URBAN TREE CANOPY

ASSESSMENT

BELLEVUE, WASHINGTON

DECEMBER | 2023

PlanIT Geo
developers of TreePlotter

CITY OF BELLEVUE WASHINGTON

earth Define

AN ASSESSMENT OF
URBAN TREE CANOPY IN
BELLEVUE, WASHINGTON

" To be without
trees would,
in the most
literal way, to be
without our roots.

-Richard Mabey "

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PREPARED FOR

City of Bellevue

COMPLETED

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8,499
ACRES OF CANOPY

40%
OF BELLEVUE'S LAND AREA WAS COVERED WITH CANOPY IN 2021

EXECUTIVE
SUMMARY

BACKGROUND OF THIS ANALYSIS

The City of Bellevue is located within King County, Washington, in the Seattle metropolitan area (Figure 1). It is approximately 33.8 square miles or 21,623 acres. Flourishing woodsy neighborhoods and expansive network of trails have earned Bellevue its nickname "a city in a park". Bellevue has been a proud Tree City USA recipient for 32 years and acknowledges that a healthy and thriving urban forest is integral in providing residents with meaningful environmental, social, and economic benefits.

As established in Bellevue's Comprehensive Plan, the City has a goal of maintaining a tree canopy of at least 40%, and has policies to promote tree preservation, planting, and tree protection. The Sustainable Bellevue Environmental Stewardship Plan seeks to advance these goals with actions to increase outreach and education, improve tracking, and update Bellevue's tree code, among others. This assessment mapped urban tree canopy (UTC), possible planting area (PPA), and analyzed how they are distributed throughout the City of Bellevue and its many geographic boundaries. Canopy size, extent and distribution was quantified, however this analysis does not attempt to define species composition or condition.

For the purpose of this report, urban tree canopy refers to the percentage of tree canopy coverage compared to the City's total land area, excluding water bodies.

PROJECT METHODOLOGY

The results, based on 2021 imagery from the USDA's National Agriculture Imagery Program (NAIP), provide a near-current look at land cover in Bellevue and will allow the City 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 allows for a more uniform comparison in future tree canopy and land cover assessments.

CITY OF BELLEVUE'S URBAN FOREST

In 2021, Bellevue contained 40% urban tree canopy cover, 20% possible planting area, and the other 40% of the City was classified as unsuitable for planting without significant land modification.

Of the six land use classes within Bellevue, Suburban Residential constituted 66% of Bellevue's land area, 64% of the citywide canopy distribution, and 77% of citywide PPA. The right-of-way (ROW) comprised 18% of the City's total area and contributed 10% towards the total canopy cover. Out of Bellevue's 16 neighborhoods, Lake Hills contained the greatest potential for canopy expansion, offering 555 acres of PPA or 13% of the City's total plantable space. The tree canopy in 2021 increased from 2019 by 0.2% to 40%. This assessment illustrates that despite some losses of trees due to development or other tree removals, the overall growth of the tree canopy surpasses any localized removal of trees, resulting in a net increase in citywide tree canopy.
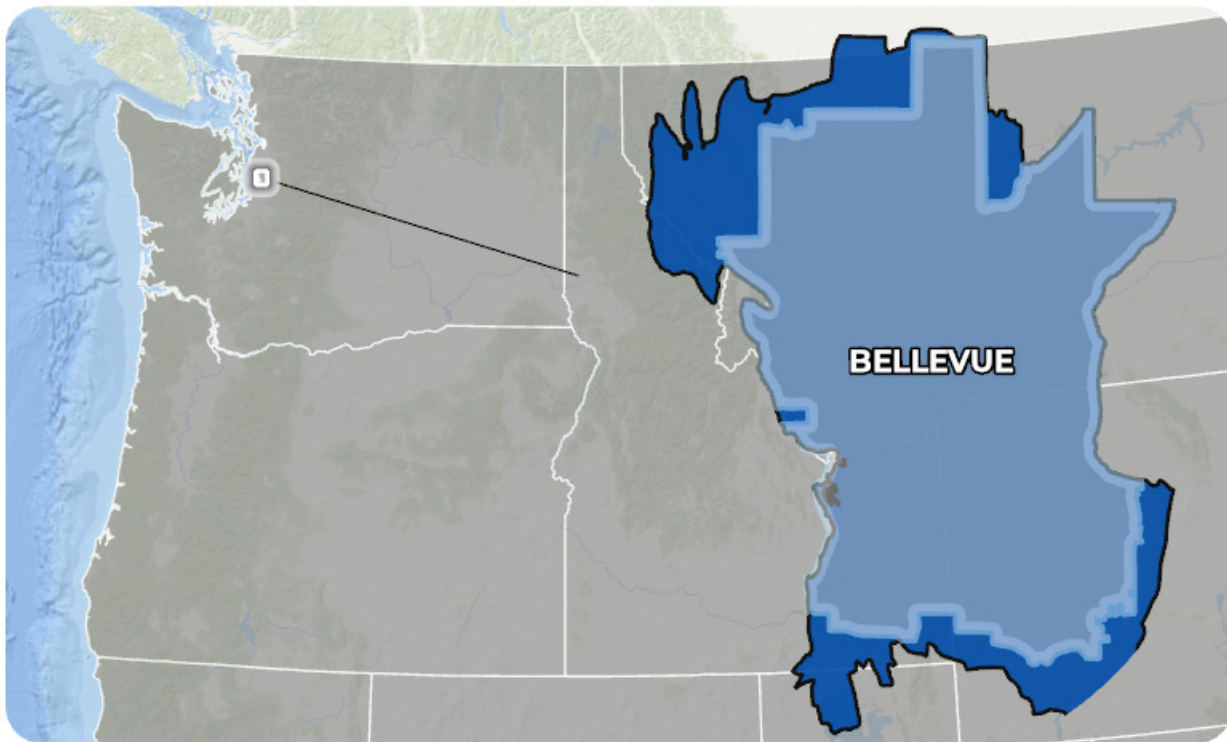
Figure 1. | Bellevue occupies approximately 33.8 square miles in King County, Washington.
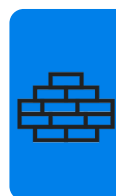
RECOMMENDATIONS

The results of this analysis can be used to develop a continued strategy to protect and expand Bellevue's urban forest. This study revealed that the City of Bellevue contains 8,499 acres of tree canopy, with more than 4,300 acres potentially available for canopy expansion. Bellevue has the opportunity to continue to increase urban tree canopy coverage on both public and private property. There are over 370 acres of plantable space along Bellevue's stream corridors areas and an additional 510 acres of PPA within the right-of-way. Through partnerships, education, and outreach programs to private landowners, the City of Bellevue can aim to plant native species to stabilize riparian corridors, address tree inequity, and mitigate the urban heat island effect. It is important for the City to use this assessment to inform future investments in the urban forest so that all those who live, work, and play in Bellevue can benefit from the urban forest. The City should proactively work to protect the existing urban forest and replenish the canopy with additional trees and native shrubs and remove invasive species when possible. Through management actions, strategic plantings, and protections for existing canopy informed by the UTC and PPA metrics included in this report, the City of Bellevue has an exciting opportunity to expand the quality and quantity of its current urban tree canopy for the benefit of future generations.

| 40% URBAN TREE CANOPY | 20% POSSIBLE PLANTING AREA | 38% IMPERVIOUS SURFACE |

Figure 2. | Based on an analysis of 2021 high-resolution imagery, the City of Bellevue contains 40% tree canopy, 20% areas that could support canopy in the future, and 38% total impervious areas.

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 July of 2021 to derive the land cover data set. The NAIP imagery was used to classify all types of land cover. For canopy change analysis, 60 centimeter resolution NAIP imagery collected in October of 2019 and 1-meter resolution data was collected in August of 2011 to classify the historic tree canopy.

MAPPING LAND COVER

The land cover data set is the most fundamental component of an urban 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 2021 NAIP imagery. These six classes are shown in Figure 3 and described in the Glossary found in the Appendix.

Given the difference in resolutions between the datasets, specifically between 2011 and the subsequent years, it's worth considering whether this discrepancy could account for any observed differences in tree canopy coverage. Additionally, data collected in October of 2021 may have capture "leaf off" imagery, where trees have shed their leaves. This seasonal variation could also potentially influence the canopy analysis, possibly accounting for observed differences in tree canopy coverage when compared with data from other years.

URBAN TREE CANOPY

SHRUB

OTHER VEGETATION

SOIL AND DRY VEGETATION

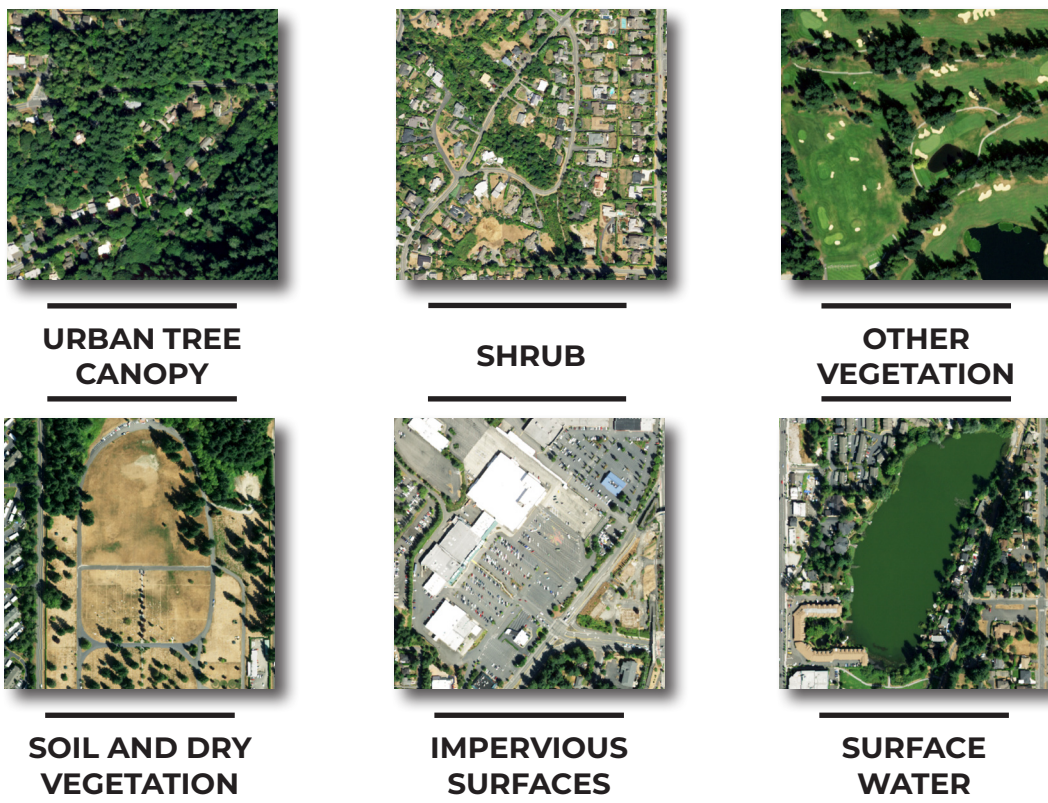**IMPERVIOUS SURFACES**

SURFACE WATER

Figure 3. | Six (6) distinct land cover classes were identified in the 2021 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 Bellevue's existing tree canopy cover, another metric of interest in this assessment was the area where tree canopy could be expanded. To assess this, all land area in the City of Bellevue that was not existing tree canopy coverage was classified as either possible planting area (PPA) or unsuitable for planting.

Possible planting areas were derived from the vegetation and shrubs layer. Unsuitable areas, or areas where it was not feasible to plant trees due to biophysical or land use restraints (e.g. golf course playing areas, recreation fields, utility corridors, airports, 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.
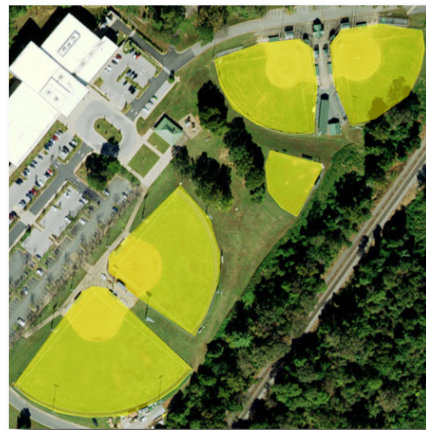

Figure 4. | Vegetated areas where it would be biophysically feasible for tree plantings but undesirable based on their current usage (left) were delineated in the data as "Unsuitable" (right). These areas included recreational sports fields, golf courses, and other open space.

DEFINING ASSESSMENT LEVELS

In order to best inform Bellevue and it's various stakeholders, urban tree canopy and other associated metrics were tabulated across a variety of geographic boundaries. These boundaries include the City boundary, land use classes, neighborhoods, stream corridors, drainage basins, schools, census block groups, and right-of-way by census block groups.
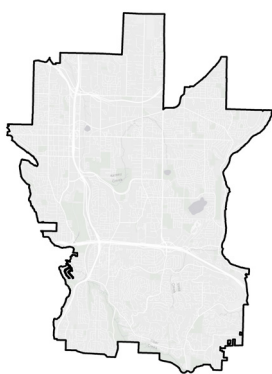
CITY BOUNDARY

The City of Bellevue's **citywide boundary** is the one (1) main area of interest over which all metrics are summarized.
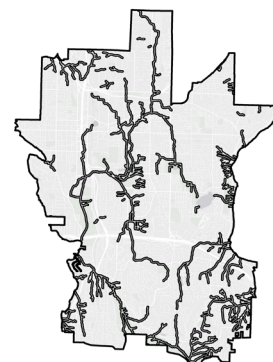
STREAM CORRIDORS

Stream corridors play an important role in urban environments. Tree canopy within 100 feet of streams was assessed.

Figure 5. | Eight (8) distinct geographic boundaries were explored in this analysis: the full City boundary, designated land use classes, neighborhoods, stream corridors, drainage basins, schools, census block groups, and right-of-way by census block groups.
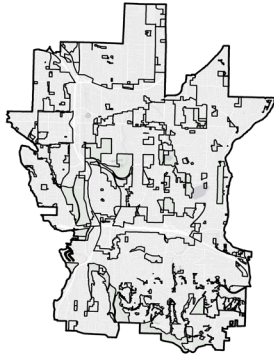
Land Use

Six (6) l**and use** classes were assessed to review the extent to which human interactions caused significant changes in the City's structure, pattern, and function of natural ecosystems.

Neighborhoods

Sixteen (16) **neighborhoods** were assessed to quantify urban tree canopy at an easily- conceptualized scale.

Drainage Basins

Because trees play an important role in storm water management, twenty-eight (28) **drainage basins** were also assessed. The boundaries for drainage basins extend beyond City boundaries.
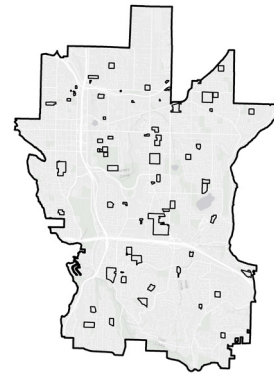
Schools

UTC was assessed for all of the **schools** in Bellevue, totaling eighty-one (81).

Census Block Groups

Eighty nine (89) **census block groups** were assessed to show relationships between canopy and sociodemographic factors, and highlight potential environmental justice issues.
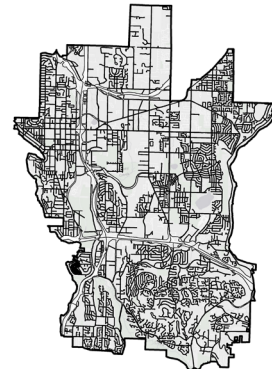
right-of-way by Census Block Group

In addition to the UTC throughout the census block groups' entire areas, UTC was also assessed within the **right-of-way found within each census block group.** This measure is useful for quantifying and tracking Bellevue's street trees.

Figure 5. | Eight (8) distinct geographic boundaries were explored in this analysis: the full City boundary, designated land use classes, neighborhoods, stream corridors, drainage basins, schools, census block groups, and right-of-way by census block groups.

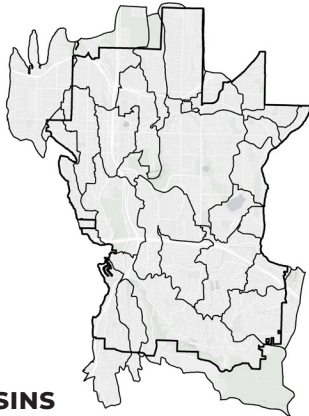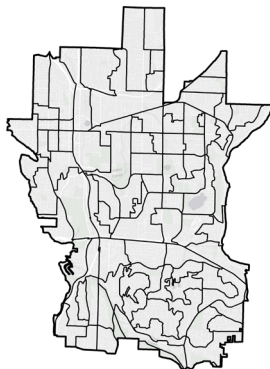## STATE OF THE CANOPY AND ▬▬▬
KEY FINDINGS

The results and key findings of this study, including the land cover map and canopy analysis results, are presented below. These results can be used to design a strategic approach to identifying existing canopy and future planting areas. Land cover percentages are based on the City Boundary as of 2021. The City boundary includes six land cover classes including tree canopy (over impervious surfaces and over pervious surfaces), shrub/scrub, soil and dry vegetation, other vegetation, impervious surfaces, and water (see Table 1 and Figure 6 for the breakdown of percentages). While citywide urban tree canopy includes urban tree canopy, PPA vegetation, unsuitable impervious, unsuitable soil (see Figure 8 for the breakdown of percentages).

Table 1. | Land cover classes in acres and percent in City of Bellevue.

Bellevue, WA	Acres	% of Total
City Limits	21,623	100%
Tree Canopy	8,499	40%
Possible Planting Area	340	20%
Unsuitable Area	4,126	40%

CITY OF BELLEVUE LAND COVER

- Tree Canopy Over Pervious %
- Tree Canopy Over Impervious %
- Non-Canopy Vegetation %
- Shrub/Scrub %
- Impervious %
- Soil & Dry Vegetation %
- Water %

36% · 4% · 19% · 2% · 38% · 1% · 1%
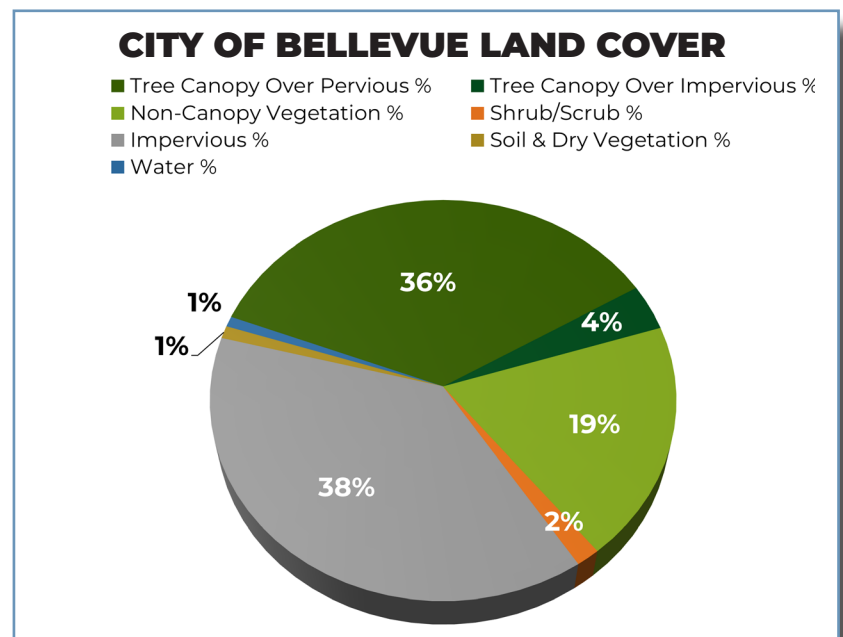
Figure 6. | Land cover classification results (percentages based on total area of Bellevue including water bodies).

CITYWIDE URBAN TREE CANOPY

This tree canopy assessment utilized the land cover data as a foundation to determine tree canopy cover and possible planting areas (PPA) throughout Bellevue. After assessing the City's 21,442 land acres, almost half (40%) of the study area was covered with canopy, with more than 4,300 acres still available to plant more trees. If the City utilizes all of its plantable space, it would theoretically have the potential to reach 60% tree canopy cover. This theoretical limit can be used to help the City set realistic goals regarding canopy expansion.

However, not all of the land area is feasible or readily available for trees. About 38% of the City is covered with impermeable surfaces such as roads and parking lots. While a greater investment, tree canopy adjacent to and over impervious surfaces can have the greatest impact in terms of reducing urban heat island effect. There is also another other 2% composed of recreational sports fields, areas of bare soil and dry vegetation.

Land Cover Classification

■	Non-Canopy Vegetation	■	Tree Canopy
■	Soil and Dry Vegetation	■	Shrub
■	Impervious	■	Tree Canopy Over Impervious
■	Water		

Figure 7. | Distribution of land cover throughout Bellevue.

URBAN TREE CANOPY POTENTIAL
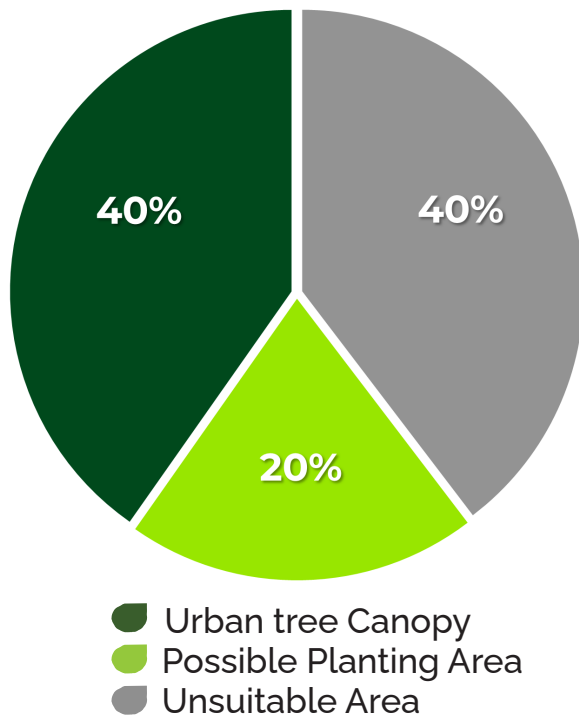
UNSUITABLE FOR PLANTING
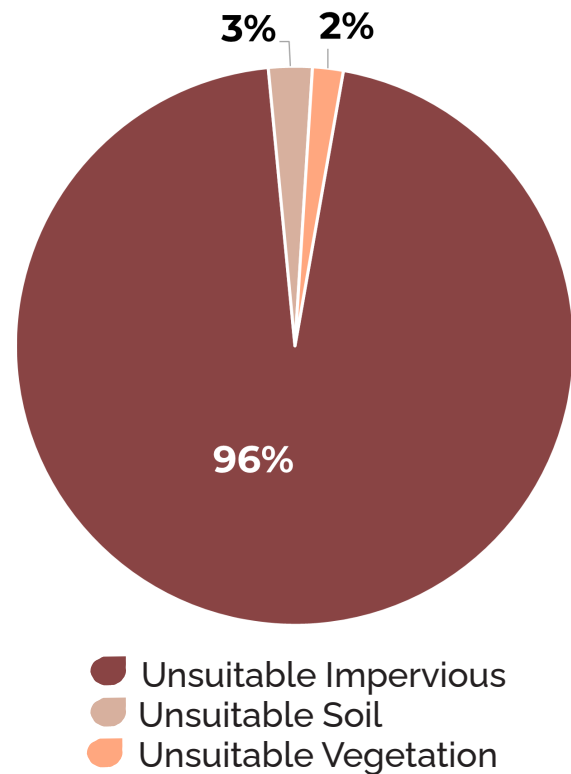
Figure 8. | Urban tree canopy, possible planting area, and area unsuitable for UTC (right). Total unsuitable area broken down by unsuitable soil, unsuitable impervious, and unsuitable vegetation percentages (left).

The presence and expansion of impervious surfaces, such as asphalt and concrete roadways, parking lots, driveways, sidewalks, and buildings, are the largest factor limiting the City's potential to increase it's overall canopy coverage. However, these areas are the typically the most in need of additional canopy, to reduce urban heat island and improve stormwater quality.

A NOTE ON CANOPY AND IMPERVIOUS SURFACES

The City's 8,499 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 the City of Bellevue's UTC was predominantly overhanging pervious surfaces at 91%, while 9% 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, such as urban heat island.

In addition to assessing Bellevue's urban tree canopy using 2021 imagery, this study also quantified shifts in urban tree canopy by utilizing imagery from both 2019 and 2011. Previous studies conducted in 1998 and 2008 by American Forests determined that the City was losing its valuable tree canopy and the associated ecosystem benefits that trees provide at alarming rates, with a 12% loss in canopy from 1986-1996 and another 9% loss in canopy from 1996-2006. Much of these changes in the 1980's and 1990's were due to development and expansion of new single-family neighborhoods in previously undeveloped parts of Bellevue. However, the downward trend appears to have been reversed.

In this comprehensive study, maps of land cover and urban tree canopy in 2011, 2019, and 2021 were produced using identical classification methodologies. All assessments used machine learning techniques on high-resolution (60 cm when feasible and 1-meter for 2011) color-infrared aerial imagery. Changes were assessed at all of the geographic assessment scales (citywide, land use, neighborhoods, stream buffers, drainage basins, schools, census block groups, and rights-of-way by census block groups). The most current boundaries were assessed in all years despite the fact that several of the geographic assessment scales may have changed due to annexation, population changes, and other land use reconfigurations since 2011.

Bellevue experienced a net increase in canopy (450 acres) from 2011 to 2021.

CITYWIDE URBAN TREE CANOPY CHANGE

Over the 10-year study period, there was an overall increase in Bellevue's urban tree canopy. Tree canopy increased by 410 acres citywide, a 1.9% raw increase from 2011 to 2019, and continued to increase by 40 acres between 2019 and 2021 resulting in an average canopy gain of 45 acres per year throughout the entire 10-year study period. This overall increase of 450 acres (+2.1%) of tree from 2011 to 2021, is a dramatic improvement from the upwards of 20% that was lost between 1986 and 2006.

However, it can be safely assumed that the tee canopy fluctuated, at least to some extent, throughout this analysis time frame. This assessment serves as a snapshot of the canopy at the time of imagery collection. Additionally, the extent to which invasive species (both trees and shrubs) are adding to this observation has yet to be assessed.

Figure 9. | Urban tree canopy in 2011, 2019, and 2021.

Generally, most losses of canopy can be traced back to commercial and residential developments near the I-405 corridor. Canopy growth can be attributed to the growth of existing trees, natural regeneration, and tree plantings in new residential and commercial development projects. Current levels of urban tree canopy in Bellevue can continue to be improved with careful planning and planting efforts of native species.

Table 2. | Urban tree canopy in 2011, 2019, and 2021.

City of Bellevue	Land Area	UTC 2011		UTC 2019		UTC 2021		UTC Change (2011-2021)	
	Acres	*Acres*	*%*	*Acres*	*%*	*Acres*	*%*	*Acres*	*%*
Urban Tree Canopy	21,442	8,051	37%	8,461	39%	8,499	40%	450	+2.1%

URBAN TREE CANOPY BY DESIGNATED LAND USE

Urban tree canopy was assessed for the City of Bellevue's designated land use classes. Suburban Residential districts were by far the largest, and therefore the most significant, of the land use classes, representing 66% of Bellevue's land area. So unsurprisingly, Suburban Residential land use had the most trees in total with 5,460 acres of canopy, which equates to 39% of its land area. However, areas designated for Parks had the highest canopy coverage, with 75% of all park area covered by tree canopy. Central Business District areas had the least amount of trees, with only 11% of its land area occupied by trees.

In terms of PPA, Suburban Residential land use area led with 23% or 3,611 acres available for new trees. So, Suburban residential areas contributed the greatest amounts of both UTC and PPA towards the citywide totals, making up 64% of the City's UTC and 77% of all PPA in Bellevue. Both Industrial and Parks land use areas also had significant PPA available within their boundaries with 18% and 17% respectively.
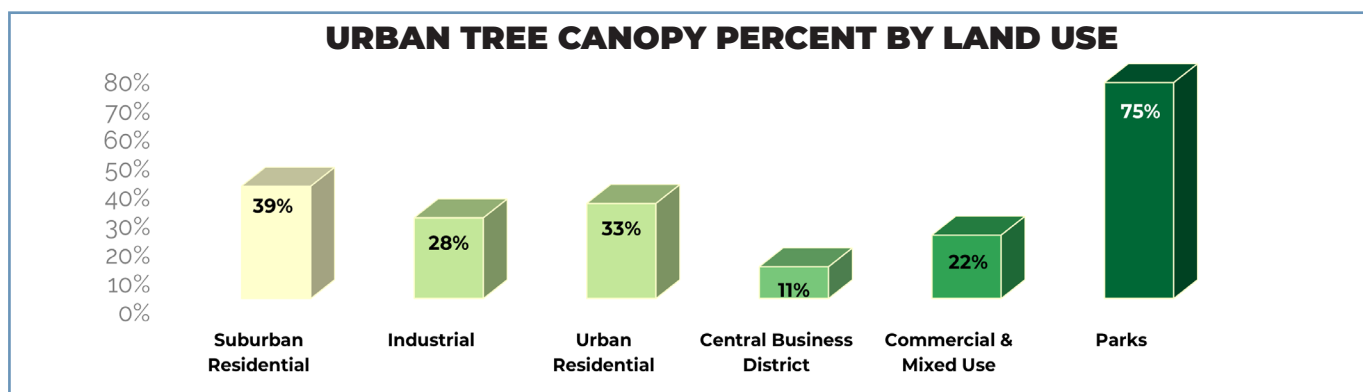
Figure 10. | Urban tree canopy assessment results by land use classes in 2021.

URBAN TREE CANOPY CHANGE BY DESIGNATED LAND USE

Dividing the urban tree canopy change results by the City's designated land use categories offered some additional insights as to how Bellevue's canopy has changed over time. Bellevue's Industrial areas were the only land use type that had a net loss of canopy throughout the 10-year study period (-4 acres or a 2% loss). While areas designated for Central Business Districts only make up 2% of Bellevue's total area, these areas experienced the largest percentage increase in canopy during the 10-year study period, from 6% (25 acres in 2011) to 11% (42 acres in 2021). Despite Parks experiencing a 2% loss of its canopy during the initial study period (2011 to 2019), the downward trajectory of canopy seems to be reversed. Between 2019 and 2021 Parks gained 62 acres of canopy.

Although Suburban Residential areas showed an overall gain during the entire ten year study period (+311 acres, the largest acreage gain of all land use types), it lost 65 acres of canopy from 2019 to 2021. In fact, this was the only land use type to lose canopy in the most recent three year research interval. This example shows the dynamic nature of Bellevue's tree canopy. It is important for Bellevue to continue to monitor canopy in Suburban land use areas to ensure that this is not the start of a downward trend.

Figure 11. | Urban tree canopy change by designated land uses in Bellevue from 2011-2021.

URBAN TREE CANOPY CHANGE BY LAND USE FROM 2019 TO 2021 (ACRES)

PARKS ▬▬▬▬▬▬▬▬▬▬▬ *62*
COMMERCIAL & MIXED USE ▬▬▬▬ *23*
CENTRAL BUSINESS DISTRICT ▬▬ *12*
URBAN RESIDENTIAL ▮ *5*
INDUSTRIAL ▮ *1*
-65 ▬▬▬▬▬▬ SUBURBAN RESIDENTIAL
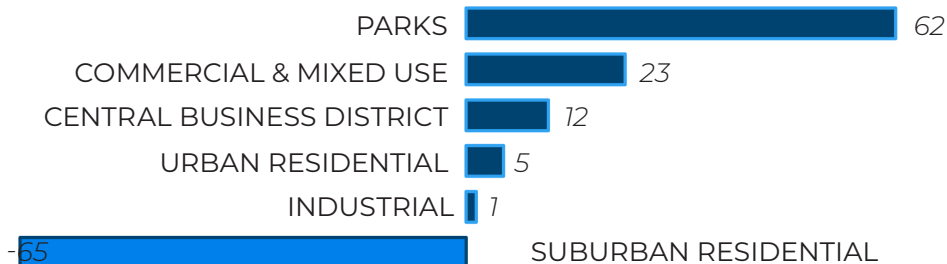
Figure 11. | Urban tree canopy change by designated land uses in Bellevue from 2019-2021.

*Figure 12. | Urban tree canopy in Bellevue by designated land use in 2021. * Designated Land Use acreage includes the Urban Growth Area in Cougar Mountain, which is outside of City limits, but included in the Comprehensive Plan, along with a portion of Newcastle Park, which the City owns and maintains.*
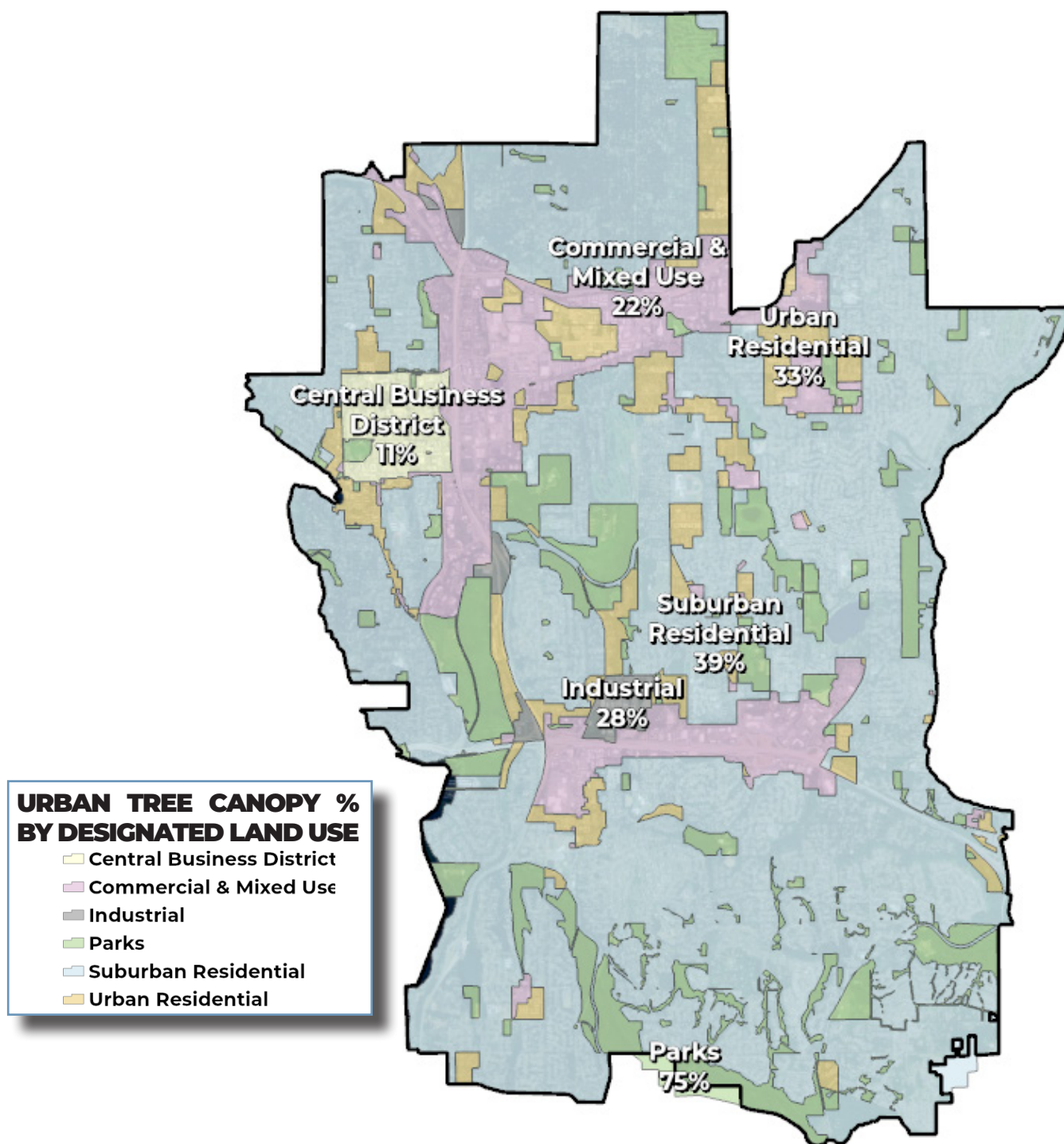
URBAN TREE CANOPY BY NEIGHBORHOODS

Urban tree canopy metrics were also assessed at the neighborhood level. This 2021 analysis revealed that Bellevue has a great deal of variation in UTC throughout the City. While some neighborhoods such as Bridle Trails and Cougar Mountain/Lakemont had around 50% canopy cover, others such as BelRed and Factoria had less than half that. Neighborhood parks, greenbelts, and open spaces are included in these canopy metrics. Consequently, some neighborhoods may have inflated tree canopy measurements due to the presence of these designated greenspaces.

Bridle Trails had the highest canopy cover at 53%. This neighborhood was the second largest contribution of citywide canopy at 13% of the total. Cougar Mountain / Lakemont had slightly more canopy acres, contributing 14% of the citywide canopy cover. Lake Hills was one of the largest neighborhoods (containing 11% of the City's land area) but only contained 9% of the City's canopy cover. Fortunately, this neighborhood has the most room for new trees, with 555 acres, or 13% of the City's total PPA.

A majority of the neighborhoods remained relatively close to the citywide average of 20% PPA. Downtown had the least amount of tree canopy cover (just 11%) and also the lowest amount of PPA, with only 7%. The Downtown neighborhood would greatly benefit from tree planting since 80% of its land is covered with impervious surfaces. Similarly, Lake Hills had almost 900 acres of impervious surfaces. Introducing more trees to these areas of high impervious neighborhoods would improve aesthetics of the City, attract more shoppers and tourists to local businesses, and improve walk-ability throughout these residential areas.

URBAN TREE CANOPY BY NEIGHBORHOODS (INCLUDING PARKS)

Neighborhood	Canopy
Bridle Trails	53%
Cougar Mountain / Lakemont	52%
West Lake Sammamish	48%
Somerset	44%
West Bellevue	44%
Newport	43%
Woodridge	42%
Wilburton	40%
Eastgate	36%
Northwest Bellevue	35%
Lake Hills	34%
Northeast Bellevue	33%
Crossroads	30%
Factoria	22%
BelRed	14%
Downtown	11%

Lake Hills
- *2nd largest neighborhood*
- *Lots of impervious*
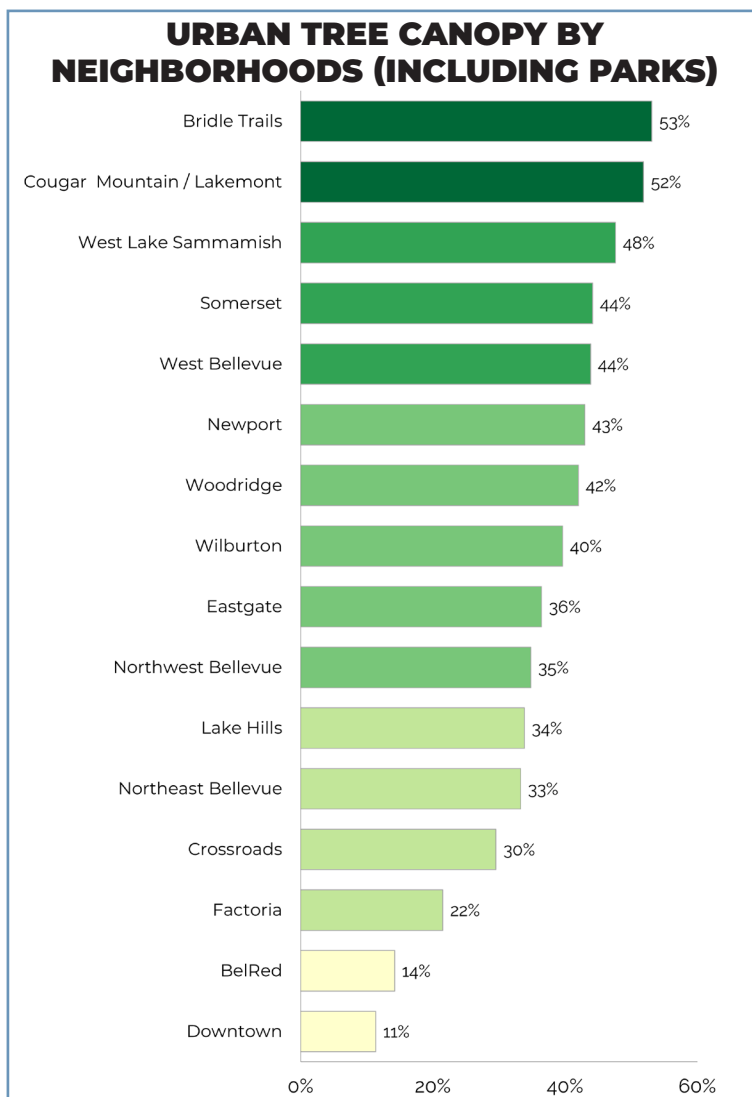- *Lots of plantable space*
- *Low canopy cover*

Figure 13. | Urban tree canopy by neighborhoods including park lands.

URBAN TREE CANOPY CHANGE BY NEIGHBORHOODS

Subdividing the results by neighborhoods, it became evident that the bulk of canopy loss was concentrated in four neighborhoods. Over the course of a decade, Wilburton had the sharpest canopy decline of 2%, equivalent to a loss of 18 acres. Conversely, the Bridle Trails neighborhood gained the most canopy area, approximately 123 acres or 6% canopy increase over the same period. Although the Downtown neighborhood had the lowest canopy cover in 2021, it consistently gained canopy throughout the assessment, making a commendable 4% canopy increase in ten years.

Between 2019 and 2021, both Eastgate and Northeast Bellevue lost about 20 acres of canopy. During this time Lake Hills also saw a decline of about 35 acres. Fortunately, all three of these neighborhoods did experience an overall net increase from 2011 to 2021. Nevertheless, given their recent reductions in canopy, it would be prudent to monitor canopy in these neighborhoods.

-2%

The largest reduction of canopy occurred in Wilburton

Table 3. | Urban tree canopy change by neighborhoods.

Neighborhood	Land Distribution		UTC in 2021		UTC Change (2019-2021)		UTC Change (2011-2021)	
	Acres	%	Acres	%	Acres	%	Acres	%
BelRed	962	4%	137	14.2%	3	0%	-2	0%
Bridle Trails	2,027	9%	1,077	53.1%	39	2%	123	6%
Cougar Mountain / Lakemont	2,369	11%	1,229	51.9%	-1	0%	75	3%
Crossroads	815	4%	241	29.6%	-10	-1%	21	3%
Downtown	433	2%	49	11.4%	12	3%	17	4%
Eastgate	1,767	8%	644	36.5%	-24	-1%	42	2%
Factoria	389	2%	84	21.5%	6	1%	13	3%
Lake Hills	2,261	11%	765	33.9%	-35	-2%	59	3%
Newport	1,719	8%	739	43.0%	14	1%	-1	0%
Northeast Bellevue	1,415	7%	471	33.3%	-18	-1%	39	3%
Northwest Bellevue	1,327	6%	462	34.8%	2	0%	17	1%
Somerset	1,313	6%	580	44.2%	-5	0%	17	1%
West Bellevue	1,677	8%	736	43.9%	41	2%	-2	0%
West Lake Sammamish	1,126	5%	536	47.6%	-7	-1%	37	3%
Wilburton	1,113	5%	441	39.6%	10	1%	-18	-2%
Woodridge	731	3%	307	42.0%	13	2%	14	2%
Totals	**21,444**	**100%**	**8,500**	**39.6%**	**+40**	**+0%**	**+451**	**+2%**

URBAN TREE CANOPY BY NEIGHBORHOODS (EXCLUDING PARKS)

Bellevue is fortunate to have an extensive parks system that includes some heavily forested areas. As part of the canopy cover analysis, parks were removed from the neighborhood areas in an effort to demonstrate canopy growth (or decline) without the influence of these densely wooded regions. Bellevue contains almost 100 parks, totaling 2,514 acres of land set aside for open space, preservation and recreation. Combined, these areas contain 1,880 acres of canopy. The results show that with parks removed, the average canopy cover among neighborhoods drops from 40% to 35%. Even though the parks contain ample plantable space, it was not enough to alter the average PPA percentage across the neighborhoods.

Table 4. | Urban tree canopy change by neighborhoods minus park lands.

Neighborhood Areas Minus Bellevue Parks	2011 % UTC	2021 % UTC	Change from 2019 to 2021	Change from 2011 to 2021
BelRed	14.3%	14.0%	0.4%	-0.3%
Bridle Trails	47.6%	54.0%	2.3%	6.4%
Cougar Mountain / Lakemont	39.3%	42.4%	-0.3%	3.1%
Crossroads	26.8%	29.2%	-1.2%	2.4%
Downtown	6.4%	10.7%	3.0%	4.3%
Eastgate	33.6%	35.9%	-1.4%	2.3%
Factoria	18.1%	21.5%	1.4%	3.4%
Lake Hills	28.6%	30.6%	-1.9%	2.1%
Newport	36.0%	36.2%	0.5%	0.2%
Northeast Bellevue	27.6%	30.3%	-1.4%	2.7%
Northwest Bellevue	33.0%	34.4%	0.2%	1.4%
Somerset	32.2%	33.7%	-0.5%	1.5%
West Bellevue	37.4%	38.1%	0.3%	0.7%
West Lake Sammamish	38.6%	41.9%	-1.2%	3.3%
Wilburton	30.2%	29.9%	0.6%	-0.3%
Woodridge	33.9%	36.3%	1.5%	2.3%
Totals	**32.9%**	**35.2%**	**-0.1%**	**2.3%**
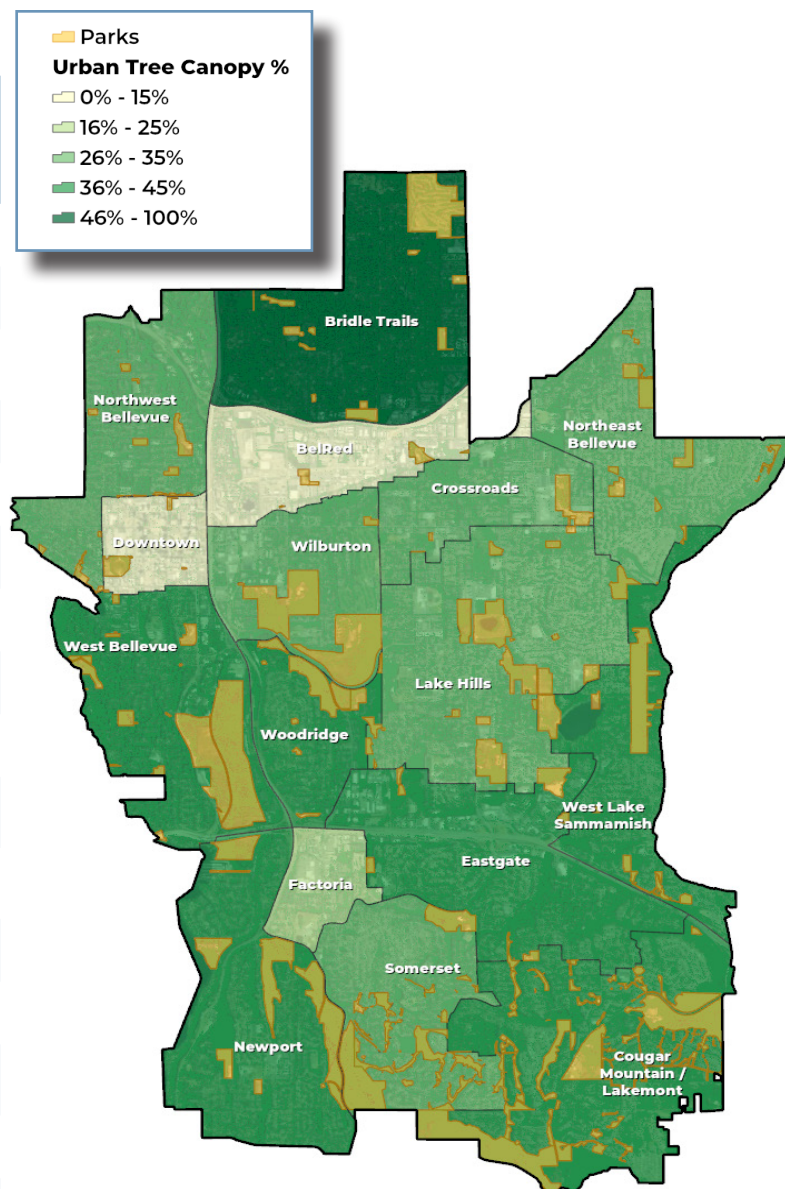
Figure 14. | Bellevue's neighborhoods excluding parks.

URBAN TREE CANOPY CHANGE BY NEIGHBORHOODS (EXCLUDING PARKS)

Looking solely at Bellevue's parks, those features collectively gained 20 canopy acres throughout the 10-year study period. On the other hand, with parks removed, neighborhoods had a net gain of 391 acres (or a consistent 2% increase) in canopy. Interestingly, the results show that tree canopy in Bellevue's neighborhoods actually had a slightly higher rate of canopy gain without the parks included (2.1% UTC change without the parks as opposed to 1.9% UTC change with the parks). In conclusion, while the parks do significantly contribute to the citywide canopy, the neighborhoods themselves are independently forested as well.

URBAN TREE CANOPY BY STREAM CORRIDORS

Stream corridors help maintain and promote a healthy natural environment in Bellevue by providing long-term protection of streams, enhanced wildlife habitat, as well as improved water quality. These corridors represent areas within 100 feet of a stream, on both sides of the stream.

These floodplains covered about 11% of the City's land area and contained 18% of the City's tree canopy cover. In 2021, Bellevue's stream corridors had an average of 66% tree canopy coverage, nearly 30% higher than the citywide average. The stream corridors studied contained 374 acres of possible planting area, or 9% of the City's total available space.

There are 385 acres (17%) of impervious surfaces within this riparian corridor. Trees planted near these impervious surfaces can aid in mitigating storm-water runoff that may otherwise carry unhealthy pollutants (such as nitrogen, phosphorous, and suspended sediment) into surface water bodies. Additionally, trees planted in these areas will provide shade for water bodies and in turn, reduce water temperatures to protect the aquatic ecosystem of endemic fish and reptile species. The Shoreline Management Act was created to empower Washington municipalities to restore and expand natural buffers in an effort to protect the state's 28,000 miles of marine shorelines. To fully comply with recommendations associated with this legislation, Bellevue should seek to increase canopy cover to near 100% to protect it's natural resources for future generations.

URBAN TREE CANOPY CHANGE BY STREAM CORRIDORS

From 2011 to 2019, there was a slight decrease in tree canopy cover (-0.1%) in Bellevue's stream corridors. However between 2019 and 2021, 20 acres of canopy were gained in these areas. So during the entire ten year study period (2011 to 2021), the stream corridors experienced an overall increase in tree canopy. In total, there was a 1% net increase, or a gain of 19 acres. By 2021, 66% of these areas were covered with canopy, up from 65% in 2011.

These corridors provide a variety of important ecosystem services so it is important to preserve and protect the existing tree canopy in these areas.
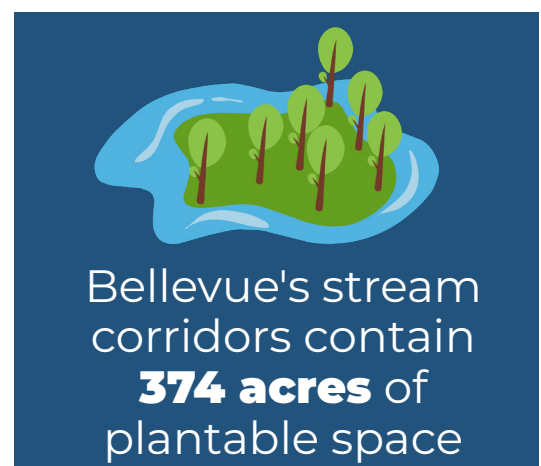

Figure 15. | Urban tree canopy in Bellevue's stream corridors.

Bellevue's stream corridors contain **374 acres** of plantable space

URBAN TREE CANOPY BY DRAINAGE BASINS

Because of their benefits for regulating runoff, reducing flooding, and maintaining a healthy water cycle, urban tree canopy metrics were also assessed across the surrounding drainage basins. This assessment boundary extended beyond the City boundary to include additional areas that drain into Bellevue's City limits (see Figure 16). Generally, the basins near the northern and southern boundaries of the City contained the highest canopy cover. The basins with the lowest canopy cover were generally concentrated at the northern part of the City as well.

Within the various drainage basins, there was significant variation in both UTC and PPA. UTC ranged from to 64% in Goff Creek to only 18% in Sturtevant Creek. Coal Creek was the largest basin, representing 14% of the total study land area, and unsurprisingly represented 20% of the citywide canopy with it's 2,401 acres of canopy. This basin also had an extremely high canopy cover within it's boundaries at 60%. The only basin with a higher percentage of canopy cover was Goff Creek.

PPA ranged from 11% in Goff Creek to 29% in the Redmond 400 basin. Coal Creek and Kelsey Creek offered the greatest opportunities for expanding the City's canopy, containing 13% and 12% of the City's total PPA respectively. Lakehurst and Mercer Slough are also prime targets for tree planting opportunities with about 300 acres of plantable space each.
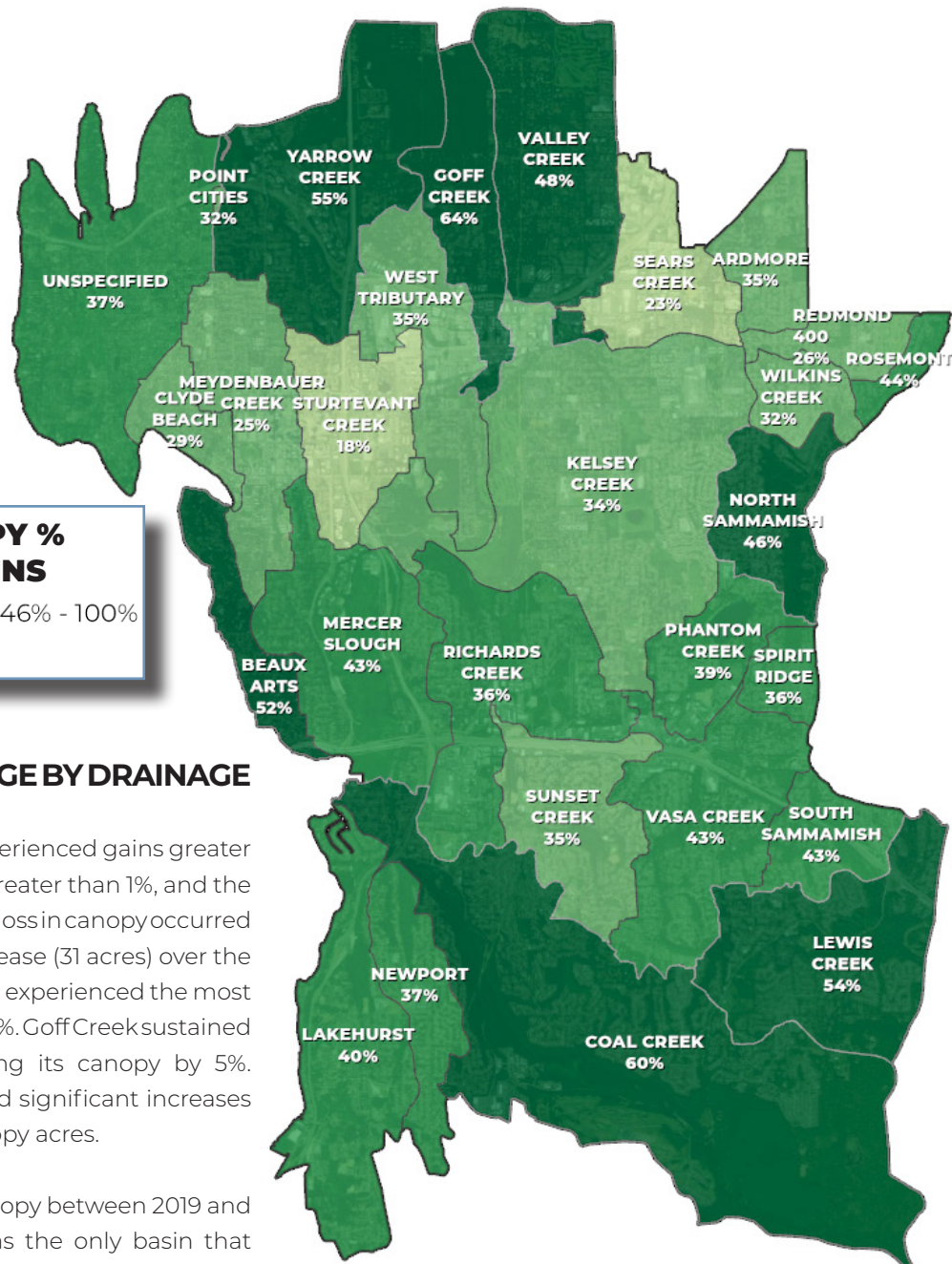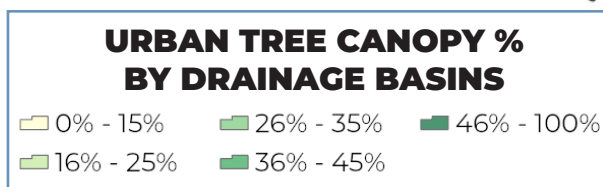
URBAN TREE CANOPY CHANGE BY DRAINAGE BASINS

Of the City's 28 drainage basins, 18 experienced gains greater than 1%, only one experienced a loss greater than 1%, and the other 9 remained relatively stable. That loss in canopy occurred in the Lakehurst basin, with a 2% decrease (31 acres) over the ten-year period. The Valley Creek basin experienced the most significant canopy gain of 84 acres, or 6%. Goff Creek sustained substantial canopy growth, increasing its canopy by 5%. Similarly, Lewsi Creek also experienced significant increases in canopy, with the addition of 51 canopy acres.

Unfortunately, 16 of the basins lost canopy between 2019 and 2021. However, Lakehurst emerged as the only basin that persisted to lose canopy throughout the ten-year evaluation. This sustained decline merits vigilant monitoring to ensure that the basin's downward trajectory of canopy is corrected.

Figure 16. | Urban tree canopy in Bellevue and surrounding areas by drainage basin in 2021.

URBAN TREE CANOPY BY SCHOOLS

UTC was assessed for all 81 public and private school properties in Bellevue to determine how well the numerous benefits of the City's urban forest are reaching its next generation of residents. Exposure to green spaces has been shown to increase attention and concentration, and improve overall mental well-being in children.

Educational institutions within Bellevue collectively occupy 825 acres, constituting roughly 10% of the City's land expanse. Combined, the schools encompass a total of 220 canopy acres. With a canopy coverage of 27%, this falls notably below the citywide average of 40%. However, leveraging all 147 acres of PPA on school yards could raise the average canopy cover up to 45%.

Table 5. | Urban tree canopy by Bellevue's schools.

Schools	UTC Acres	UTC %	Schools	UTC Acres	UTC %	Schools	UTC Acres	UTC %
America's Child	0.1	19%	Eastgate	2.5	31%	Northwest University	0.4	35%
Ardmore	3.1	30%	Eastside Academics	3.7	40%	Odle	2.9	15%
Asia Pacific	0.3	23%	Eastside Academy	3.8	38%	Open Window	1.7	22%
Bellevue College (Main Campus) - Landerholm	33.9	35%	Eastside Montessori	0.8	25%	Overlake Specialty	0.4	38%
Bellevue College (Main Campus) - 145th Ave	0.2	41%	Eastside Preparatory School	0.0	0%	Phantom Lake	1.6	16%
Bellevue College (North Campus) - 29th Place	0.4	23%	Educational Service Center (East)	1.0	40%	Puesta Del Sol	4.7	35%
Bellevue College (Main Campus) - 145th Ave	0.3	40%	Educational Service Center (West)	1.1	42%	Ringdall	4.5	24%
Bellevue	13.0	33%	Emerald Heights	4.1	77%	Risdon	5.4	31%
Bellevue Big Picture	1.6	12%	Enatai	2.3	27%	Sacred Heart	2.6	28%
Bellevue Children's Academy (Lower Campus)	0.3	19%	Eton	0.7	52%	Sammamish	4.1	11%
Bellevue Children's Academy (Upper Campus)	0.3	11%	Forest Ridge	6.5	39%	Sarodgini Children's Academy	0.4	37%
Bellevue Christian School (Three Points Campus)	2.5	30%	French Immersion School	0.5	30%	Seattle Voctech	0.0	0%
Bellevue Christian School (Clyde Hill Campus)	0.9	10%	GIX	0.1	3%	Sherwood Forest	1.0	11%
Bellevue Management Support Ctr	1.2	19%	Hazelwood	5.1	36%	Somerset	4.2	41%
Bellevue Montessori School (Main Campus)	0.9	61%	Highland	3.7	18%	Spiritridge	3.1	34%
Bellevue Montessori School (Park Elementary Campus)	0.1	35%	Hillside	3.4	94%	St Louise	1.5	16%
Bellevue Montessori School (Rossano Campus)	0.2	24%	Interlake	10.2	26%	St Madeleine	3.0	29%
Bellewood	2.5	25%	International	5.8	30%	St Thomas	0.6	10%
Bel-Red Bilingual	0.2	44%	International Montessori	0.3	34%	Stevenson	1.0	10%
Bennett	2.2	23%	Jewish Day	0.9	15%	Sunset	3.9	28%
Cedar Crest	0.5	31%	Jing Mei	3.4	34%	Tillicum	2.1	12%
Cedar Park Christian	0.3	9%	Lake Hills	0.8	10%	Tyee	4.8	21%
Cherry Crest	6.8	67%	Little School	7.4	76%	Undeveloped	1.1	53%
Chestnut Hill	0.8	26%	Living Montessori	3.7	40%	Undeveloped	3.0	36%
Chinook	2.6	15%	Medina	0.9	15%	Wilburton	2.2	24%
Clyde Hill	1.4	20%	Newport	4.7	12%	Wilburton Instructional Service Ctr	0.5	8%
Cougar Ridge	2.9	29%	Newport Heights	2.4	26%	Woodridge	1.2	12%

Overall in 2021, canopy cover varied dramatically, ranging from a near 0% at Seattle Voctech School to 94% at the Hillside Student Community School. Interestingly, primary education (K-5 schools) boasted the highest average canopy cover. However, it is important to highlight that this grade level category had the highest number of schools compared to other grade level types.
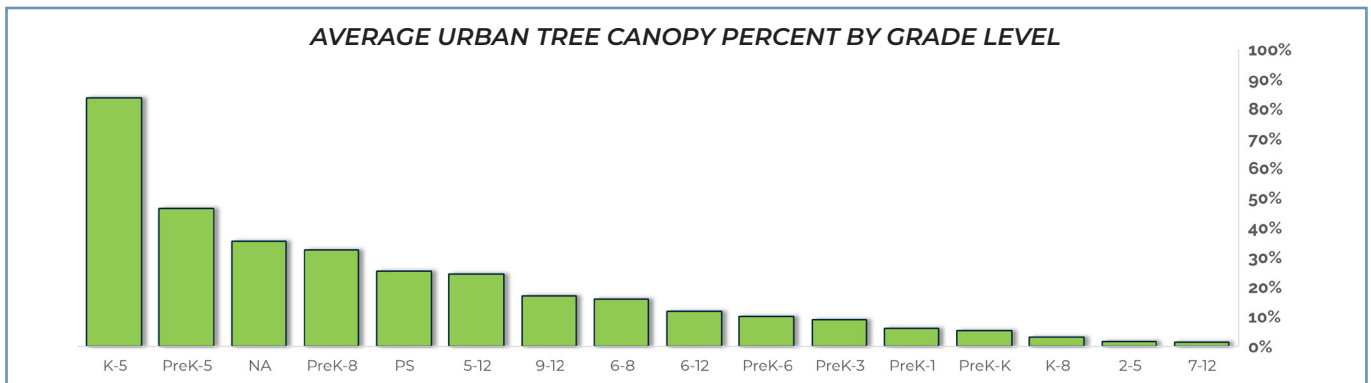

Figure 17. | Average urban tree canopy percent by school grade level.

The average PPA of 1.8 acres on school property reveals that while school properties are in need of additional tree canopy, there is minimal available space to plant trees. Bellevue College (Main Campus) - Landerholm offers the greatest opportunity, offering 15 acres of PPA. Similarly to UTC, when assessing grade level, K-5 schools had the highest average percentage of plantable space.
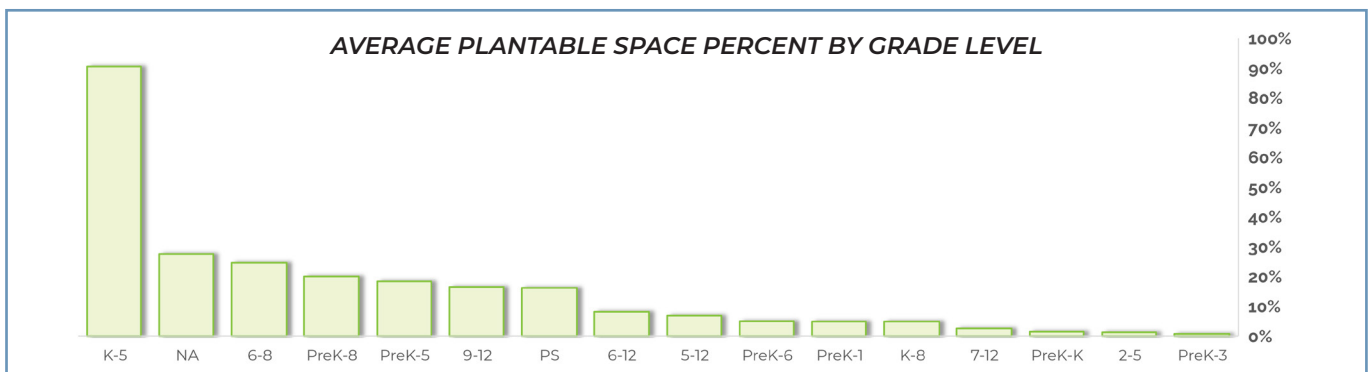

Figure 18. | Average plantable space percent by school grade level.

URBAN TREE CANOPY CHANGE BY SCHOOLS

Bellevue's 81 school properties experienced a total net gain of 17 acres of tree canopy, or a 2.1% increase in canopy across the combined school areas. Wilburton Elementary School, which was built in 2017-2018, experienced the greatest reduction in canopy, losing four of its seven acres from 2011-2021 (equating to a 51% loss). Bellevue College's Main Campus (on Landerholm Circle SE) is the largest school property in Bellevue, and that campus experienced the largest increase of canopy acreage from 29 acres in 2011 to 34 acres in 2021 (a gain of 5%). A majority of school properties (58 schools, or 72%) experienced increases in canopy cover over the ten year period. Targeting those 20 schools that lost canopy for tree planting events can serve as community-building activities, fostering collaboration among students, teachers, parents, and local organizations.
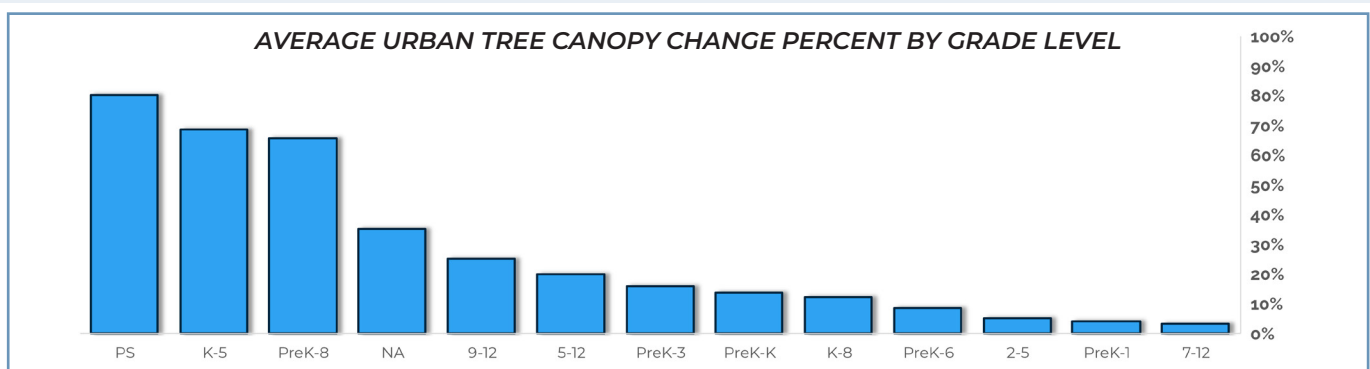

Figure 19. | Average tree canopy change percent by school grade level.

URBAN TREE CANOPY BY CENSUS BLOCK GROUPS

Urban tree canopy and possible planting areas were assessed at the census block group level. These boundaries are reviewed and updated at the start of every decade. The boundaries analyzed in this assessment were modified by the U.S. Census Bureau in 2020. This was the smallest geographic area unit analyzed in this assessment and is particularly valuable for assessing the equitable distribution of tree canopy throughout the City as the block groups are linked to all demographic and socioeconomic U.S. census data.

Results indicated that urban tree canopy varies substantially throughout the City, with one census block group containing only 6% cover and another containing as much as 90%. The areas of low canopy cover were generally concentrated in the northeastern portion of the City near the Northwest Bellevue and the Bel-Red neighborhoods. Areas of high canopy cover were seen along the edges of the City's perimeter, particularly in the vicinity of Coal Creek, Lakemont and West Lake Sammich.
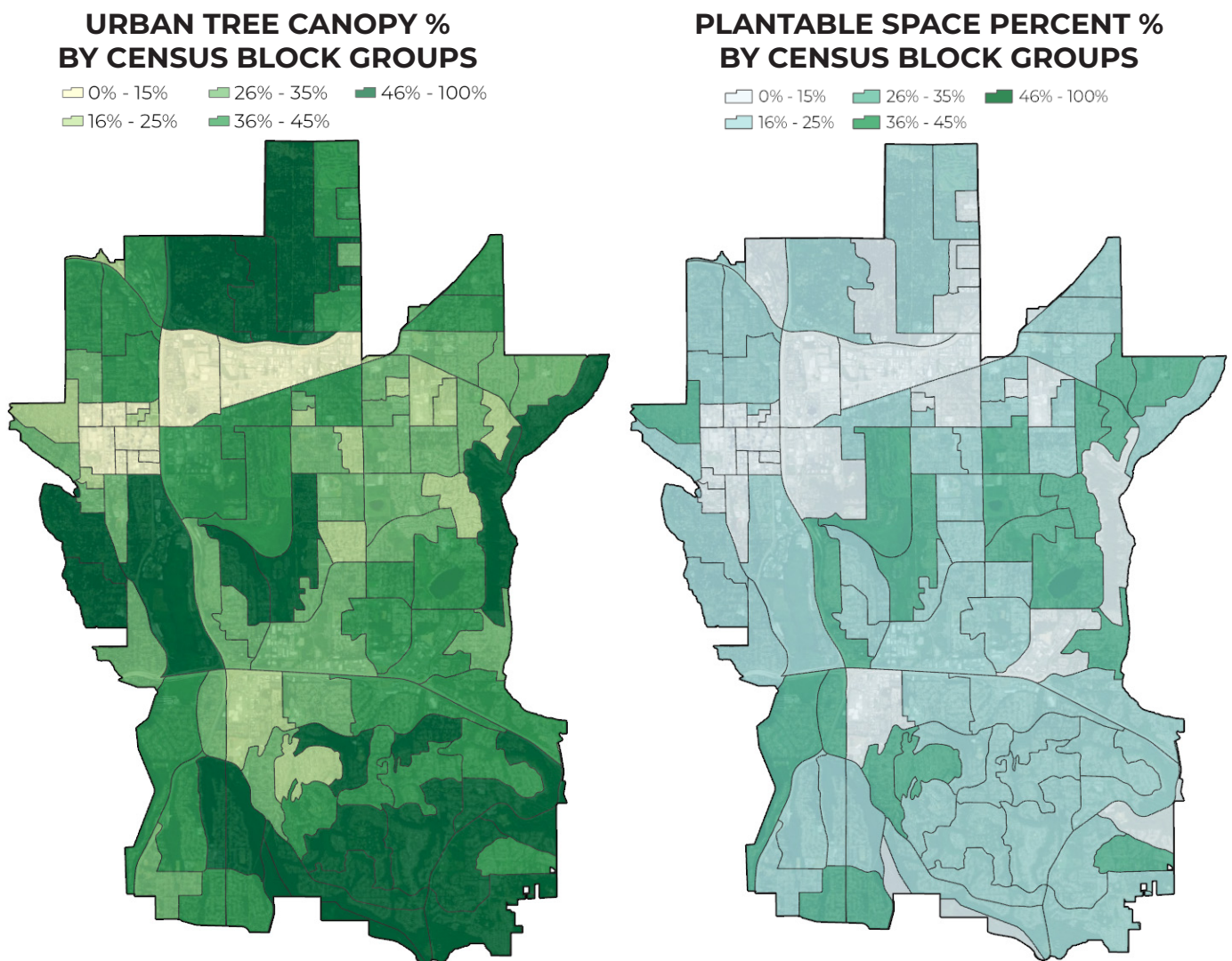
Figure 20. | Urban tree canopy percent (left) and plantable space percent (right) by census block groups.

PPA also varied somewhat across the block groups, with one containing only 2% PPA and another as much as 34% PPA. Unfortunately some of the areas of low UTC are also areas of low PPA, as seen in the more industrial neighborhoods in the northern portion of the City.

For the census blocks adjacent to I-405, I-90, and SR520, additional tree planting in the vicinity of the freeways can help improve air quality, reduce noise, and improve the experience for pedestrians in these areas.

URBAN TREE CANOPY CHANGE BY CENSUS BLOCK GROUPS

The most fine-grained unit of analysis for this assessment was the change in canopy across census block groups. As the smallest geographic unit covering the entire City, this assessment revealed changes in canopy at the finest scale. Some block groups lost as much as 5% of their canopy while others gained up to 18%. Losses in canopy tended to be concentrated near the center of the City and along the I-405 corridor. The most significant loss within one block group was a loss of 18 acres in the block group that contained the Glendale County Club. Generally, block groups in the northern part of the City experienced more canopy increases. The largest increase occurred in the block group containing Bridle Trails State Park with a gain of 51 canopy acres.

A deeper understanding of canopy trends may be gleamed from evaluating canopy change in more recent years. For instance, the largest block group, containing Mercer Slough, experienced the largest reduction in canopy, losing 68 acres of canopy between 2011 and 2019. Yet, this same area also had the largest increase in canopy with 52 acres from 2019 to 2021. So over the entire 10-year assessment period, the block group had a net loss of just 15 acres.
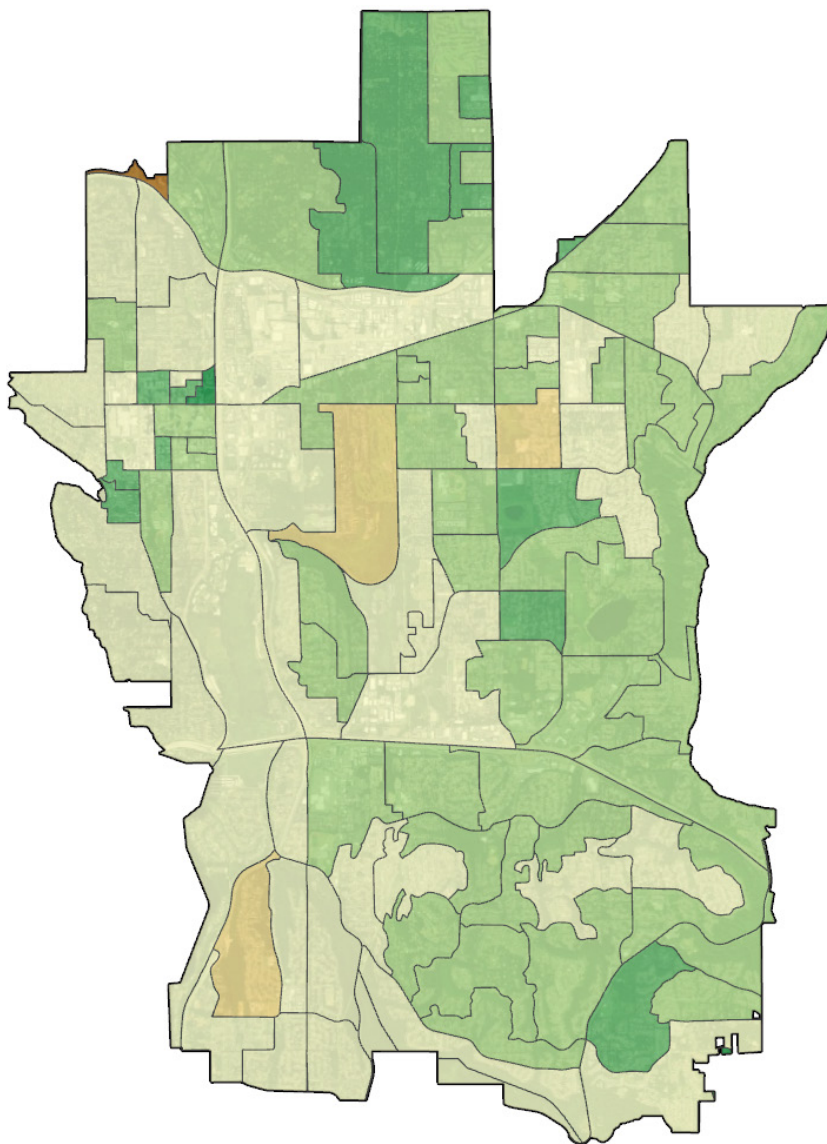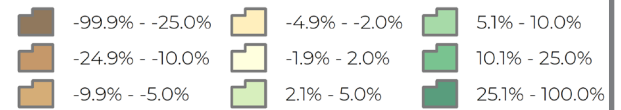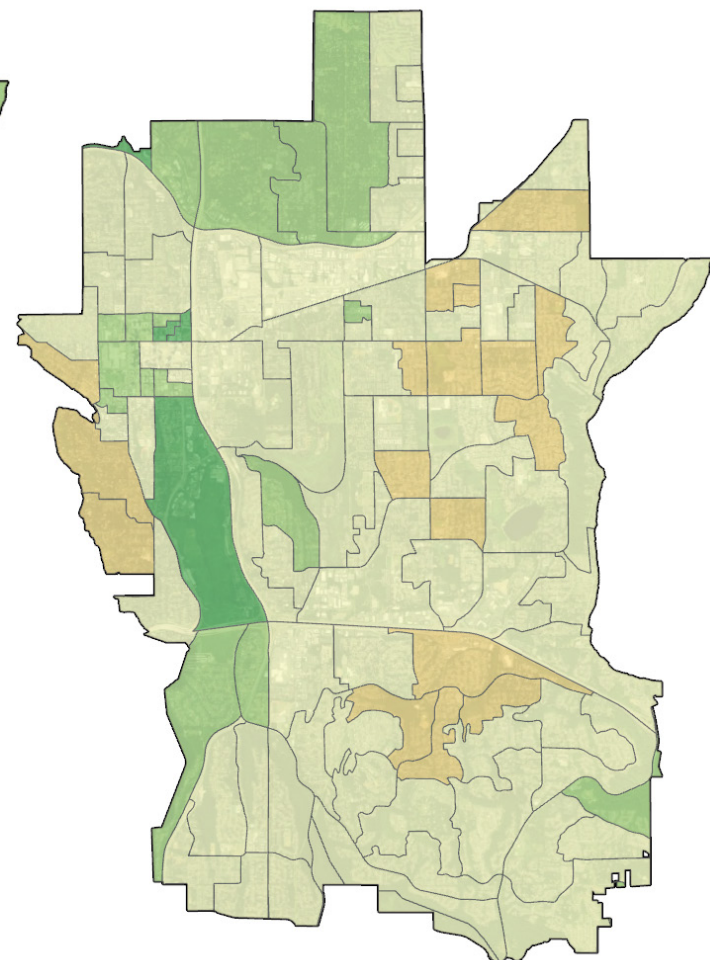

Figure 21. | Urban tree canopy change by census block groups. Canopy change from 2011 to 2021 on the left and changes from 2019 to 2021 on the right.

URBAN TREE CANOPY BY RIGHT-OF-WAY BY CENSUS BLOCK GROUPS

In addition to being assessed throughout each census block group's entire area, UTC was also assessed for the right-of-way (ROW) areas within each census block group. Right-of-way areas include the City's sidewalks, roadways, and medians that are publicly owned and maintained. This metric is helpful for quantifying the City's street tree resources, as trees in this area provide an especially valuable service in terms of air pollution control and shading, while still tying it to a small and significant unit of measure (census block groups).

The ROW occupies 3,867 acres of land, approximately 18% of Bellevue's land area. On average, Bellevue's rights-of-way had a UTC of 24% in 2021. This figure fell well below the citywide average of 40%. Additionally, 63% of the ROW surface was classified as impervious and therefore unsuitable for tree planting without major land modification. However, there are 510 acres of plantable space, or 13% of the right-of-way is composed of open vegetation available for new trees.

Figure 22. | Urban tree canopy in the right-of-way.

URBAN TREE CANOPY CHANGE BY RIGHT-OF-WAY BY CENSUS BLOCK GROUPS

Changes in canopy cover within the rights-of-way of each census block group were assessed to gain insight on street trees citywide. Throughout the entire 10-year study period these areas had an overall increase of 3% which was greater than the citywide average of 2%. In more recent years, street trees gained 26 acres or saw an increase of 1% from 2019 to 2021. Changes across census block groups varied with the greatest decrease at -14% and the greatest increase at 19%.

ASSESSMENT OF
ECOSYSTEM BENEFITS

Using the best available science from i-Tree tools, values were calculated for some of the benefits and functions provided by the urban tree canopy in Bellevue, Washington. The urban forest holds millions of dollars of savings in avoided infrastructure costs, pollution reduction, and stored carbon. The following values were calculated using the USDA Forest Service's i-Tree Landscape tool with the City of Bellevue's total acres of urban tree canopy as the input data.

AIR QUALITY

Trees produce oxygen, indirectly reduce pollution by lowering air temperature, and improve public health by reducing air pollutants which cause death and illness. The existing tree canopy in Bellevue removes approximately 520,300 pounds of air pollution annually, valued at over $2,589,762.

BENEFIT	UNITS	VALUE
Pollution Removed	520,284 tons/yr	$2,589,763
Runoff Avoided	700 M gal/yr	$6,259,703
CO_2 Sequestered	7,172 tons/yr	$1,223,204
ANNUAL VALUE PROVIDED		**$10,072,669**
CO_2 Stored	362,446 tons	$61,815,465

STORM-WATER AND WATER QUALITY

Trees and forests mitigate storm-water runoff which minimizes flood risk, stabilizes soil, reduces sedimentation in streams and riparian land, and absorbs pollutants, thus improving water quality and habitats. The tree canopy in Bellevue absorbs over 700 million gallons of water per year. Extrapolated citywide, this means that the City of Bellevue's existing canopy provides over $6,259,702 annually in storm-water benefits.

CARBON STORAGE AND SEQUESTRATION

Trees accumulate carbon in their biomass; with most species in a forest, the rate and amount increase with age. The trees of Bellevue store approximately 362,450 tons of carbon, valued at over $61.8 million (or $170 per ton), and each year the tree canopy absorbs and sequesters approximately 14.3 million pounds of carbon dioxide, valued at over $1.2 million.

MENTAL HEALTH
People without views of nature from their desks claimed 23% more sick days than workers with views of nature.

TOTAL ANNUAL BENEFITS
Bellevue's trees annually provide **$10,072,669** in ecosystem benefits.

CLEANER AIR
$2,589,762
Each year, roadside trees remove 260.14 tons of air pollution.

CARBON STORAGE
$61,815,464
Bellevue's urban forest stores 362,446 tons of carbon.

STORMWATER MANAGEMENT
$6,259,702
Bellevue's tree intercepts about 700.47 million gallons of runoff annually.

CARBON SEQUESTRATION
$1,223,203
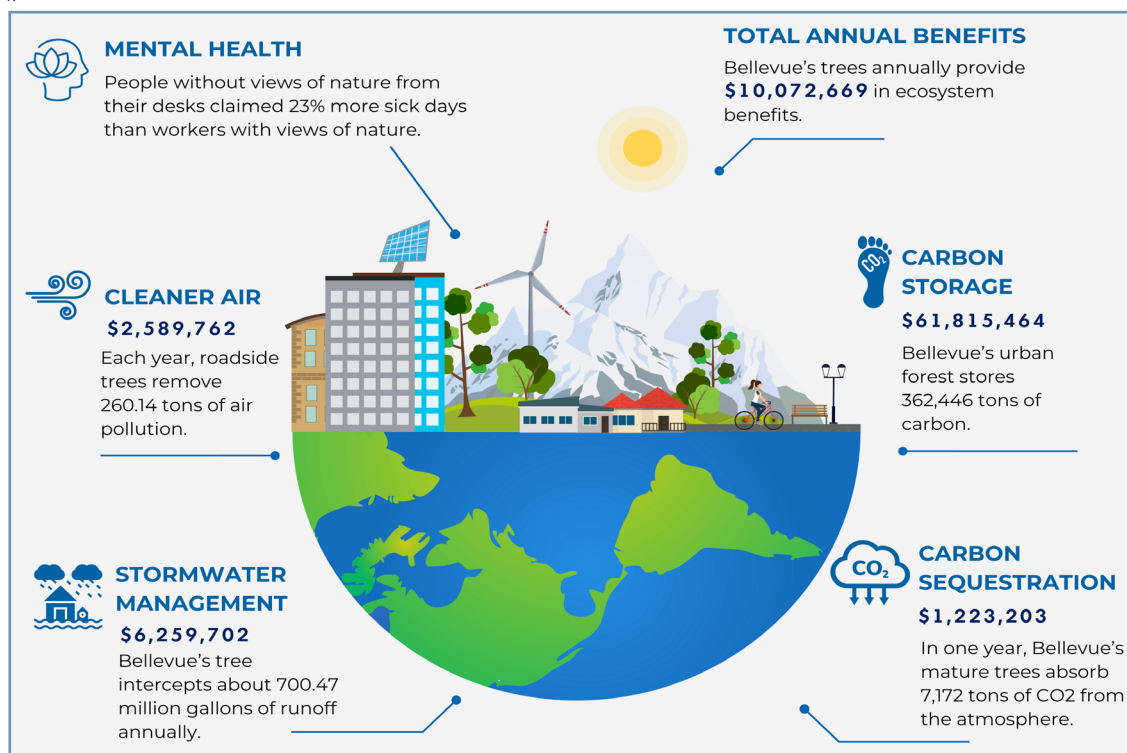In one year, Bellevue's mature trees absorb 7,172 tons of CO_2 from the atmosphere.

Figure 23. | Eco-benefits of Bellevue's urban forest derived from I-Tree. Additional data sourced from the Arbor Day Foundation and the EPA.

CONCLUSIONS AND
RECOMMENDATIONS

SUMMARY OF KEY FINDINGS

Overall, the City of Bellevue and the surrounding areas within Bellevue's drainage basins have very large resource of Urban Tree Canopy and Plantable Spaces. Along with this resources comes the responsibility to protect and preserve these green infrastructure, especially in light of the current rapid pace of urbanization, development, and overall growth. The key findings in the figure below represent a selection of actionable findings that this analysis uncovered. Page numbers are included for quick reference to the most important information.

• • • PAGE 9 • • •
Tree canopy within the City boundary increased by 2% in ten-years.

• • • PAGE 10 • • •
Suburban residential areas contributed the greatest amounts of both UTC and PPA towards the citywide totals, making up 64% of the City's UTC and 77% of all PPA in Bellevue.

• • • PAGE 12 • • •
Lake Hills was one of the largest neighborhoods (containing 11% of the City's land area) but only contained 9% of the City's canopy cover. However, this neighborhood has the most room for new trees, with 555 acres, or 13% of the City's total PPA.

• • • PAGE 13 • • •
Canopy loss was concentrated in four neighborhoods. Over the course of a decade, Wilburton had the sharpest canopy decline of 2%, equivalent to a loss of 18 acres.

• • • PAGE 15 • • •
In 2021, Bellevue's stream corridors had an average of 66% tree canopy coverage. This is nearly 30% higher than the citywide average.

• • • PAGE 17 • • •
Educational institutions within Bellevue collectively have an average canopy cover of 27%. However, leveraging all 147 acres of PPA on school yards could raise the average canopy cover up to 45%.

• • • PAGE 19 • • •
For the census blocks adjacent to I-405, I-90, and SR520, additional tree planting in the vicinity of the freeways can help improve air quality, reduce noise, and improve the experience for pedestrians in these areas.

• • • PAGE 21 • • •
Bellevue's ROW contains 501 acres of plantable space.

RECOMMENDATIONS

1. Leverage the results of this assessment to promote the urban forest and monitor trends

The results of this assessment should be used to encourage investment in urban forest monitoring, maintenance, and management; to prepare supportive information for local budget requests/grant applications; and to develop targeted presentations for City leaders, planners, engineers, resource managers, and the public on the functional benefits of trees in addressing environmental issues. The land cover, tree canopy, and plantable space data should be disseminated to diverse partners for urban forestry and other applications while the data are current and most useful for decision-making and implementation planning. The information from this study can help establish new canopy cover goals for the short- and long-term to continue to expand City of Bellevue's urban forest to its known potential. Recurring assessments of the City's tree canopy represent important steps in ensuring the long-term health of its urban forest. Refining management strategies and revisiting strategic documentation can empower the City and it's stakeholders to not only evaluate its progress towards current objectives, but also formulate new ones as well.

In 2021, Bellevue's 39.6% tree canopy fell just short of the City's comprehensive plan goal of 40% tree canopy. In the 2007 study, American Forests provided the following recommendations for tree canopy in different land use types:

Table 6. | Urban tree canopy cover of each land use type compared to American Forests' 2007 recommended goals.

Land Use Types	Suggested UTC Goal %*	Current UTC %
Urban Residential	35%	33%
Suburban Residential	50%	39%
Central Business District	15%	11%
Commercial & Mixed Use	25%	22%
Industrial	25%	28%
Parks	75%	75%
Right-of-way	25%	23%

*In the American Forest's 2007 Tree Canopy Assessment, the report recommended tree canopy goals by land use type as a best practice. Further analysis of these goals is needed to determine relevance for Bellevue in terms of community character, feasibility, and desirability, especially for the suburban residential goal.

2. Use the urban tree canopy data to identify areas to prioritize canopy expansion

The City and its various stakeholders can utilize the results of the UTC and PPA analyses to identify the best locations on City-owned and private property to focus future tree planting and canopy expansion efforts. Trees can play a large role in improving public health by improving air quality, reducing temperatures, and addressing climate change. The City can acquire parcels for public use as part of redeveloped neighborhoods to be used as carbon sinks to address community access to nature, climate, human health, and equity. This assessment should be used to identify areas with the greatest need for canopy expansion. In addition to low canopy coverage, other socio-economic factors and environmental justice considerations can be used to identify areas for protecting and expanding the tree canopy in residential areas.

Additionally, the right-of-way often contains high concentrations of impervious surfaces. Utilizing the 501 acres of plantable space in the right-of-way could provide significant shading for walkways and roadways. The City can develop a proactive street tree maintenance program to take on the responsibility of planting and managing street trees, ensuring healthy trees are distributed equitably across the City. The City should evaluate City codes to increase tree preservation, protect existing trees during the development process, and set aside space for new larger stature trees to be planted within the public right-of-way to maximize the benefits of trees. Adopting ordinances and policies that reflect a "complete green streets" design methodology can help harmonize gray and green infrastructure, simultaneously maximizing public functionality and environmental benefit, while reducing associated costs.

3. Develop outreach programs towards private landowners

Suburban Residential and Urban Residential accounted for 71% of City's total tree canopy and contained 82% of all Citywide PPA. The City should focus on community outreach and education programs to better inform residents and private landholders of the environmental, health, social, and financial benefits that trees provide and consider other strategies to help preserve existing trees and grow the tree canopy in the 3,525 acres of plantable space on these residential zoned lands. The City's new urban forestry programs such as the annual Trees for Bellevue Tree Giveaway, the Tree Ambassador program, and Tree Tours all hep to increase knowledge of the value and benefits of trees and encourage tree planting and preservation. The City should explore options to develop grant programs for tree maintenance or removal of hazard or invasive trees within the City to remove barriers for overburdened communities which lack tree canopy. Tree planting programs, and tree maintenance events can help to promote proper pruning techniques for maintaining healthy, resilient trees. The City should also continue to develop partnerships with Community Based Organizations and individual champions throughout neighborhoods to build stewardship at the community level. In addition, the City should continue to conduct volunteer tree planting and tree maintenance events to increase awareness levels in the community.

4. Use TreePlotter to identify areas in need of tree canopy, prioritize planting efforts, and continue to monitor the urban forest

Performing a canopy assessment every five years is recommended. The City's current subscription to TreePlotter Canopy will guarantee updated assessments occur once than every 2-3 years. To maximize impact, see greater return on investment, and provide the greatest number of benefits to the community, we recommend that the City focus planting and management efforts in areas with high weighted priority rankings. Planting priority maps and data, displayed in TreePlotter™ CANOPY, show land cover metrics and the areas of highest priority collectively and individually for all planting prioritization criteria. Additionally, TreePlotter can be used to create unique weighted scenarios to focus efforts in targeted areas that meet specific criteria.

For instance, the City could find areas that have low UTC, high PPA, or would offer the greatest benefits to improving air quality and reducing summertime temperature. Focusing urban forest management resources on expanding and maintaining tree canopy in areas like these will have positive impacts on multiple factors that the City has deemed important. Efforts should focus on outreach to the residents of these neighborhoods, as well as local business and landowners, in order to promote new tree plantings and continued maintenance of existing trees. NAIP imagery was collected in 2021 in Washington and is collected by the USDA every two-three years. The City's CANOPY application can be updated with new UTC and PPA metrics when they become available in mid- to late-2024.

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 6ft 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" (Raciti et al., 2006) when viewed from above; the metric used to quantify the extent, function, and value of the urban forest. Tree canopy was generally taller than 10-15 feet tall.

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

URBAN TREE CANOPY

ASSESSMENT
CITY OF BELLEVUE, WASHINGTON