CITY OF SNOQUALMIE

URBAN TREE CANOPY ASSESSMENT

SNOQUALMIE, WASHINGTON

DECEMBER 2024

PlanIT Geo™ developers of TreePlotter

earthdefine

TREE CANOPY ASSESSMENT

SNOQUALMIE, WA

The true meaning of life is to plant trees, under whose shade you do not expect to sit.

- Nelson Henderson

PREPARED BY

PlanIT Geo, Inc., Wheat Ridge, Colorado

PREPARED FOR

The City of Snoqualmie

COMPLETED

December 2024

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2,483
ACRES OF CANOPY

52%
OF SNOQUALMIE'S LAND AREA WAS COVERED WITH CANOPY IN 2023

EXECUTIVE SUMMARY

BACKGROUND OF THIS ANALYSIS

Urban tree canopies are in perpetual motion. New tree plantings and existing tree growth add canopy, while development, natural disasters, disease, and pests take it away. These changes can be hard to gauge from the ground, but tree canopy change can be precisely tracked by analyzing aerial imagery from the past and present. This assessment evaluated urban tree canopy (UTC), possible planting area (PPA), and tree canopy change from 2015 to 2023 within the City of Snoqualmie, located just east of Seattle in King County, Washington.

Snoqualmie has been designated as a Tree City USA for 14 years and has received the Growth Award from the Arbor Day Foundation for 10 years. The urban forest is an invaluable asset for the City of Snoqualmie, providing residents and visitors with meaningful, quantifiable environmental, social, and economic benefits. This assessment can be used for data-driven decision-making by city officials. Current canopy goals, policies, ordinances, management practices, and priorities can be amended based on the results provided herein. By highlighting areas where current efforts are working well, but also areas where improvement is needed, this assessment serves as a strategic compass for future planning efforts.

PROJECT METHODOLOGY

The results, based on 2023 imagery from the USDA's National Agriculture Imagery Program (NAIP), provide a near-current look at land cover in Snoqualmie and will allow the area to revise existing and develop new strategies to protect and expand the urban forest. This study utilized modern machine learning techniques to create land cover data that are reproducible and allow for a more uniform comparison in future tree canopy and land cover assessments. **This assessment report will follow the standards established by the US Forest Service and report tree canopy metrics as a percentage of the land area (excluding water bodies) unless stated otherwise.**

SNOQUALMIE'S URBAN FOREST

In 2023, Snoqualmie's full Area of Interest (AOI), which includes city limits plus city-owned forested parcels outside of the city boundary, excluding bodies of water, had 52% of its land covered with urban tree canopy and 22% available for potential planting. The remaining 26% of the land area was deemed unsuitable for planting without substantial land modification. Snoqualmie's total area within the AOI, including surface water, comprises 51% tree canopy, 24% other vegetation, 20% impervious surfaces, 3% water, 2% shrubs, and 1% soil or dry vegetation. The terms "City of Snoqualmie" and "the city" will refer to the comprehensive boundary previously outlined unless otherwise stated.

Census-designated urban areas within Snoqualmie account for 56% of the area and have 42% urban tree canopy cover, compared to non-urban areas that have 62% tree canopy. Of the 19 zoning types within Snoqualmie, Mixed-Use and Open Space 1 zoned areas together contribute 67% of all canopy in Snoqualmie city limits (excluding the forested parcels outside of city limits). Eight out of fourteen census block groups fall above Snoqualmie's average canopy cover (52%). Over half (53%) of all of Snoqualmie's canopy can be found within three block groups.

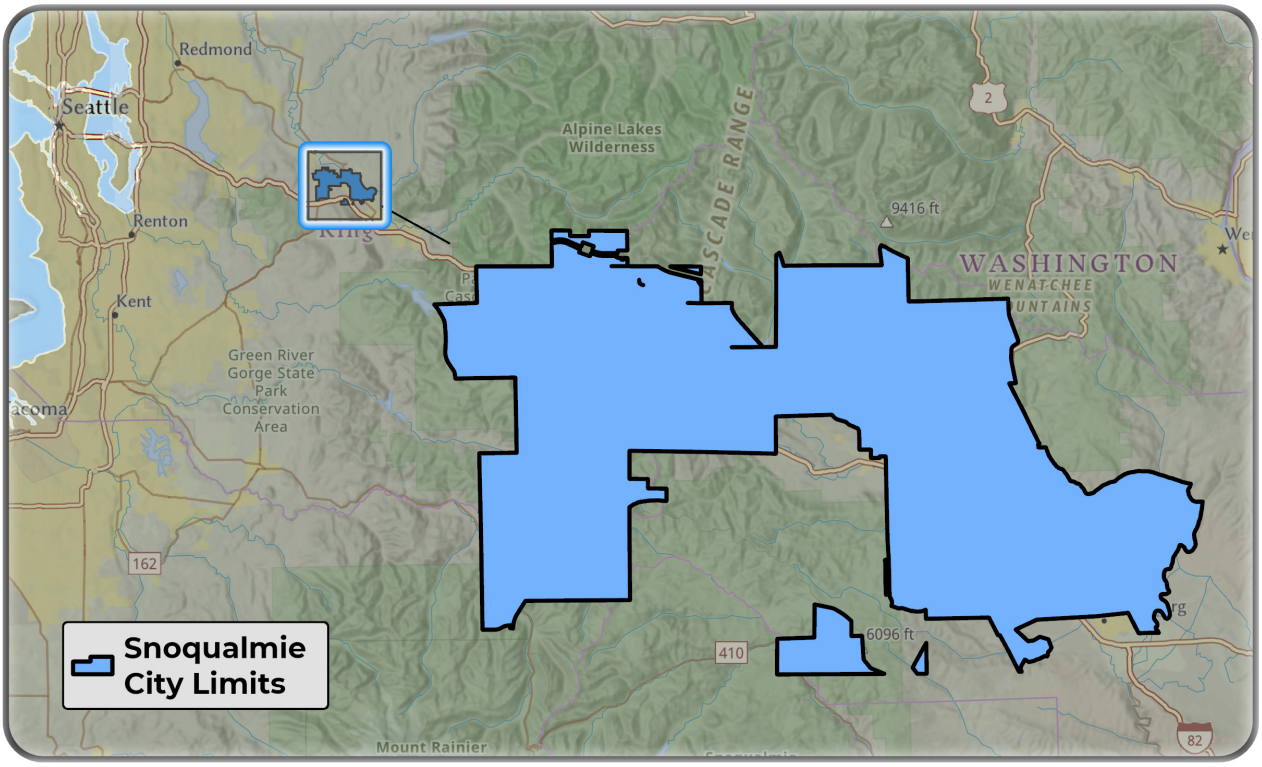


Figure 1. | The City of Snoqualmie and city-owned forested parcels occupy approximately 7 square miles and is located just east of Seattle in King County, Washington.

RECOMMENDATIONS

This analysis supports the development of a strategy for preserving and enhancing Snoqualmie's urban forest. Snoqualmie currently boasts an impressive 52% canopy cover within its city boundaries, equating to 2,483 acres of tree canopy. Rather than striving solely for maximum coverage, the emphasis can be placed on sustaining this canopy and optimizing opportunities for targeted growth where it's most needed.

Four specific census block groups stand out, with both the lowest tree canopy and the highest potential for planting, together encompassing 553 acres of plantable space across public and private lands. These areas also face socioeconomic challenges, making them prime candidates for focused tree planting efforts to foster environmental equity. By partnering with private landowners and community organizations and implementing outreach and education programs, the City of Snoqualmie can strategically plant native trees to enhance urban cooling and quality of life. More information about these targeted areas can be found on Page 19.

This report provides urban tree canopy, possible planting area, and urban tree canopy change metrics to help guide these efforts, ensuring that Snoqualmie's urban forest is managed thoughtfully to sustain its benefits for future generations.

52% URBAN TREE CANOPY

22% POSSIBLE PLANTING AREA

20% IMPERVIOUS SURFACE

Figure 2. | Based on an analysis of 2023 high-resolution imagery

PROJECT

METHODOLOGY

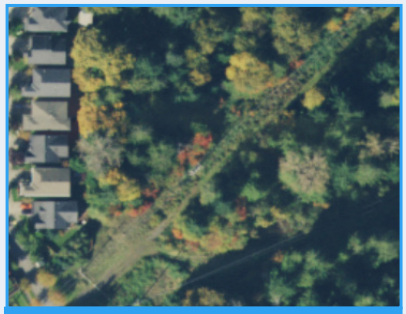
Land cover, urban tree canopy, and possible planting areas were mapped using the sources and methods described below. These data sets provide the foundation for the metrics reported at the selected geographic assessment scales.

DATA SOURCES

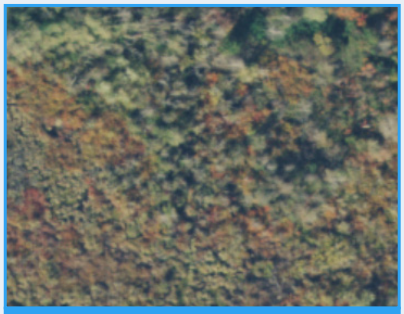
This assessment utilized high-resolution (60-centimeter) multi-spectral imagery from the U.S. Department of Agriculture's National Agriculture Imagery Program (NAIP) collected in 2023 to derive the land cover data set. The NAIP imagery was used to classify all types of land cover. For canopy change analysis, 1-meter resolution data was collected in 2015 to classify the historical tree canopy.

MAPPING LAND COVER

The land cover data set is the most fundamental component of a tree canopy assessment. Tree canopy and land cover data from the EarthDefine US Tree Map (https://www.earthdefine.com/treemap/) provided a six-class land cover data set. The US Tree Map is produced using a modern machine-learning technique to extract tree canopy cover and other land cover types from the latest available 2023 and 2015 NAIP imagery. These six classes are shown in Figure 3.



URBAN TREE CANOPY



SHRUB

OTHER VEGETATION

SOIL AND DRY VEGETATION

IMPERVIOUS SURFACES

SURFACE WATER

Figure 3. | Six (6) distinct land cover classes were identified in the 2024 tree canopy assessment: urban tree canopy, shrubs, other vegetation, bare soil and dry vegetation, impervious surfaces, and water.

IDENTIFYING POSSIBLE PLANTING AREAS AND UNSUITABLE AREAS FOR PLANTING

In addition to quantifying the City of Snoqualmie's existing tree canopy cover, areas where trees can be planted (PPA-Possible Planting Area) were also identified. To assess this, all land area in Snoqualmie that was not currently tree canopy was classified as either possible planting area (PPA) or unsuitable for Planting.

Possible planting areas were derived from the shrubs and other vegetation land cover classes. Unsuitable areas or areas where it was not feasible to plant trees (e.g. recreation fields, utility corridors, stormwater facilities, etc.) were manually delineated and overlaid with the existing land cover data set (Figure 4). The final results were reported as PPA Vegetation, Unsuitable Impervious, Unsuitable Vegetation, Unsuitable Soil, and Water.

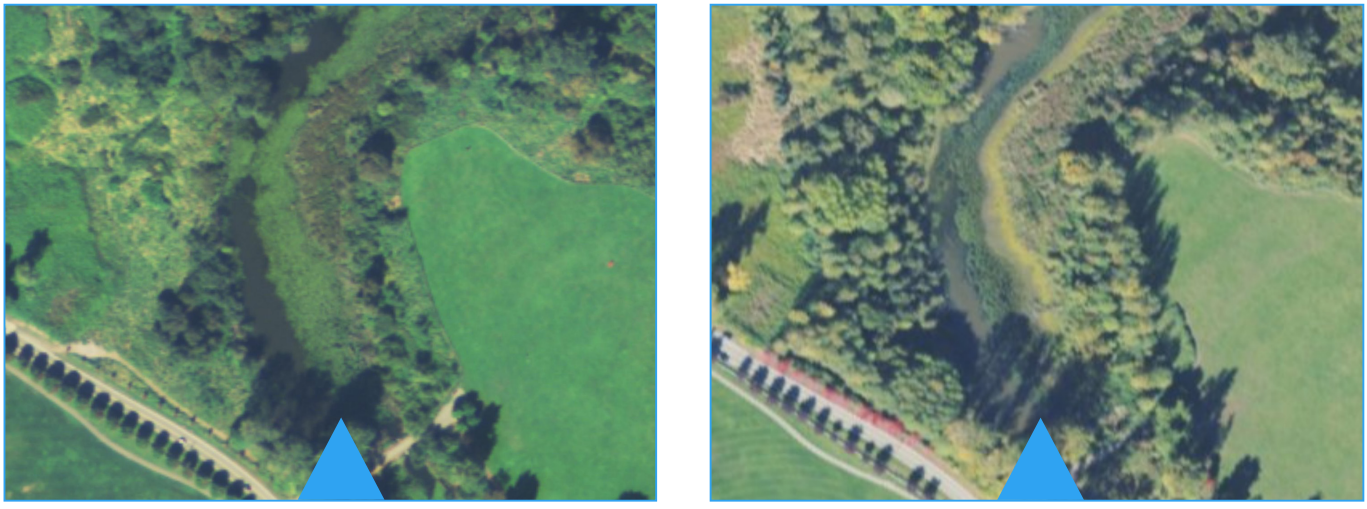
Figure 4. | Vegetated areas where it would be feasible for tree plantings but undesirable based on their current usage (left) were delineated in the data as "Unsuitable" (right). These spaces primarily consisted of recreational sports fields, utility corridors, and golf course fairways.

IDENTIFYING TREE CANOPY CHANGE

Tree canopy change was identified by comparing imagery captured from multiple years (2015 and 2023). The figures below provide examples of canopy loss and canopy gain.

2015 2023

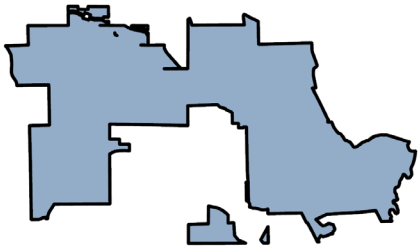
Figure 5. | The development of Panorama Apartments just north of the Snoqualmie Valley Hospital caused a loss of canopy from 2015 (left) to 2023 (right).



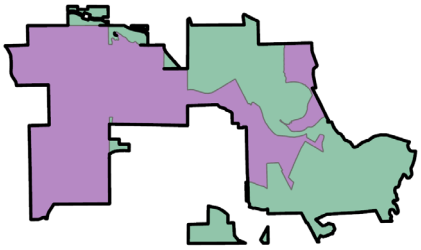
2015 2023

Figure 6. | Maturing trees added canopy in this riparian area adjacent to the Three Forks Off Leash Dog Park between 2015 (left) to 2023 (right).

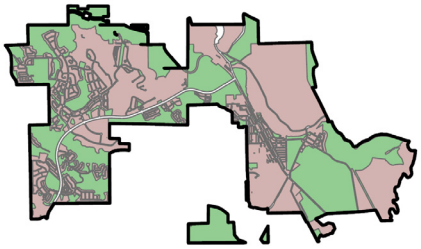
ASSESSMENT GEOGRAPHIES



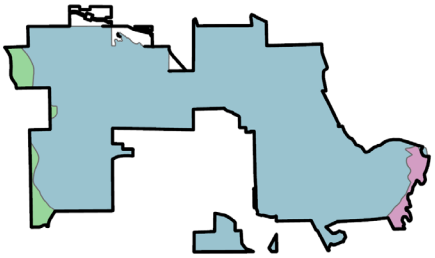
SNOQUALMIE AOI - The Area of Interest is defined as Snoqualmie city limits boundary with the inclusion of city-owned forested parcels outside of city limits.



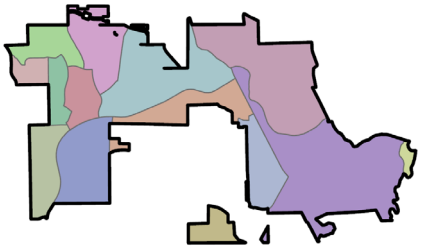
URBAN VS. NON-URBAN AREAS - As defined by the U.S. Census Bureau, these two (2) boundaries were assessed to understand how urban forest metrics differ between predominately urban areas and areas that are categorized as less urban.



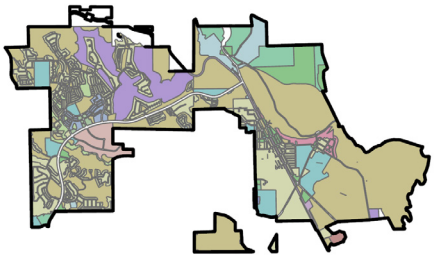
PRIVATE VS. PUBLIC PROPERTY- Two (2) land ownership types were analyzed to determine how tree canopy differs on land owned by public vs. private entities.



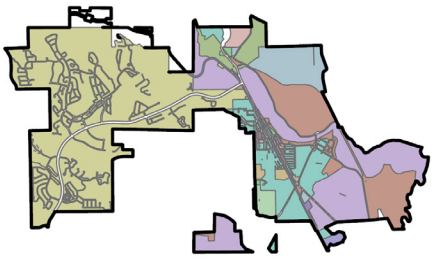
WATERSHEDS- Because trees play an important role in stormwater management, three (3) watersheds were assessed.



CENSUS BLOCK GROUPS- Fourteen (14) census block groups were assessed to show relationships between canopy and sociodemographic factors, and highlight potential environmental justice issues



LAND USE- Sixteen (16) land use classes were assessed to review the extent to which human interactions caused changes in the city's structure, pattern, and function of natural ecosystems.



ZONING - Tree canopy was assessed on seventeen (17) permitted zoning classes to identify any relationships between the city's zoned areasand tree canopy cover.

Figure 7. | Seven (7) distinct geographic boundaries were explored in this analysis: full AOI (Snoqualmie's City limits plus city-owned forested parcels), urban vs non-urban areas, private vs public property, watersheds, census black groups, land use, and zoning.

STATE OF THE CANOPY AND KEY FINDINGS

The assessment results can be used to design a strategic approach to identifying existing canopy and future planting areas. Land cover and distribution of existing and potential urban tree canopy maps presented below show an area of interest slightly larger than the City of Snoqualmie's current city limits. The full AOI comprises the Snoqualmie city limits boundary, along with city-owned forested parcels outside of this boundary, which contribute an additional 533 acres.

In 2023, the city's land cover consisted of 51% tree canopy, 24% other vegetation, 20% impervious surfaces, 3% water, 2% shrubs, and 1% soil or dry vegetation.

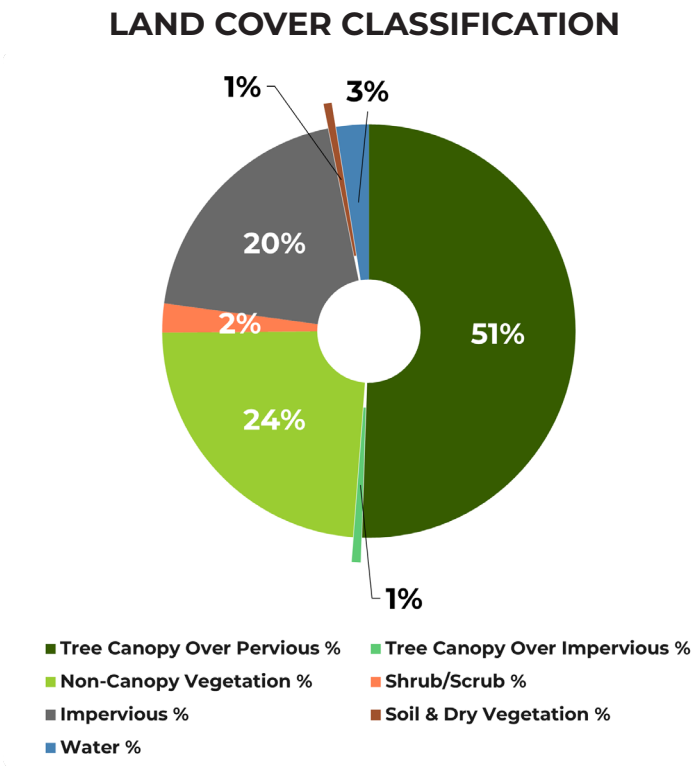


Figure 8. | Land cover classification results (percentages based on total area of Snoqualmie's full AOI including water bodies).

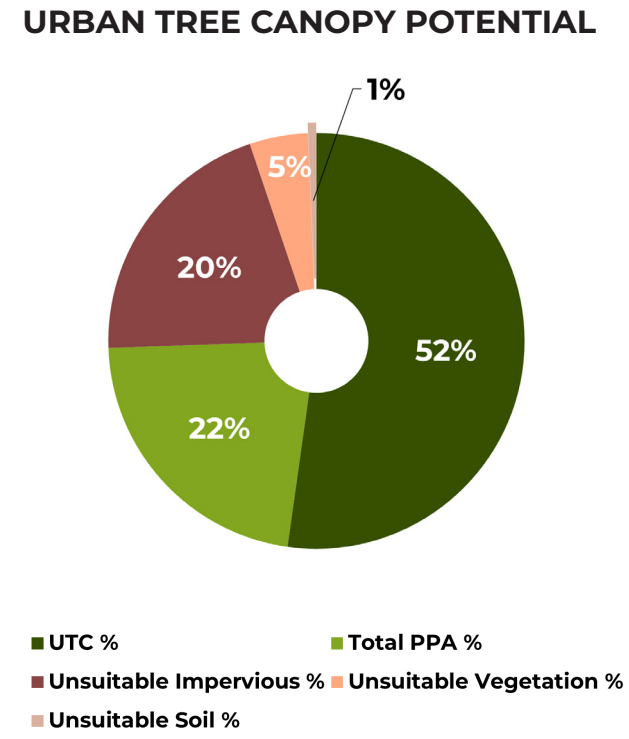


Figure 9. | Tree canopy, possible planting area, and area unsuitable (impervious, soil, vegetation) for tree canopy throughout the full AOI.

CITY-WIDE TREE CANOPY COVER

This urban tree canopy assessment utilized the land cover data as a foundation to determine tree canopy cover and possible planting areas throughout the City of Snoqualmie. Results of this study indicate that within the city, 2,483 acres are covered with urban tree canopy, making up 52% of the city's 4,755 land acres; 1,058 acres are covered with other vegetation where it would be possible to plant trees, making up 22% of the city; and the other 1,214 acres were considered unsuitable for tree planting, making up 26% of the city. Impervious surfaces made up 80% (or 967 acres) of total unsuitable areas.

Figure 10. | Distribution of land cover classes throughout the City of Snoqualmie including city-owned forested parcels (full AOI).

CANOPY AND IMPERVIOUS SURFACES

The city's 2,483 acres of urban tree canopy were further divided into subcategories based on whether the canopy was overhanging pervious or impervious surfaces. Tree canopy overhanging an impervious surface offers many ecological advantages such as localized cooling through shading and increased storm-water absorption. Results indicated that Snoqualmie's UTC was predominantly overhanging pervious surfaces at 99%, while only 1% was overhanging impervious surfaces. Planting trees in rights-of-ways, along streets and sidewalks, and in other public areas, as well as strengthening ordinances for planting around parking lots in new developments can help to offset the negative effects of impervious surfaces.

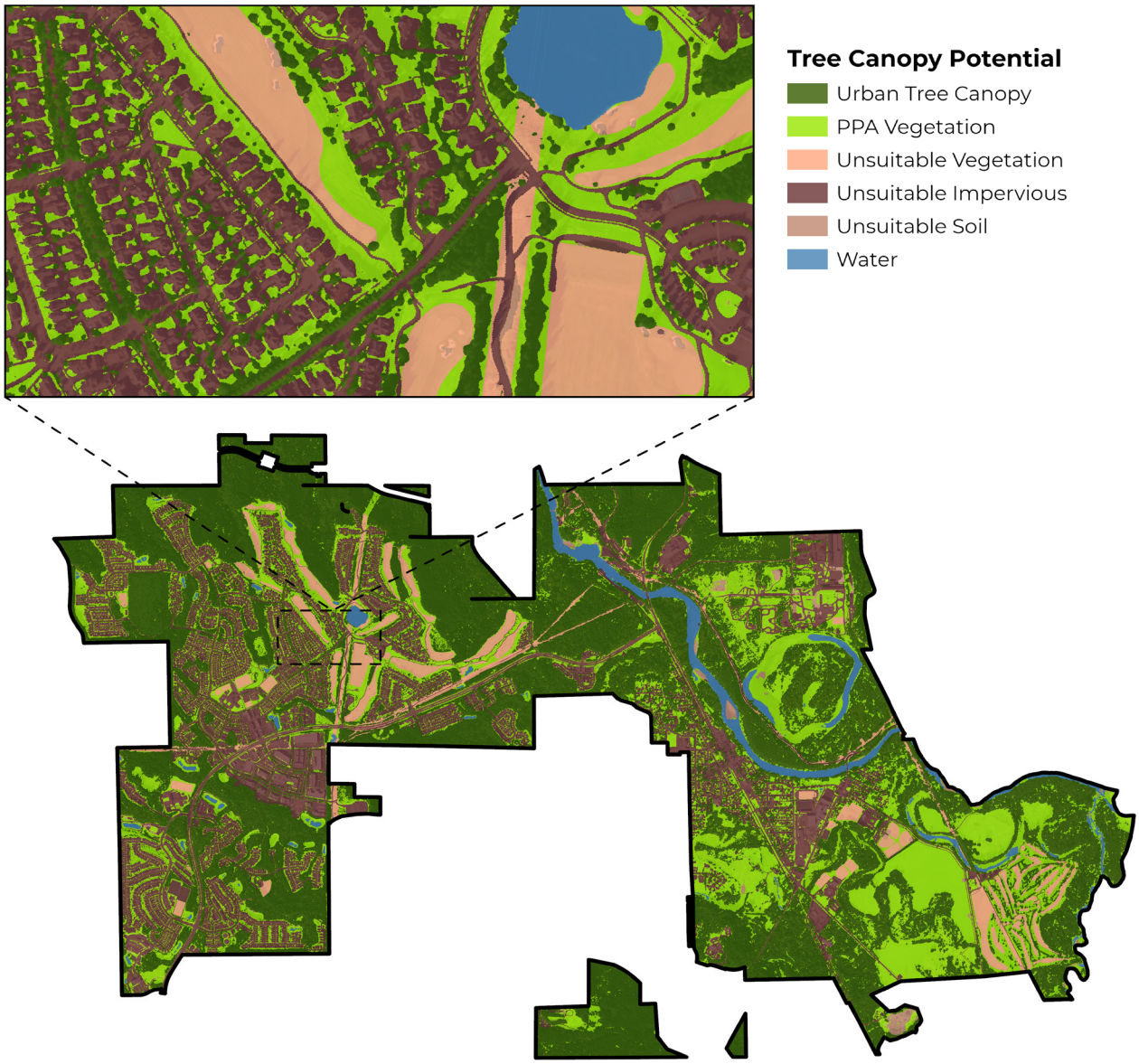


Figure 11. | Distribution of UTC, possible planting area, and areas unsuitable for UTC within the full AOI.

CITY-WIDE TREE CANOPY CHANGE

Over the 8-year study period, Snoqualmie's tree canopy increased slightly. Within the full AOI, tree canopy increased by 67 acres, a 1.4% absolute increase from 2015 to 2023. While it's likely that the canopy coverage fluctuated over the past eight years, this assessment provides a snapshot of the canopy at the time the imagery was collected. Instances of canopy growth can be attributed to the growth of existing tree canopy, tree plantings, and natural regeneration through seed dispersal. Generally, most large losses of canopy can be traced back to vacant lots being cleared for developments.

Between 2015 and 2023, the City of Snoqualmie **gained 67 acres (+1.4%) of tree canopy**

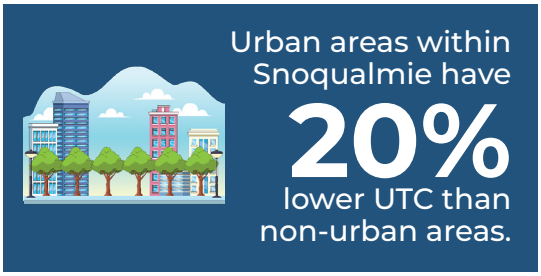
TREE CANOPY COVER BY URBAN VS NON-URBAN AREAS

Urban areas, as defined by the Census Bureau, are regions with concentrated populations, characterized by higher-density development and more intensive land use. In contrast, non-urban areas, or rural areas, are sparsely populated, featuring lower-density housing, more open spaces, and typically less infrastructure. Looking at the division of urban and non-urban areas in Snoqualmie, urban areas make up 56% of the land distribution while non-urban areas make up 44% of the land distribution within the Snoqualmie AOI.

Although non-urban areas make up less of the land within the AOI, they contribute 53% of the total urban tree canopy, with an impressive average canopy coverage of 62% compared to 42% in urban areas. Non-urban areas also contain 539 acres (26%) of potential planting space. However, certain land uses, such as agriculture, may limit tree planting opportunities there. In contrast, urban areas, which have 519 acres (19%) of available planting land, present a strategic opportunity for planting and maintenance efforts. With 31% of urban land covered by impervious surfaces, expanding the urban tree canopy could help mitigate the environmental impacts of these surfaces, enhancing stormwater management, cooling, and air quality within the urban landscape.

URBAN VS. NON-URBAN AREAS TREE CANOPY CHANGE

Over the 8-year study period, both urban and non-urban areas experienced increases in canopy cover. Non-urban areas gained 25 acres of canopy, reflecting a 1% net increase, while urban areas saw a gain of 42 acres, marking a 2% net increase.



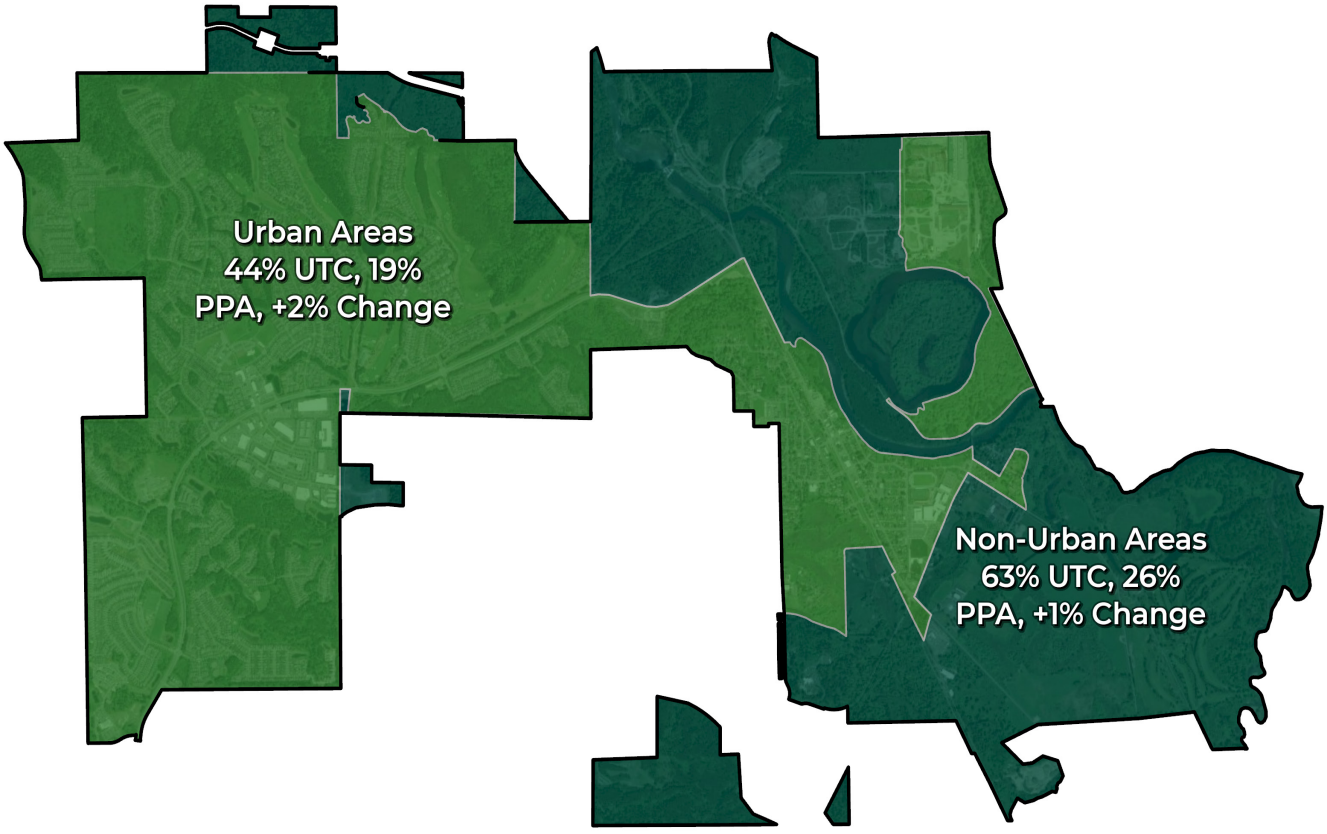


Figure 12. | UTC, PPA, and UTC change by urban vs. rural areas.

TREE CANOPY COVER BY PROPERTY OWNERSHIP

Private and public properties each offer unique opportunities and approaches to tree planting and maintenance, and Snoqualmie stands out from many other municipalities in that a majority of the urban forest distribution lies on public land. In terms of land area, private property comprises 56% of the AOI, while public property accounts for the remaining 44%.

Although private lands make up a larger portion of the area, public lands contribute a more significant share of the tree canopy, comprising 57% of the tree canopy distribution.

In addition to having the larger proportion of the urban forest, public properties have an average coverage of 71% compared to 42% on private lands. Private lands hold 636 acres of potential planting area (26% of their land area), whereas public lands offer 387 acres (20% of their land area). Together, these areas provide substantial opportunities for targeted canopy maintenance and expansion.

PROPERTY OWNERSHIP TREE CANOPY CHANGE

Over the 8-year study period, both private and public lands saw modest gains in canopy coverage. Private lands gained 32 acres (1% increase), while public lands added 36 acres (2% increase).

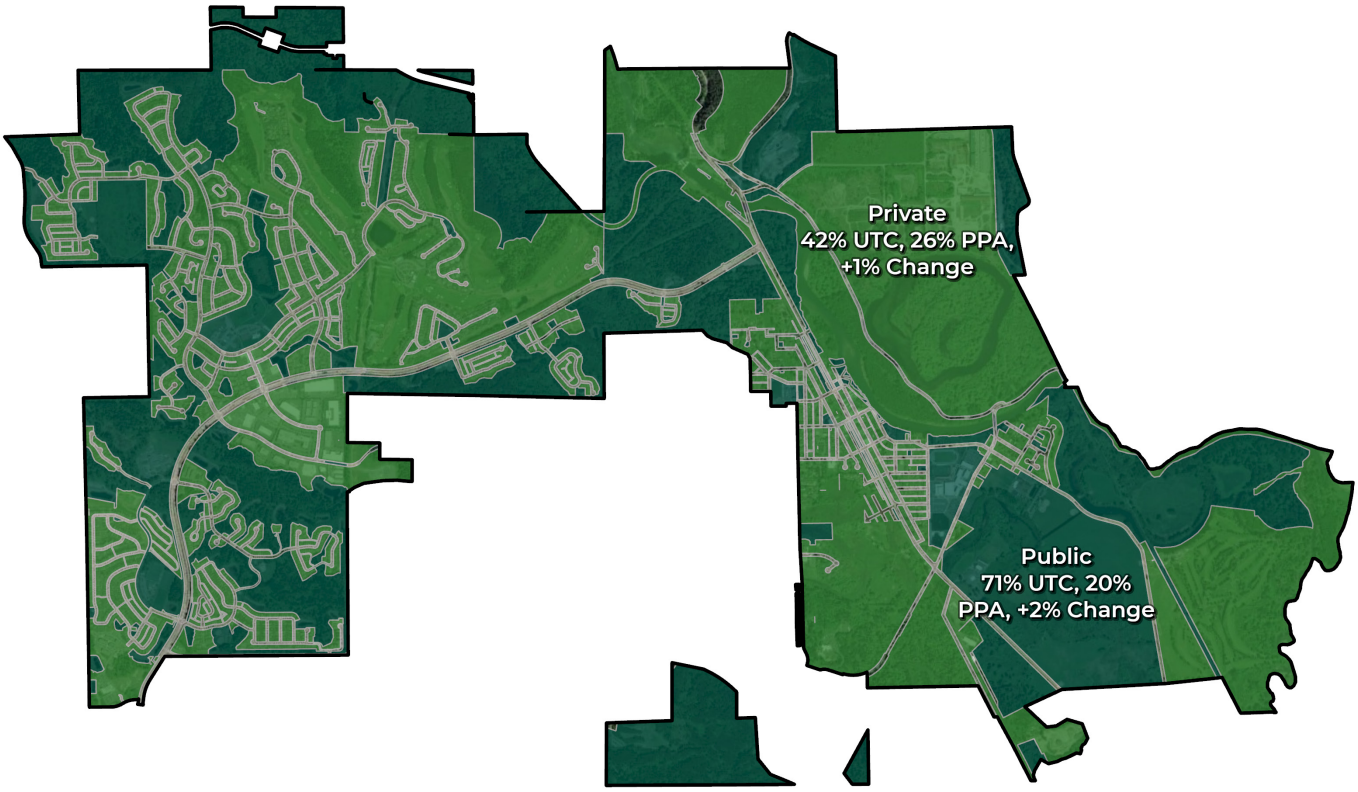


Figure 13. | UTC, PPA, and UTC change by public and private properties.

TREE CANOPY COVER BY WATERSHEDS

Trees mitigate stormwater runoff, filter pollutants, and sediment and as a result, reduce flooding and enhance water quality. Snoqualmie's tree canopy is distributed across three HUC-12 watersheds, each presenting unique opportunities for canopy management and planting. The Raging River, Lower South Fork Snoqualmie River, and Patterson Creek-Snoqualmie River watersheds make up 3%, 2%, and 94% of the land area within the AOI, respectively. The Patterson Creek-Snoqualmie River watershed holds the largest share of tree canopy, contributing 52% of the total canopy across the AOI, while the Lower South Fork Snoqualmie River watershed has the highest canopy coverage at 73%.

The Raging River Watershed, located along the western border of the town, contains 60 acres (36%) of canopy and 41 acres (25%) of potential planting space. However, this watershed is also impacted by 37% impervious surfaces, so tree canopy conservation efforts could be a great benefit to this area to mitigate flooding. The Lower South Fork Snoqualmie River Watershed, with 96 acres of land area, holds 70 acres (73%) of tree canopy, though it has limited planting potential, with only 22 acres (23%) available for future tree plantings. The Patterson Creek-Snoqualmie River Watershed, the largest in the central area of Snoqualmie, holds 2,353 acres (52%) of canopy and offers 995 acres (22%) of planting area, making it the most significant area for potential canopy expansion.

WATERSHEDS TREE CANOPY CHANGE

Over the 8-year study period, the three watersheds showed varied changes in canopy. While the Raging River watershed experienced no net change in canopy, the Lower South Fork Snoqualmie River Watershed saw a decrease in canopy, losing 3 acres (a 3% decline). On the other hand, the Patterson Creek-Snoqualmie River Watershed gained 70 acres of canopy (a 2% increase). The decrease in canopy in the Lower South Fork Snoqualmie River watershed signals the importance of focused preservation and restoration efforts in this area.

The Lower South Fork Snoqualmie River Watershed experienced a **3% net decrease in tree canopy over the 8-year study period.**

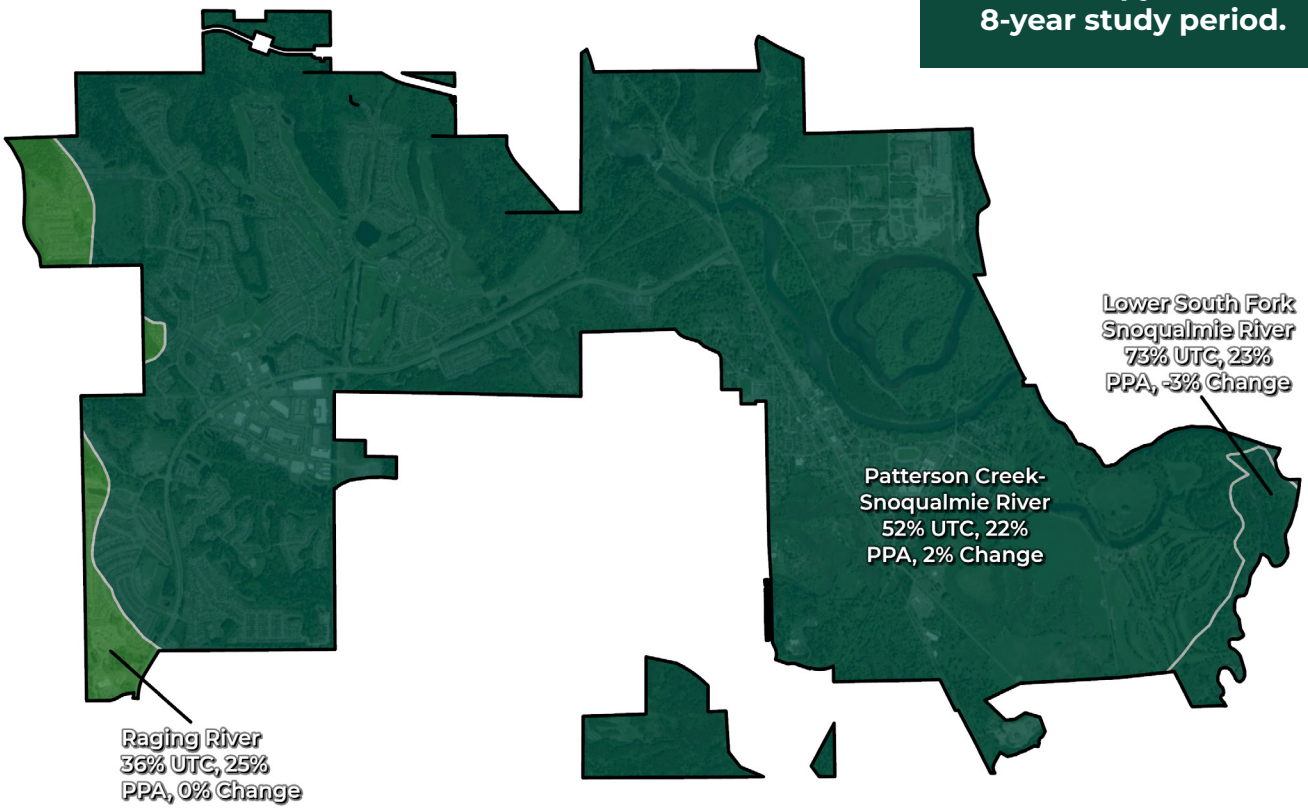


Figure 14. | UTC, PPA, and UTC change by watersheds.

TREE CANOPY COVER BY CENSUS BLOCKS GROUPS

UTC and PPA were also assessed at the census block group level, which is valuable for determining the equitable distribution of tree canopy throughout Snoqualmie, as the block groups are linked to readily available demographic and socio-economic data. This geographic scale is the second smallest unit of measure at which the U.S. Census publishes statistical data within a state and represents between 600 and 3,000 people. Of the 14 census block groups in Snoqualmie, eight have UTC percentages higher than the AOI-wide average of 52%. Together, these block groups make up over half of Snoqualmie's total land area, and comprise 60% of the urban forest canopy. Only one block group has less than 30% UTC, identified as block group 53-033-032605-1 located in the western portion of the city and containing Snoqualmie Community Park.

Looking at PPA, two block groups have over 30% of their land designated as potential planting area, totalling 453 acres. These block groups are located right next to each other in the eastern portion of the city and are identified as block groups 53-033-032703-1 and 53-033-032703-2. The latter block group is the largest block group in the city and contains Mount Si High School and Snoqualmie Elementary and High Schools.

CENSUS BLOCK GROUPS TREE CANOPY CHANGE

From 2015 to 2023, two block groups lost canopy canopy, nine block groups gained canopy, and the remaining 3 block groups stayed relatively stable (less than a 1% increase or decrease throughout the study period). The largest acreage increase in an individual block group was +16 acres (53-033-032603-3), and the largest acreage decrease was -3 acres (53-033-032705-3).

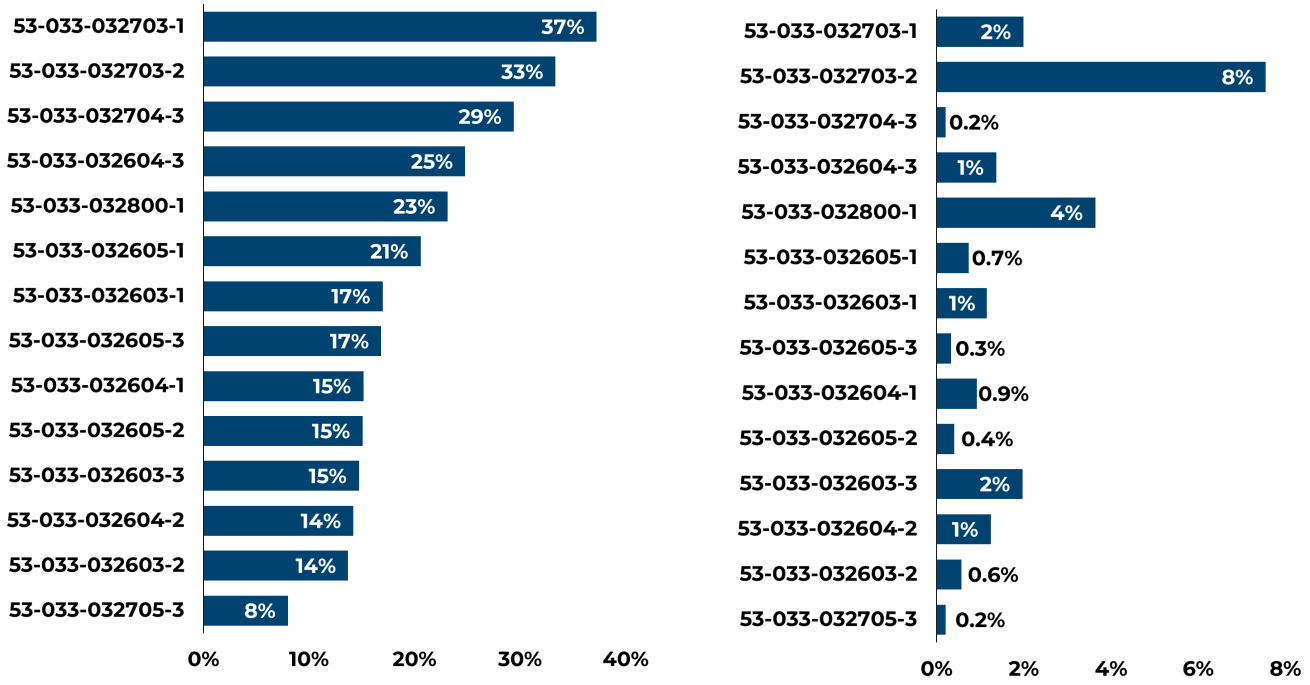


Figure 15. Potential planting area percent (left) and percent distribution (right) by census block group.

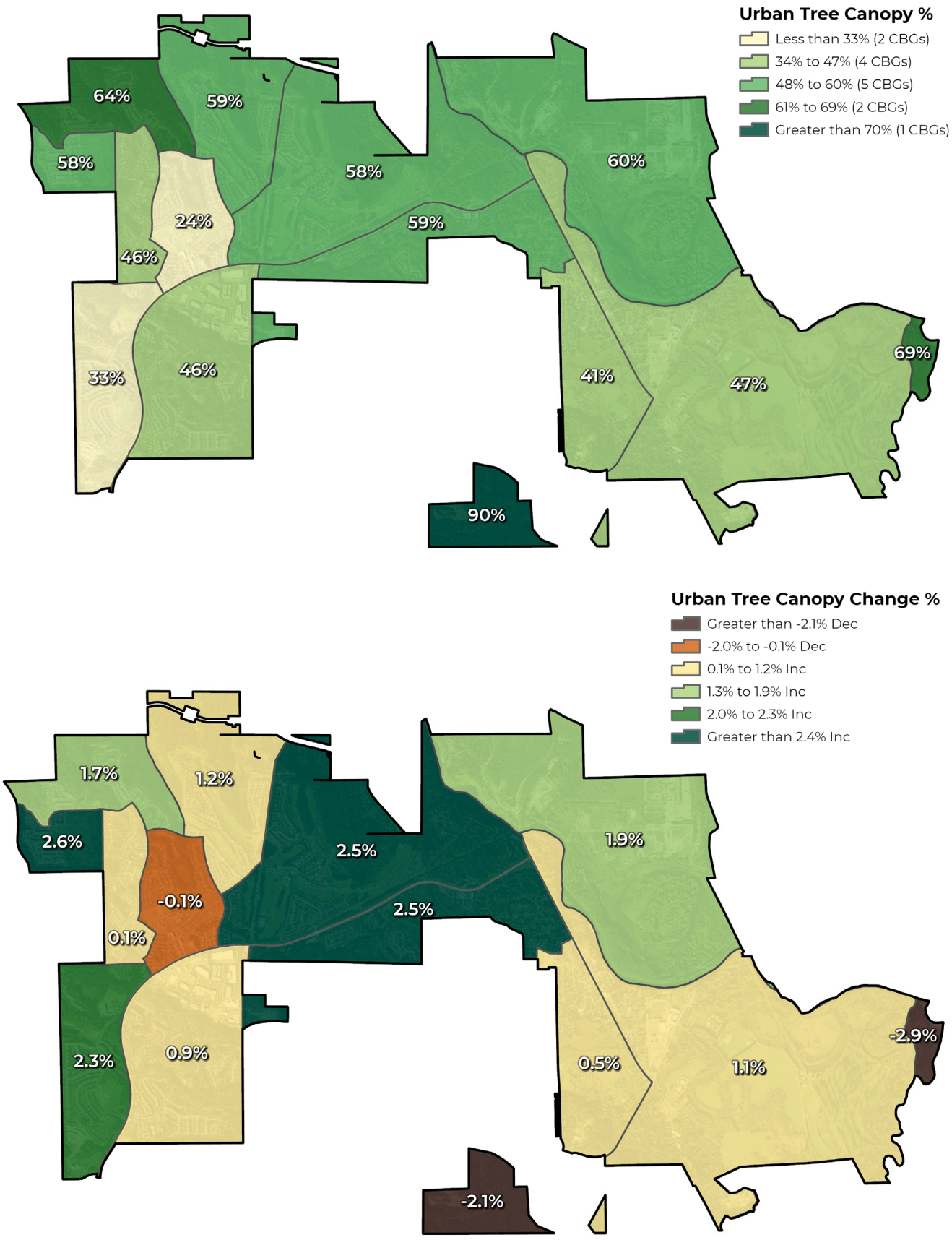


Figure 16. | UTC (top) and UTC change (bottom) percentages by census blocks.

TREE CANOPY COVER BY LAND USE

Land use types play a critical role in dictating permissible activities and development for specific parcels, helping to organize and regulate urban growth while ensuring compatibility with surrounding areas and addressing community needs. In this assessment, tree canopy cover and potential planting area were evaluated across 16 designated land use types within Snoqualmie's city limits (excluding the city-owned forested parcels). Open space areas make up 47% of city limits and contribute significantly to the overall urban tree canopy, comprising 58% of the total tree canopy with a high average UTC of 68%.

Residential land use areas, which account for 21% of city limits (888 land acres), have notably lower-than-average canopy cover, with just 31% UTC. These areas also feature a higher-than-average impervious surface coverage (17%), which can exacerbate issues like urban heat island effect and stormwater runoff. As such, approximately 30% of residential land (or 266 acres) holds potential for tree planting, which could help mitigate these negative environmental impacts. On the other hand, wetland buffer areas and vacant land have exceptionally high canopy cover, at 93% and 73%, respectively, indicating that these areas should be prioritized for conservation and tree canopy protection efforts to maintain their ecological value.

LAND USE TREE CANOPY CHANGE

Among Snoqualmie's 16 land use types, only two land use types lost canopy cover (NC - Residential and NC - Retail), but this loss totaled to less than an acre. Residential and Open Space land use types experienced the largest acre increases, with 11 and 26 acres of canopy gained, respectively.organize

Table 1. | Land area distribution, urban tree canopy, potential planting area, urban tree canopy change, and impervious surface coverage by land use type.

Land Use Types	Land Area Distrubuted %	Urban Tree Canopy %	Potential Planting Area %	Urban Tree Canopy Change %	Impervious Surface %
BP/COMMERCIAL	2%	20%	8%	1.0%	68%
COMMERCIAL	4%	24%	27%	1.4%	46%
GOLF COURSE	8%	44%	23%	1.7%	5%
INSTITUTIONAL	6%	52%	16%	2.6%	25%
LB/OPEN SPACE	46%	68%	25%	1.4%	2%
LB/OPEN SPACE 1	1%	49%	41%	5.4%	5%
NC - RESIDENTIAL	1%	11%	17%	-2.0%	70%
NC - RETAIL	0.3%	6%	5%	-0.6%	88%
UNZONED	0.4%	21%	8%	1.6%	70%
RAILROAD	1%	48%	23%	2.6%	28%
RESIDENTIAL	21%	31%	30%	1.2%	39%
RESOURCE EXTRACTION	0.3%	29%	24%	0.2%	1%
TRIBE	0.1%	65%	19%	5.8%	16%
UTILITY PARK	3%	66%	12%	2.6%	16%
VACANT	4%	73%	19%	3.4%	5%
WETLAND BUFFER	2%	93%	4%	1.9%	1%

TREE CANOPY COVER BY ZONING

Zoning boundaries help local governments designate specific areas for land uses—such as residential, commercial, industrial, and recreational—to guide urban development and uphold community planning standards. Tree canopy cover and potential planting area were analyzed across the city's 17 zoning districts (excluding the city-owned forested parcels). The Mixed-Use zoning class contributes 42% of tree canopy within city limits with 49% canopy cover, while Open Space - 1 zoned areas hold the next largest share of canopy (25%) at 68% coverage.

Mixed-Use zones, along with the highest share of existing canopy, also contain the largest distribution (36%) and highest acreage (361 acres) of potential planting space. Residential 1-10 zoning, although having a low canopy coverage of 17%, provides the greatest proportion of available planting space at 77%, totaling 18 acres that could be used to enhance canopy cover. Business General and Business Retail - 1 zones have the lowest canopy (14% and 11%, respectively) and the highest impervious surfaces (72% and 81%, respectively), highlighting areas where canopy improvements could reduce impervious surface impacts.

ZONING TREE CANOPY CHANGE

Among Snoqualmie's 17 zoning classes, eight gained canopy, four lost canopy, and the remaining five classes remained relatively stable (less than a 1% increase or decrease throughout the study period). Mixed Use zones saw the greatest acreage increase (39 acres), a 2% net gain.

Table 2. | Land area distribution, urban tree canopy, potential planting area, urban tree canopy change, and impervious surface coverage by land use type.

Zoning Class	Land Area Distribution %	Urban Tree Canopy %	Potential Planting Area %	Urban Tree Canopy Change %	Impervious Surface %
Business General	0.2%	14%	14%	-1.4%	72%
Business Office	0.1%	35%	28%	2.5%	36%
Business Retail 1	0.1%	11%	8%	0.6%	81%
Business Retail 2	0.3%	24%	22%	-1.1%	54%
Constrained Residential	9%	49%	26%	1.1%	21%
Form-Based Mixed-Use	0.2%	23%	23%	0.5%	54%
Mixed Use	45%	49%	19%	2.0%	25%
Office Park	1%	74%	16%	1.5%	10%
Open Space 1	19%	68%	30%	0.8%	0.4%
Open Space 2	12%	51%	33%	1.0%	3%
Open Space 3	1%	47%	23%	2.6%	30%
Planned Com/Industrial	6%	42%	28%	3.2%	27%
Planned Residential	1%	99%	1%	-0.1%	0%
R-1-10	1%	17%	77%	-1.6%	6%
R-2	0.1%	21%	38%	-1.5%	41%
Resource Extraction	0.5%	44%	20%	0.1%	1%
Utility Park	3%	67%	11%	1.9%	16%

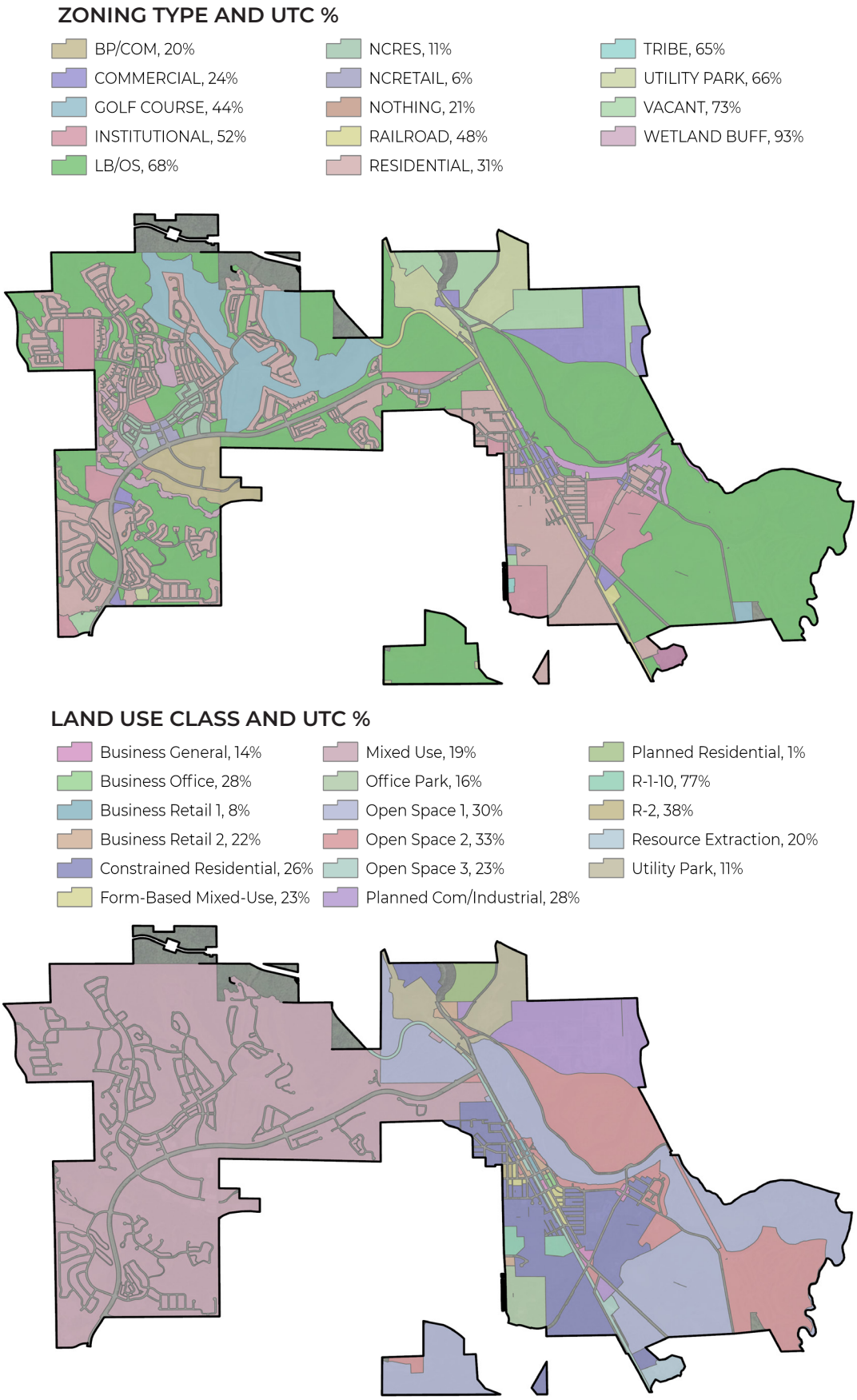


Figure 17. | Zoning types (top) and land use classes (bottom) and their respective UTC %.

TREE PLANTING

PRIORITIZATION

Increased tree canopy cover can provide a wide array of benefits to a local community and its residents and visitors. To locate specific areas in need, several socioeconomic, demographic, and accessibility data sources were analyzed at the census block group scale and each was ranked. Rankings are sorted from high (dark blue) to low (light yellow) and were calculated for each criterion as well as overall to show where multiple needs overlap.

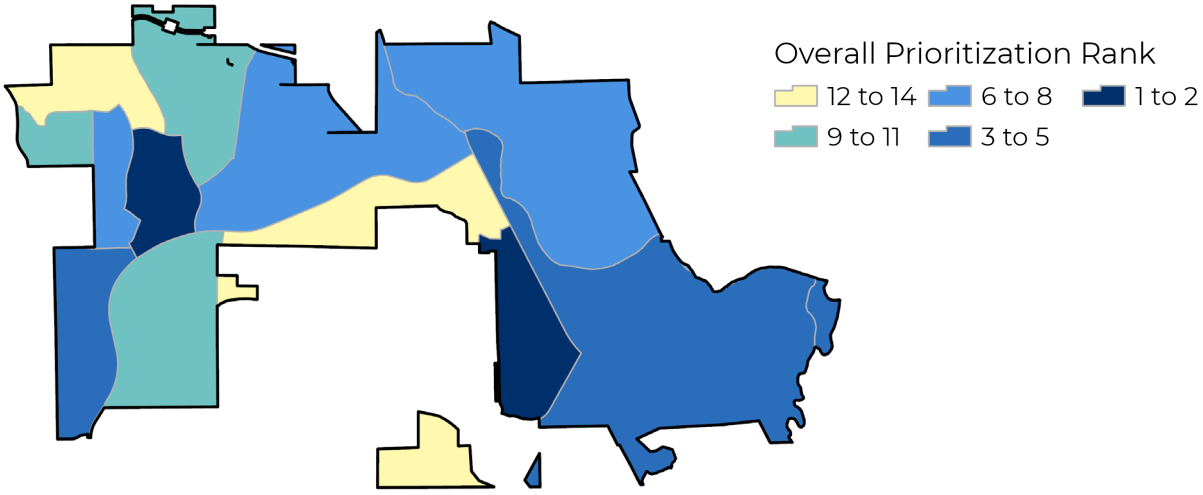


Figure 18. | Overall prioritization rankings for Snoqualmie's census block groups. Lower rankings indicate higher priority for tree plantings.

Low Existing Tree Canopy: This indicator highlights census block groups with low percentages of existing tree canopy cover. This criterion prioritizes census block groups with higher percentages of non-canopy-covered land.

Possible Urban Tree Canopy: Identifying census block groups that can support tree plantings is the first step in expanding future urban tree canopy cover. This indicator shows the percentage of each census block group that is available for planting, prioritizing those with a greater proportion of plantable area.

Poverty Rate: This indicator shows the percentage of residents living below the federally designated poverty level, as reported by the U.S. Census American Community Survey 5-year summaries, highlighting census block groups where trees could enhance environmental and health benefits for residents.

Unemployment Rate: This indicator shows the percentage of the labor force without employment, available to work, and actively seeking employment, as reported by the U.S. Census American Community Survey 5-year summaries. Census block groups with higher unemployment rates are prioritized for planting.

Vulnerable Population: Trees provide essential environmental and health benefits to vulnerable populations. This indicator shows the ratio of residents under the age of 18 or over the age of 65 compared to the working-age population, as reported by the U.S. Census American Community Survey 5-year summaries. Census block groups with larger vulnerable population ratios are prioritized.

Median Household Income: Income inequality often overlaps with environmental inequality, where lower-income residents may reside in areas with more impervious surfaces and fewer trees, parks, and greenspaces. This criterion prioritizes census block groups with lower median household incomes, as reported by the U.S. Census American Community Survey 5-year summaries.

Educational Attainment: This indicator shows the percentage of the population without a high school diploma or GED, as reported by the U.S. Census American Community Survey 5-year summaries. Census block groups with lower educational attainment levels are prioritized, aligning with the observed benefits of trees on educational and social outcomes.

Urban Heat Island: Using LANDSAT surface temperature data collected on August 19, 2023, this indicator shows the average surface temperature in Fahrenheit for each census block group. Census block groups with higher average temperatures are prioritized for planting.

Stormwater Management: This indicator assesses plantable space within 100 feet of surface water bodies and impervious surfaces, identifying census block groups with significant planting opportunities to reduce stormwater runoff. Census block groups with higher percentages of potential planting areas near water bodies and impervious surfaces are prioritized.

TOP PRIORITY CENSUS BLOCK GROUPS

Considering the nine prioritization variables with the highest weight towards current urban tree canopy and the space available for potential planting opportunities, four census block groups stand out.

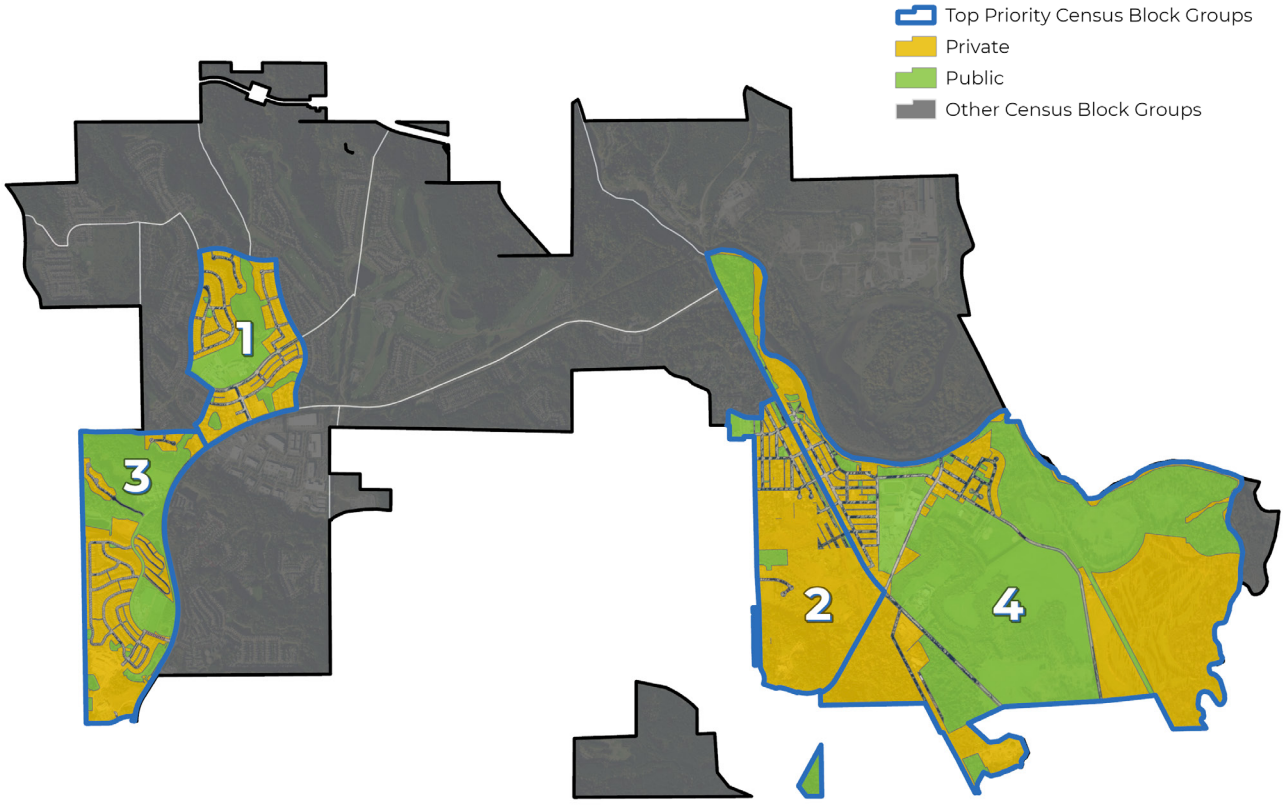


Figure 19. Top 4 priority census block groups by private and public property.

Table 3. | Top 4 highest priority census block groups with UTC, PPA, and UTC change metrics summarized by property ownership.

CBG ID	Rank	Metric	Total %	Public %	Private %	Total Acres	Public Acres	Private Acres
530330326051	1	UTC Change	-0.1%	+3.4%	-0.7%	-0.1	+1.7	-0.6
		Total UTC	24%	38%	17%	41	19	15
		Total PPA	20%	29%	20%	35	15	18
530330327031	2	UTC Change	+0.5%	+1.3%	+0.6%	+1.2	+0.3	+1.3
		Total UTC	41%	22%	45%	105	4	95
		Total PPA	37%	48%	40%	95	9	84
530330326043	3	UTC Change	+2.3%	+5.4%	-0.5%	+6.0	+6.3	-0.6
		Total UTC	33%	56%	16%	86	65	19
		Total PPA	25%	21%	32%	65	25	38
530330327032	4	UTC Change	+1.1%	+1.9%	+0.0%	+11.8	+11.5	+0.1
		Total UTC	47%	48%	49%	508	297	196
		Total PPA	33%	40%	26%	359	244	104

CONCLUSIONS AND RECOMMENDATIONS

The City of Snoqualmie values its natural resources and is committed to maintaining a healthy, sustainable urban environment. Regular assessments of the city's tree canopy are key to ensuring the long-term health of its urban forest. Maintaining and expanding canopy cover can be achieved through careful planning, investment, and the ongoing care of existing trees.

To preserve and enhance Snoqualmie's tree canopy, the city should continue conducting tree canopy assessments at regular intervals, either through a TreePlotter CANOPY subscription or ongoing projects. As the city grows, this data will inform urban forest policies and management practices, prioritizing canopy health and growth. The urban forest provides a range of environmental, social, and economic benefits, fostering greater community pride and engagement with city-wide initiatives. Continuing assessments will help identify areas where canopy cover should be preserved, opportunities to expand it, and where targeted investments can yield the greatest benefits.

RECOMMENDATIONS

1. Leverage the results of this assessment to promote the urban forest and review canopy goals

The findings of this assessment are pivotal for promoting investment in urban forest monitoring, maintenance, and management; and offer essential support for state, county, and local budget requests and grant applications. These results can be used to craft targeted presentations and resources for government leaders, planners, engineers, resource managers, and the public, to make an empirical case for urban forest needs and benefits.

As Snoqualmie's population grows and urbanization expands, the preservation and growth of the existing canopy is vital. These assessment findings can be used to develop short and long-term goals, such as establishing annual tree planting and maintenance targets or setting specific canopy coverage goals by a future date.

2. Identify areas to prioritize canopy expansion and preservation

The city and its various stakeholders can utilize the results of the UTC, PPA, and prioritization analyses to identify the best locations for canopy expansion efforts. Utilizing the 293 acres of plantable space (PPA) within public property in the top four priority census block groups could help make these areas more equitable. Because Snoqualmie already sits at a very high UTC average of 52%, the city should evaluate city codes to increase tree preservation, create space for existing trees during the development process, and develop a formal program to identify and protect significant old growth and heritage trees within the community.

3. Develop outreach programs toward private landowners

Residential zoned areas account for 12% of the city's total tree canopy and contain over 26% of all city-wide PPA. To maintain and increase canopy in Snoqualmie on private lands, it's important to collaborate with community organizations, homeowner associations, and other stakeholders to promote tree planting and proper maintenance. The city can develop educational resources and workshops for property owners and maintenance personnel on proper tree care practices. Empowering residents with knowledge about tree maintenance can lead to better stewardship of both private and public trees, ultimately contributing to overall canopy health.

4. Implement a plan to preserve Snoqualmie's canopy as the city continues to grow

Integrate urban forestry stakeholders early to ensure the involvement of tree-related city commissions, local organizations, and urban forestry staff at the outset of development projects. Collaborate to conduct pre-development tree assessments, preserve trees during construction, and develop post-construction tree planting plans. By integrating urban forestry expertise from the start, cities can minimize canopy reduction, preserve valuable trees, and enhance green infrastructure in developed areas.

REPORT

APPENDIX

GLOSSARY/KEY TERMS

Land Acres: Total land area, in acres, of the assessment boundary (excludes water).

Non-Canopy Vegetation: Areas of grass and open space where tree canopy does not exist.

Possible Planting Area - Vegetation: Areas of grass and open space where tree canopy does not exist, and it is biophysically possible to plant trees.

Shrub: Areas of shrub or other leafy and woody vegetation (smaller than 10 ft tall) that are not classified as tree canopy.

Soil/Dry Vegetation: Areas of bare soil and/or dried, dead vegetation.

Total Acres: Total area, in acres, of the assessment boundary (includes water).

Unsuitable Impervious: Areas of impervious surfaces that are not suitable for tree planting. These include buildings and roads and all other types of impervious surfaces.

Unsuitable Planting Area: Areas where it is not feasible to plant trees. Airports, ball fields, golf courses, etc. were manually defined as unsuitable planting areas.

Unsuitable Soil: Areas of soil/dry vegetation considered unsuitable for tree planting. Irrigation and other modifiers may be required to keep a tree alive in these areas.

Unsuitable Vegetation: Areas of non-canopy vegetation that are not suitable for tree planting due to their land use.

Urban Tree Canopy (UTC): The "layer of leaves, branches and stems that cover the ground" when viewed from above; the metric used to quantify the extent, function, and value of the urban forest.[2] Tree canopy is generally taller than 10 feet.

Water: Areas of open, surface water not including swimming pools.

DECEMBER | 2024

URBAN TREE CANOPY

ASSESSMENT

SNOQUALMIE, WASHINGTON

PlanIT Geo™
developers of TreePlotter

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