



**CITY OF
TUMWATER
TREE BOARD
MEETING AGENDA**

**Online via Zoom and In Person at
Tumwater Fire Department
Headquarters, Training Room, 311 Israel
Rd. SW, Tumwater, WA 98501**

**Monday, September 08, 2025
7:00 PM**

1. Call to Order
2. Roll Call
3. Changes to Agenda
4. Approval of Minutes
 - a. August 12, 2024 Tree Board Meeting Minutes
5. Tree Board Member Reports
6. Manager's Report
7. Public Comment
8. Tree Canopy Assessment Update
9. Next Meeting Date - 11/10/2525
10. Adjourn

Meeting Information

The public are welcome to attend in person, by telephone or online via Zoom.

Watch Online

https://us02web.zoom.us/webinar/register/WN_GNQSkcv2TbO_z_k-AYbyCg

Listen by Telephone

Call (253) 215-8782, listen for the prompts and enter the Webinar ID 844 0036 8559 and Passcode 912425.

Public Comment

The public is invited to attend the hearing and offer comment. The public may register in advance for this webinar to provide comment: https://us02web.zoom.us/webinar/register/WN_GNQSkcv2TbO_z_k-AYbyCg

After registering, you will receive a confirmation email containing information about joining the webinar.

The public may also submit comments prior to the meeting by sending an email to:

AJonesWood@ci.tumwater.wa.us. Please send the comments by 1:00 p.m. on the date of the meeting.

Comments are submitted directly to the Commission/Board Members and will not be read individually into the record of the meeting.

If you have any questions, please contact Sustainability Coordinator Alyssa Jones Wood at (360) 754-4140 or AJonesWood@ci.tumwater.wa.us.

Post Meeting

Video of this meeting will be recorded and posted on our City Meeting page: <https://tumwater-wa.municodemeetings.com>.

Accommodations

The City of Tumwater takes pride in ensuring that people with disabilities are able to take part in, and benefit from, the range of public programs, services, and activities offered by the City. To request an accommodation or alternate format of communication, please contact the City's ADA Coordinator directly, call (360) 754-4129 or email ADACoordinator@ci.tumwater.wa.us. For vision or hearing impaired services, please contact the Washington State Relay Services at 7-1-1 or 1-(800)-833-6384.

What is the Tree Board?

The Tumwater Tree Board is a citizen advisory board that is appointed by and advisory to the City Council on urban forestry issues, including drafting and revising a comprehensive tree protection plan or ordinance, or any other tree matter. Actions by the Tree Board are not final decisions; they are Board recommendations to the City Council who must ultimately make the final decision. If you have any questions or suggestions on ways the Tree Board can serve you better, please contact the Community Development Department at (360) 754-4180.

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MINUTES OF HYBRID MEETING
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CONVENE: 7:00 p.m.

PRESENT: Chair Trent Grantham and Boardmembers Brent Chapman, Michael Jackson, Tanya Nozawa, Hannah Ohman, and Jim Sedore.

Excused: Brodrick Coval.

Staff: Sustainability Coordinator Alyssa Jones Wood and Senior Planner Alex Baruch

CHANGES TO AGENDA: Approval of minutes was removed from the agenda.

TREE BOARD MEMBER REPORTS: Chair Grantham announced the recent resignation of Boardmember Hannah Ohman.

COORDINATOR'S REPORT: Coordinator Jones Wood advised of Boardmember Ohman's potential replacement, who is a staff member of the Thurston Conservation District. The City received the individual's application. The Mayor is scheduling an interview of the applicant.

Coordinator Jones Wood presented a Certificate of Appreciation to Boardmember Ohman from Mayor Sullivan recognizing her service as a member of the Tree Board.

A Climate Action Workshop and Open House is scheduled on Wednesday, August 14, 2024 from 7:00 p.m. - 9:00 p.m. at the ASHHO Cultural Community Center located off Littlerock Road in Tumwater. The open house will feature different stations with staff members. An accompanying online open house will be available for approximately one month to receive feedback and perspectives from the public to assist in drafting the Climate Element. Urban forestry is interwoven in each of the three stations.

Boardmember Sedore asked whether a climate baseline was established for Tumwater. Coordinator Jones Wood said climate data will be shared at the open house and during the online open house in terms of risks anticipated in the next 50 to 100 years based on different climate hazards and projections of emissions or the reduction of emissions to meet state requirements. Another station will feature information on implementation and governance. Each station will also include conversations on environmental justice. The City has historic data for different climate hazards, such as precipitation and how often the area experiences extreme rainfall over a short duration, days of drought, and average days of extreme heat. The data was obtained over a span of several decades. The greenhouse gas emissions baseline for the City is based on the 2015 inventory completed by the Thurston Climate Action Team. New state requirements necessitate a 2022 baseline and establishment of a new goal.

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Projections on weather extremes are based on a small geographical grid within Thurston County.

Boardmember Sedore inquired about the possibility of sharing pre development and post development weather extremes with the Kingswood developer for the area of that new development. Coordinator Jones Wood advised of the availability of Tumwater data in different areas, such as the Olympia Airport, which is typically warmer than most of the City. Staff is scheduled to install data loggers on ambient air temperatures throughout the City to provide more frequent and in-depth observations and data for average ambient air temperature.

Boardmember Sedore commented that if it is possible to document the impact of climate from such a large development it could help inform the City as to whether it would be wise to promote similar development in the future. Coordinator Jones Wood replied that the ambient air temperature sensors would be installed in areas of disadvantaged communities within the City based on the availability of specific sites to affix the sensors. It speaks to the balance within the City as housing is always needed, which often includes impervious surface.

PUBLIC COMMENT:

Coordinator Jones Wood advised of several communications received from Nancy Partlow. Ms. Partlow also forwarded a video containing one of the comments. Coordinator Jones Wood played the video of the kestrel chicks nesting in the Davis Meeker oak tree.

Boardmember Chapman commented on his interest in the concept of tree infrastructure to ensure the safety of people while preserving the tree for many more years. He inquired as to the Board's interest in forwarding a recommendation to the City Council.

Coordinator Jones Wood advised of the Board's role with respect to advice to the City Council on tree-related issues. Normally, recommendations or comments on issues are forwarded when the Board is recommending changes in policy. However, she could forward a recommendation from the Board to the City Council and the City Administrator.

Boardmember Nozawa added that Ms. Partlow also requested the City Council issue an emergency stay and explore other alternatives to save the tree.

Boardmember Sedore said he understands that the Mayor has contracted with another tree assessment. Coordinator Jones Wood said the City released a request for qualifications (RFQ) and has selected an applicant. The City is negotiating the contract with the company on the scope and price for the second assessment.

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Chair Grantham reported the City received approximately six detailed proposals. One company declined to participate and thanked the City Council for notifying them of the RFQ opportunity.

Discussion ensued on the timing of the assessment and the potential timeline for a decision regarding the tree. Boardmember Sedore said he assumed that the Washington State Department of Transportation (WSDOT) would need to approve any type of infrastructure system placed over Old Highway 99 to support the tree. If such approval is required, that process could take several years.

Coordinator Jones Wood noted that the tree is located on City right-of-way.

The Board and staff discussed potential requirements to meet height regulations, jurisdictional oversight of any infrastructure measures used to support and preserve the tree, and signage placed near the tree warning of the possibility of falling limbs.

Boardmember Chapman queried members on interest in forwarding a recommendation to the City Council to explore options for preservation of the tree regardless of the outcome of the assessment as a way to protect the City from liability moving forward. Boardmember Sedore said he is not aware of any type of structure around a tree that would prevent or catch limbs if they were to fall from the tree, although there are some structural supports on the Capitol Campus to support branches. It would appear the structure would be more of a barrier or net.

Boardmember Chapman recommended encouraging the Council to explore the parameters and possibility of installing a structure regardless of the outcome of the assessment.

Boardmember Sedore offered that the tribe might be willing to sponsor the cost if designed properly to preserve the cultural importance of the tree.

Chair Grantham noted that the assessment could include the possibility of adding some cabling mechanism to prevent the loss of tree limbs.

The Board agreed to forward a recommendation following any decision by the City after completion of the tree assessment.

**CASE STUDY OF
CURRENT
PROTECTION OF
TREES AND**

Planner Baruch reviewed the topics of the overview of the City's protection of trees and vegetation codes:

- Tree removal and land clearing exemption permits

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**VEGETATION CODE
(TMC 16.08)
IMPLEMENTATION:**

- Development regulations framework
- Standards, Tree Reports
- Case Study Review
- Response to Board's prior questions

Planner Baruch outlined his education and work experience. He has been with the City of Tumwater for three years and recently attained certification as an American Institute Certified Planner.

Tree removal waivers and land clearing exemptions are typically obtained by homeowners for different reasons. Tree removal waivers are the most common. Waiver criteria are included in TMC 16.08.080 under exemptions for tree codes. The removal of not more than six trees from any parcel of land in three consecutive calendar years is allowed under the code. Staff requires applications and photos of the subject trees to document the removal of specific trees on properties to enable the City to ensure property owners are not exceeding the removal of six trees within a three-year period.

Boardmember Sedore asked whether a parcel could be of any size, such as a small lot or multiple acres. Planner Baruch affirmed parcel size can vary and can encompass multiple acres. Any tree exceeding six inches in diameter at breast height is considered a tree. Property owners are not required to state the reason for removal of a tree(s) as the ordinance allows removal of trees as long as the owner obtains a permit and does not exceed removal of six trees within the three-year period. Additionally, the City's permit system has the ability to track all parcels in the City to include all permits issued for a parcel. Any tree removed in the City requires a permit or a tree removal waiver.

Land clearing exemption permits are issued for dead, diseased, or hazardous trees following verification by the City's tree protection professional or any certified arborist or forester. The exemption requires a replacement tree for each tree removed. A parcel is designated through Thurston County with a legal description describing the property boundaries. A plat is considered a subdivision. Street trees as identified by the City's Transportation and Engineering Department include requirements for planting trees within the City's right-of-way, which can often extend beyond a paved road. Planting of street trees requires root barriers on both sides of a tree to protect adjacent infrastructure and to encourage the growth of roots in a downward direction. The size of the root barrier is dependent upon the size of the landscape strip. The City ensures the right species of trees are planted as street trees.

Several examples of other types of land clearing exemptions include land clearing in an emergency with replacement tree(s) planted after the

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situation has been resolved or land clearing required as part of a public project within the public right-of-way while maintaining the 1:1 replacement ratio. The size of a replacement tree is a tree with a 2-inch caliper six inches above the root ball or a 6-foot evergreen. Several instances in the recent past have received discretion whereby staff worked with a homeowner association arborist and received an arborist report for the entire subdivision identifying hazards caused by street trees growing into the sidewalk. Property owners were authorized to use the overarching report rather than securing a separate report for each tree. Another recent situation involved a subdivision experiencing compromised waterline issues caused by tree roots. The trees were initially planted in small front yards under a required landscape tree plan for each home. The subdivision, as a whole, has a sufficient number of trees that were planted as part of the landscape plan, as well as retained trees surrounding a wetland for the development. Staff determined that the subdivision had planted more than the required number of trees and subsequently did not require replacement trees in front of each home to avoid future encroachment of waterlines by tree roots. Staff members work with applicants to resolve those types of issues. It is an important development tool to enable the City to achieve its densities or to accommodate growth within the City.

Boardmember Sedore inquired about the possibility of the Tree Board receiving an annual report on the number of exemptions and the number of tree removals to assess potential trends occurring in the City. Planner Baruch acknowledged the request.

Boardmember Chapman acknowledged the exemptions, waivers, and variances within the code that are utilized under specific and unique applications; however, the code should include some definitions as to the differences between the various applications.

Planner Baruch commented on the requirement by the City to update the Comprehensive Plan by the end of 2025. Applicable city and counties are required to undergo planning with counties allocating a specific amount of housing to each jurisdiction for future planning. Future housing needs are essentially divided among all the jurisdictions with each city and county required to plan to meet the higher housing requirements. The City of Olympia led the region in allowing middle housing types in single-family housing developments.

Boardmember Chapman inquired as to whether native trees that are removed are replaced with similar native trees. Planner Baruch said staff encourages native tree replanting.

Boardmember Chapman asked whether the consultant is reviewing all tree codes. Coordinator Jones Wood explained that the review has been paused until the City fills the Urban Forester position. Staff drafted an ordinance

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based on the previous reviews and community engagement, as well as during the reviews with the Tree Board last year.

Discussion followed on code requirements for planting of the 5% tree track. Planner Baruch explained that as long as the developer meets the tree standard, a 5% tree track is not required. It only applies when a developer is approved for a modification or a waiver. Then a 5% tree tract is required of the developed property.

If the developer cannot meet replanting standards within the development, the developer can provide a cash payment of \$400 per tree to the City's Tree Fund.

Boardmember Sedore asked whether the City has ever denied a developer's request. Planner Baruch advised that applicants have been able to achieve the requirements through different methods. Development regulations are the parameters and the City lacks the authority to require any developer to reduce density or increase density as long as the proposal aligns with the requirements of the ordinance. In a situation whereby a parcel of land to be developed does not meet the retention standard in an undeveloped state, the requirement is 12 trees per acre. If the property contains only eight trees, the development does not meet the required amount. In many instances, more trees are planted as part of landscaping requirements creating more trees prior to development of the parcel.

Planner Baruch reviewed case studies of the Belmont Flats and Yorkshire developments located south of Israel Road off Tyee Drive.

Belmont Flats Tree Report: 626 apartment units and 27,500 square feet of commercial space. Summary of tree retention calculations:

Gross acreage is 15.18 acres with 1.12 acres of dedicated right-of-way. The City required retention of 12 trees per acre. The proposed retention is 32 trees; however, the developer had a shortfall of 137 trees requiring the replanting of 411 trees as part of the proposed development. A majority of the 32 trees are located within the 5% tree tract. The priority of replanting is within the 5% tree tract as long as spacing is available and appropriate. The remaining trees are distributed throughout the site through landscape code requirements and parking requirements. A forester/arborist creates a plan for replanting the 5% tree tract to ensure appropriate spacing based on tree species.

Yorkshire Tree Report: 1,150 apartment units, 9,000 square feet of commercial and a 324-unit self-storage facility. Total impervious surface is 73% of the property. Maximum impervious surface is 85% of the property with a zoning density of 53 units per acre (no maximum). Required replanting totaled 645 trees throughout the property. The

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developer is required to prioritize planting in the tree tract. Once the tree tract is appropriately planted, the remaining trees will be planted throughout the property as part of landscaping for the development.

Discussion ensued on the displacement of wildlife and the possibility of creating wildlife corridors. City developments continue to segment existing wildlife corridors making it impossible for animals to migrate safely across the region.

Boardmember Sedore pointed out the option of the City considering the location of retained trees to help create wildlife corridors. Planner Baruch responded that when there are existing opportunities such as wetland buffers and other connected areas where development is not possible, connectivity can be preserved. However, it could be possible to create more connectivity through the City's development regulations.

Coordinator Jones Wood added that many species of wildlife have adapted to living in urban conditions. For example, more deer live in the urban area than previously because of the reduction in predators. Other species are adapting and are surviving in an urban environment while insects may suffer, which speaks to the importance of planting native plants and different species of trees. She offered to invite WSDOT staff members who work on habitat corridors and wildlife crossings to brief the Board on recent efforts in the state.

Planner Baruch reported that the 20% or 12 trees per acre was waived for both developments because compliance could not be achieved because of the necessity of complying with applicable zoning and development requirements including, but not limited to, residential densities, open space requirements for active recreation, floor area ratios, parking requirements, stormwater requirements, and street construction requirements, etc.

Planner Baruch reviewed the parking requirements for each development.

Planner Baruch referred to the Kingswood Apartments project. In situations where a parcel of land to be developed does not meet the tree retention standards in an undeveloped state, the applicant is required to meet applicable standards at a 1:1 ratio as a condition of project approval.

Code variances are approved or denied by the City's Hearing Examiner. Modifications and waivers are imbedded in the code as administrative allowances as long as the applicant satisfies specific criteria.

Planner Baruch reviewed and responded to previous questions from members:

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- How many land clearing exemptions have been applied for in the last three years? Land clearing exemption applications in 2021 totaled 16, 17 in 2022, 28 in 2023, and 25 in 2024 year-to-date.
- What advice could the Board offer to the City for specific changes to the tree protection codes to retain more trees for each development project to meet the City's tree canopy goals? The addition of the City's Urban Forester will provide in-house expertise to address questions during development reviews of applications, as well as making in-roads with the community regarding tree removal and land clearing exemption permits. Other suggestions could include requiring native plants for landscaping in new developments or removing the ability to use storm facilities for active open space during the dry season.
- What are the parking stalls marked "C" on the map? They are compact car spaces.
- Has the City ever fined a contractor for removing more trees than the Tumwater Municipal Code allows? Several fines were issued by the previous planner for several instances; however, documentation on the details could not be located.
- Why does the City allow contractors to remove mature Western cedar and suggest they replant with Western cedar? In those instances where trees need to be cleared to develop a property to the highest and best use within City limits, the arborist recommends replacing the mature trees with native trees. The City has the ability to require native trees to be replanted in the tree tract but lacks the ability in other areas of the development.
- What percentage of land development applications over the past two years were in the category on not meeting the 5% tree protection open space? The 5% tree protection area is only required if the development cannot retain 20% of the trees on the site or 12 trees per acre. All of the developments that request a waiver from the standards are required to set aside 5% of the developable land for a tree tract.
- Were any code variances granted for any of the projects? If so, what were they and how were they? Variances required approval through the Hearing Examiner. No variances have been applied for tree related code requirements over the past three years based on a records review.

The Board expressed appreciation for the presentation and the information shared. Planner Baruch commented on the feedback he and other staff receive through the public engagement process, from Tree Board meetings, and the Comprehensive Plan update process. Feedback is conveyed to staff experts. Staff plans to continue working on the tree and vegetation protection codes to implement best practices. He expressed appreciation for the Board's feedback and expertise.

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NEXT MEETING: The next meeting is scheduled on September 9, 2024 as a field tour with stops at the Sapp Road Park and the future Operations and Maintenance Facility and park. Departure from City Hall is scheduled at 6 p.m.

ADJOURNMENT: **With there being no further business, Chair Grantham adjourned the meeting at 9:12 p.m.**

Prepared by Valerie L. Gow, Recording Secretary/President
Puget Sound Meeting Services, psmsoly@earthlink.net

TO: Tree Board
FROM: Alyssa Jones Wood, Sustainability Manager
DATE: September 8, 2025
SUBJECT: Tree Canopy Assessment Update

1) Recommended Action:

Receive a briefing from City GIS staff and discuss.

2) Background:

The City Council adopted the Urban Forestry Management Plan (UFMP) on March 2, 2021, by Ordinance No. 2020-004. The UFMP includes the following action relevant to this item:

Objective 1.1 Action A. Establish tree-canopy cover targets for the City and its neighborhoods to increase canopy cover in appropriate areas, taking into account land uses established by the *Comprehensive Plan*, community desires, tree functions, climate, and ecosystems.

3) Alternatives:

☐ No alternatives suggested.

4) Attachments:

A. 2025 Tree Canopy Cover Assessment Staff Report

STAFF REPORT

Date: September 8, 2025

To: Tree Board

From: Alyssa Jones Wood, Sustainability Manager



2025 Tree Canopy Cover Assessment

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1. Introduction

The Tumwater City Council adopted the Urban Forestry Management Plan (UFMP) on March 2, 2021, by Ordinance No. 2020-004. As part of the development of the UFMP, City GIS¹ staff completed a baseline tree canopy assessment in 2020 which is included as Appendix A of the UFMP. The evaluation of “canopy cover” in the UFMP is intended to allow the City to use change in canopy cover over time as a way to measure the performance of City policies and regulations on the City’s urban forest over the 20-year scope of the plan. The term “canopy cover”

Table 1. 2040 Tree Canopy Cover Goals per Land Use Type.

Land Use Type	2040 Tree Canopy Cover Goal in UFMP
Industrial	25%
City Core Mixed Use	25%
Other Mixed Use	25%
General Commercial	30%
Single-Family Residential	50%
Multifamily Residential	40%
Open Space & Green Belt	55%
Port of Olympia – Olympia Regional Airport	3%
Port of Olympia- Industry	25%
Tumwater + Urban Growth Area	39%

¹ Geographic Information Systems.

means the area in the City and its urban growth area currently covered by a tree and vegetation canopy made up of street trees, areas of native forest, and trees in parks, green space, and landscaping on private property. Canopy cover usually is expressed as a percentage of the total area of the City and its urban growth area covered by tree and vegetation canopy or as a percentage of the area of individual zone districts grouped into larger general land use categories covered by tree and vegetation canopy.

Because each zone district has different policies and regulations governing the type and intensity of development, the UFMP identified different canopy cover targets for its larger general land use categories (Table 1). These tree canopy targets by land use type is intended to allow the City to meet a range of legislative and strategic policies, by establishing different canopy cover goals for the different zone districts in the City. The canopy cover targets by zone district are intended to be used as a measure of the progress of the UFMP. In addition, the canopy cover targets will be used to provide policy guidance for Tumwater Municipal Code amendments address street trees, the protection of trees and vegetation, and landscaping. In turn, these regulations will establish the minimum requirements and standards for development and redevelopment of individual properties in the City as they relate to the urban and community forest.

Objective 1.1, Action A of the City Council Adopted UFMP includes a monitoring action to measure tree canopy cover every five years.

Goal 1. Restore and enhance the community and urban forest.

Objective 1.1. Increase canopy cover in the City to expand the community and urban forest.

Action A. Establish tree-canopy cover targets for the City and its neighborhoods to increase canopy cover in appropriate areas, taking into account land uses established by the *Comprehensive Plan*, community desires, tree functions, climate, and ecosystems.

Priority	Leads [Primary (P) & Secondary (S)]	Timing	Monitoring Action
#1 ✓	Community Development (P) Public Works (P) Tree Board (S)	Review every five years based on City cycle for acquiring updated LiDAR or equivalent	Measure Tree canopy cover (Percentage of total City land covered by tree canopy and percentage of land use designation and/or neighborhoods covered by tree canopy every five years) Plan includes targets in Chapter 2, Table 5 <i>Canopy Cover Targets by Land Use Designation</i> based on 2018 Plan development work

The intent of this agenda item is to review the updated tree canopy cover assessment and assess changes against both the baseline year data and the tree canopy cover goals established in the UFMP.

2. Methodology

The City of Tumwater’s GIS Team has determined that the Support Vector Machines (SVM) classification method is best suited to classify tree canopy cover within the City. SVM classification is a supervised, high-level machine learning classification method that uses kernel functions and hyperplanes to classify data. [Please click here to learn more about SVM.](#)

This analysis is completed using ArcGIS Pro with the following tools: [The Image Classification Wizard](#), [Segment an Image](#), and [Create Accuracy Assessment Points](#).

There are several steps to a Tree Canopy Cover analysis:

1. Create a segmented image.
2. Create training samples
3. Train the classifier
4. Add additional training samples and retrain the classifier (repeat as much as necessary)
5. Create final classification
6. Create accuracy assessment points
7. Compute confusion matrix
8. Determine accuracy
9. Export raster to polygons
10. Compute tree canopy cover by zoning

To complete this analysis, the GIS Team used 19-inch 3-band Maxar imagery that was captured on April 14, 2025.

First, the GIS Team created a segmented raster from the original aerial photo. Segmenting smooths and groups like-pixels together to create an almost “animated” looking raster. They used the following values to create our segmented raster:

Spectral Detail	Spatial Detail	Minimum Segment Size (Pixels)
18.5	19	20

Spectral Detail: Spectral detail is used to distinguish between features that have similar spectral characteristics. For our analysis, we needed to distinguish between grass and deciduous trees and between shadows and fir trees.

Spatial Detail: Spatial detail determines the importance of space between features. A higher value is used when features are small and close together. In this analysis, trees were clustered around pockets of development or next to roads.

Minimum Segment Size: Segments smaller than the designated segment size are grouped with the best fitting neighboring segment.

Next, they then created 30+ training samples for each of the following classes:

Class Name	Class Value
Tree Canopy Cover	1
Non-canopy Vegetation	2
Soil and Dry Vegetation	3
Buildings	4
Other Impervious	5
Water	6

More training samples create a higher statistical significance when classifying, thus, they ensured that the Tree Canopy Cover class had the highest percentage of samples (70-80% of samples). Creating training samples can take several hours to several days, depending on how many times the model needs to be trained.

The GIS Team trained the SVM classifier using supervised, object-based classification. They generated the classification schema from their training samples and used the segmented image as an additional input to the tool. The segmented image helps the classifier recognize like-groups of pixels more easily. This process takes varying amounts of time depending on the resolution of the image. For this process, training took 10 minutes on average. Training the classifier is an iterative process that involves adding additional training samples and re-running the trainer. For this aerial imagery, the classifier was trained approximately 12 times. Each “retraining”, which involved adding additional training samples and, for several classified images, completing an accuracy assessment, of the classifier took three to six hours in total.

Then, they ran the SVM classifier using the default sample size per class but adding on four segment attributes: active chromaticity color, mean digital number, standard deviation, and count of pixels. These attributes provide additional information about each class (tree canopy cover, water, buildings, etc.). Classification took about 10-15 minutes on average but can take much longer.

When classification was complete, they created 250 equalized stratified random Accuracy Assessment Points using the 'Classified' value from the classified raster. Then they determined the 'ground truth' value for each point. With this information, they were able to populate a Confusion Matrix to compute various statistics (precision, commission, error of omission, Kappa, etc.) and the accuracy of the classifier.

For 2025, the classifier was 97% accurate at identifying tree canopy cover.

Next, they exported the rasters to polygons. The export process takes about 10 to 30 minutes on average but can take much longer depending on the size of the raster. When the export was complete, they exported Tree Canopy Cover to its own feature class. Using the 'Union' tool, they combined Tree Canopy Cover, and Zoning categories. This enabled us to compute the amount of tree canopy cover by zoning type and land status.

3. Results

Land Use Type	2020 Total Acres	2025 Total Acres	2020 Canopy Acres	2025 Canopy Acres	2020 Percent Canopy	2025 Percent Canopy	2040 Tree Canopy Cover Goal in UFMP
Industrial	2,445.73	2,529.02	771.29	778.66	32%	31%	25%
City Core Mixed Use	525.78	527.28	143.22	119.15	27%	23%	25%
Other Mixed Use	138.40	141.69	41.46	44.29	30%	31%	25%
General Commercial	733.64	642.60	301.96	214.25	41%	33%	30%
Single-Family Residential	6,306.41	6,320.08	3,253.21	2,876.53	52%	46%	50%
Multifamily Residential	813.61	816.13	328.02	312.55	40%	38%	40%
Open Space & Green Belt	1,472.12	1,487.45	714.10	647.75	49%	44%	55%
Port of Olympia – Olympia Regional Airport	807.59	805.85	24	27.30	3%	3%	3%
Port of Olympia- Industry	688.41	688.93	282.02	278.45	41%	40%	25%
Tumwater + Urban Growth Area	13,931.69	13,959.03	5,859.28	5,298.92	49%	38%	39%

	Acres	Canopy Acres	Percent Canopy Cover	2040 Tree Canopy Goal in UFMP
City Limits	1,1377.692	3,935.558	34.59%	-
Urban Growth Area	2,729.25	1,477.716	54.14%	-
City Limits and Urban Growth Area	14,317.677	5,413.318	37.81%	39%

4. Discussion

The Tree Board is encouraged to discuss these results.

Please note that in the next cycle of tree canopy assessment (2030), some City Land Use designations and their acreage may change with the adoption of the 2025 Comprehensive Plan. Visit the City 2025 Comprehensive Plan Periodic Update to learn more about changes proposed: [2025 Comprehensive Plan Update | City of Tumwater, WA](#).