



December 2, 2020

TO: Park Board Chair and Commissioners
FROM: General Manager – Vancouver Board of Parks and Recreation
SUBJECT: Urban Forest Strategy Update

RECOMMENDATION

THAT, in recognition of improvements to previously reported canopy coverage metrics resulting from changes in technology and measurement timing, the Vancouver Park Board approve the updated Urban Forest Strategy, with a new city-wide target of 30% tree canopy cover by 2050, and:

- A. THAT the VanPlay Masterplan be amended to reflect this new target;
- B. THAT Park Board staff work with City of Vancouver staff to incorporate this new target into the Climate Change Emergency Response planning and land use policy, work, and the pending Vancouver Plan; and
- C. THAT staff report back on the implementation of the new canopy cover target on an annual basis.

REPORT SUMMARY

Vancouver's urban forest provides a multitude of social, ecological and economic benefits. The Park Board is responsible for the planting, care and maintenance of the city's urban forest on public land. In 2011, the City's Greenest City Action Plan set out a goal of planting 150,000 trees by 2020. Through the consistent efforts of the Park Board, this goal has recently been surpassed with the planting of a grove of Douglas firs in New Brighton Park. In light of updated canopy cover data, this report proposes increasing the city-wide canopy cover target from the current 22% to 30% tree canopy cover city-wide by 2050. This new target seeks further expansion of the urban forest in order to advance Park Board and the City's goals related to equity, nature and mitigation of the climate crisis.

BOARD AUTHORITY / RELATED POLICY

As per the [Vancouver Charter](#), the Board of Parks and Recreation has exclusive jurisdiction and control over all areas designated as permanent and temporary parks in the City of Vancouver, and the custody, care and management of other areas belonging to or held by the City as Council may from time to time determine.

As per the City of Vancouver [Street Tree By-Law \(No. 5985\)](#), the Board of Parks and Recreation is responsible for the care, custody and control of all public street trees, which includes installation and ongoing maintenance. This also includes working closely with the City of Vancouver Risk Management department to ensure best practices are implemented regarding the safety of citizens and property within the City of Vancouver.

The City of Vancouver [Protection of Trees By-law No. 9958](#) amended in 2014 addresses tree removals on private property and goals associated with retention of trees, as outlined in the Urban Forest Strategy. The Urban Landscape Development Branch within Planning, Urban Design and Sustainability primarily administers this By-Law.

[VanPlay](#): Vancouver's Parks and Recreation Services Master Plan (2018/19) sets priorities and provides tools and policies to support the pursuit of equity, connectivity and access to parks and recreation for all. The [VanPlay Framework](#) (2020) includes direction to 'Weave the City Together', by connecting and enriching ecosystems throughout the city. A key element within VanPlay recognizes the need to increase tree canopy cover within the City of Vancouver, especially in canopy deficient neighbourhoods. As shown in Figure 1, urban forest canopy by block was one of three measures used to establish the key Equity Initiative Zones.

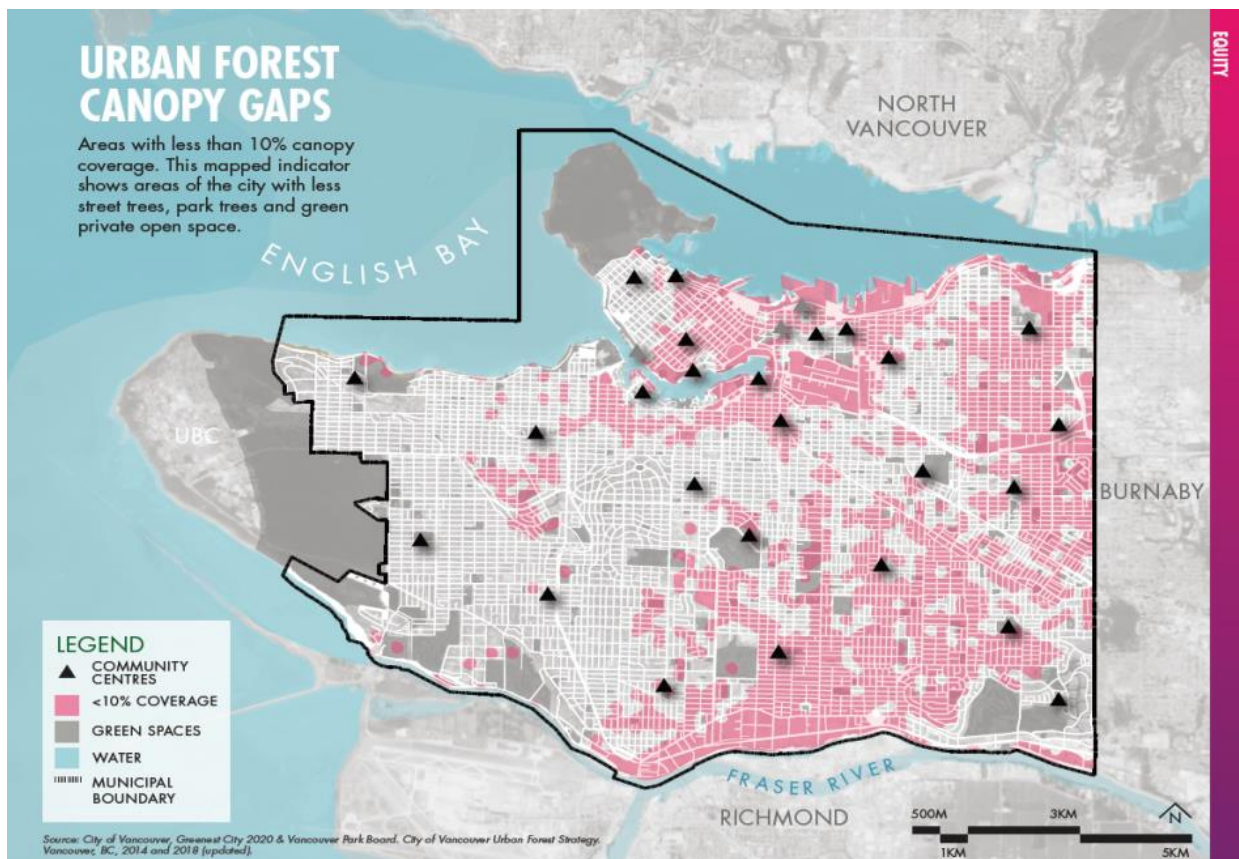


Figure 1: VanPlay Equity Initiative Zones - Urban Forest Canopy Gaps

In July 2019, the Board approved a motion titled “[Urban Forestry & Climate Emergency Action Plan](#)” directing staff to work in collaboration with Metro Vancouver and regional members to develop a plan, with participation of representatives of academia and botanical institutions, indigenous forestry researchers, arborists and climatologists, to further investigate the impacts of climate change on the urban forest.

In April 2018, the Board received a [staff report](#) and presentation outlining the [Urban Forest Strategy - 2018 Update](#), which expanded and refined the [2014](#) and [2015](#) strategy presentations. This strategy was developed in response to the unanimously approved 2012 Park Board motion directing staff to develop an [Urban Forest Action Plan](#).

The proposed Urban Forest Strategy updates outlined in this report are also supported by the following policy and strategies: [Greenest City Action Plan](#) (2011); [Vancouver Bird Strategy](#) (2015, 2020 updates for approval); [Biodiversity Strategy](#) (2016); [Rain City Strategy](#) (2019); [Climate Change Adaptation Strategy](#) (2012,2018) and [Climate Emergency Action Plan](#) (2020).

BACKGROUND

The Greenest City 2020 Action Plan (GCAP) was approved by City Council in 2011 to serve as a road map outlining 10 goals and 15 measurable targets guiding Vancouver’s environmental efforts during the past decade. Per the [GCAP ‘Access to Nature’ Goal Area](#), the primary urban forest-related goal was to plant 150,000 new trees in the city between 2010 and 2020, and increase canopy cover to 22% by 2050.

Since 2010, the Vancouver Park Board championed and took responsibility for this goal by increasing tree planting efforts on public land, including parks and streetscapes. Park Board further supported urban forest expansion on private property through the annual tree sale. Additionally, tree retention and planting on private development parcels contributing to city-wide goals is tracked by the Urban Landscape Development Branch within the City of Vancouver Planning, Urban Design and Sustainability department.

In 2013, Vancouver undertook a measurement of urban forest canopy cover to understand the impacts of tree planting efforts and other factors influencing canopy extent. While striving to achieve absolute numbers of trees planted is a laudable goal, the measurement of “canopy cover” is a more scientifically acceptable method of determining the extent of a city’s urban forest. It is usually expressed as a percentage or ratio of an overall area of a region (e.g. City of Vancouver). Canopy cover is defined as the measured physical extent, when measured from above, of a tree’s branches and leaves. The percent of a city’s canopy cover (i.e. the area of the city covered by trees) provides the baseline measurement necessary to understand the extent of a city’s urban forest.

The remote-sensing technology typically used to measure canopy cover is Light Detection and Ranging (LiDAR) technology, which provides the most sensitive and accurate measurements for the calculation of canopy cover. LiDAR measures points collected from aircraft using a sensor that sends down laser pulses. Each LiDAR point has an elevation creating a 3D representation of the earth surface. Through this technology, the canopy cover in 2013 was estimated at 18% (2,063 ha of tree cover across the city’s total area of 11,500 ha). Note that this canopy cover was determined using ‘leaf-off’ data collected in February 2013.

The [Urban Forest Strategy](#) was first presented to Council and the Park Board in April 2014, and it included an update to the [Protection of Trees Bylaw](#). The strategy aims to guide Park Board and City efforts to protect, expand and manage Vancouver’s urban forest, while also emphasizing the need to engage citizens to understand the role of the urban forest and the social, ecological and economic benefits that trees contribute to the urban environment.

As shown in Figure 2, which depicts the distribution of the urban forest across various jurisdictions, 64% of tree canopy is on publicly managed lands. Park Board staff manage trees on

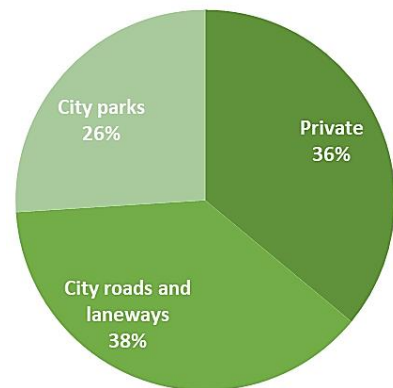


Figure 2: Urban Forest Land Allocation

public land, with trees on private property regulated by the City Planning, Urban Design and Sustainability department.

The Urban Forest Strategy commits to measure the city's canopy cover in regular intervals to monitor changes and assess the effectiveness of planning, policy and planting efforts. In 2015, the canopy cover approach served as the inspiration to update the urban forest goals in the GCAP to beyond solely counting the number of trees planted. The GCAP update provided a net measure for overall expansion of the urban forest, with a target to increase canopy cover to 22%, utilizing LiDAR to track progress using a baseline of 18% per the 2013 LiDAR study.

In April of 2018, staff presented the Park Board with the [Urban Forest Strategy - 2018 Update](#) that adopted the target of 22% canopy cover to be achieved by 2050.

The Urban Forest Strategy is intimately linked to several city-wide strategies related to environmental progress, including VanPlay, however the most pressing in the immediate-term is the Climate Change Adaptation Strategy and Climate Emergency Action Plan. This plan was approved by Council on November 17, 2020 and puts Vancouver on track to reduce its carbon pollution by 50% by 2030. This is in alignment with the findings of the United Nations Intergovernmental Panel on Climate Change to limit global warming to 1.5°C. Vancouver's urban forest plays a critical role in mitigating the impacts of climate change and in removing carbon pollution from the atmosphere reducing our overall emissions. Following are some of the environmental benefits Vancouver's urban forest provides:

- Shading/cooling in summer and thermal cover in winter;
- Carbon sequestration (C.E. Big Move 6);
- Removing carbon pollution through biosequestration (removal of carbon from the atmosphere to store in earth's natural carbon sinks);
- Retaining and delaying rainfall resulting in reducing peak-flows during storm events thereby increasing the capacity of the storm sewer;
- Shoreline and soil stabilization from sea level rise;
- Shading and cooling of foreshore and riparian habitats;
- Improved air quality; and
- Provision of habitat for birds, insects and urban wildlife.

DISCUSSION

Through coordinated efforts to plant trees in parks and on streets, as well as private tree planting through the bi-annual tree sale and during the development of private property, the Park Board and City of Vancouver achieved the GCAP 150,000 tree target in late 2020. To mark this significant achievement and planting of the 150,000th tree, a grove of Douglas firs was planted in New Brighton Park proximate to the salt marsh – an urban habitat and bio-sequestration project completed in 2017.

This location was selected in recognition of the current inequity of the urban forest provision in this area of the city, as well as to build on ongoing habitat enhancement efforts in New Brighton Park. This accomplishment was made possible through City investment of fiscal resources, as well as the commitment of countless staff at the Park Board and City of Vancouver. The

achievement of this GCAP goal is a critical step in taking ownership of the climate emergency work that must be advanced in the decades ahead.

LiDAR Analysis of Urban Forest Canopy

To understand the impacts of tree planting efforts and ongoing canopy growth, Park Board staff undertook another LiDAR analysis of the City of Vancouver urban forest canopy in the summer of 2018. This data was analyzed by Diamondhead Consulting and results were received by staff in fall 2020. The results of this new study were significant; 2018 LiDAR analysis identified Vancouver's urban forest canopy cover was 23% in 2018 (2,645 ha of tree cover across the city's total area of 11,500 ha).

In order to understand the significant change from 2013 (18% canopy cover) to the 2018 (23%) in such a short period of time (5 years), staff undertook a thorough analysis of both sets of data and the methodology used to determine percent canopy cover. The analysis revealed several factors that contributed to the dramatic change in canopy cover. For example, the 2013 canopy cover assessment, the first ever undertaken by the Park Board, was completed with available data from the City of Vancouver Engineering department. This 2013 data was collected in the winter when leaves were off trees. This leaf-off state is preferential for analyzing on-the-ground engineering infrastructure, but not ideal for assessing deciduous tree canopy cover as it resulted in an under-counting of deciduous tree canopy. In order to gain a more accurate canopy measurement the 2018 data was collected in the summer when leaves were on.

Additionally, significant improvements in the precision of LiDAR technology were made between 2013 and 2018. The higher resolution imagery used in the 2018 analysis was able to detect tall hedges and small trees that were omitted in 2013. Probably most importantly, the 2018 analysis revealed there was an absolute increase in canopy (tree growth and new tree planting) in the five-year period between 2013 and 2018. Given these factors, the 2018 LiDAR studies revealed an underestimate of the baseline canopy in 2013.

To accurately calibrate canopy growth and future targets, staff deemed it necessary to undertake further analysis to re-establish the baseline canopy cover percentage for 2013. This was achieved in collaboration with Diamondhead Consulting who used a USDA-developed software product called i-Tree Canopy. This software accurately measures canopy cover with aerial imagery specific to the year of study. The desired outcome was primarily to re-establish the 2013 baseline canopy cover percentage using imagery acquired in the summer of 2013 with leaves on rather than leaves off. Secondly, staff and Diamondhead Consulting established an updated methodology to ensure consistent and comparable results between future LiDAR canopy assessments.

The additional i-Tree Canopy study cross-referenced with the LiDAR results revealed that the actual leaf-on canopy cover of the City of Vancouver was 21% in 2013 (not 18% as initially thought) and by 2018 the city's tree canopy cover had grown to 23%. The fact that there was an absolute increase in Vancouver's canopy cover of 2% over 5 years is positive and hopeful news. Additionally, the new 2013 baseline challenges the Park Board and City to aspire to greater canopy cover targets for the future.

With this understanding, staff are recommending that the Park Board and City re-establish a more ambitious canopy cover target than the 22% established in the 2018 Urban Forest Strategy. With climate change as one of the biggest current global challenges, many municipalities are establishing ambitious urban forest canopy cover targets in an effort to mitigate climate impacts

and reduce/remove carbon pollution. Examples of canopy cover targets of other North American cities with similar levels of urbanization include: Toronto 40%; Portland 33%; and Seattle 30%.

Given the new baseline urban forest canopy cover of 23%, staff recommend that the target of 30% canopy cover by 2050 be adopted as an ambitious but achievable target. Achieving this target will require efforts beyond planting trees in parks. It will require ongoing stewardship of our existing trees to ensure robust and healthy canopy growth and continuing advocacy and expansion of the urban forest in low canopy areas.

At this time, the most available and low cost planting locations (e.g. no boulevard pavement or utility conflicts) are already occupied by trees. Developing future tree planting sites will require greater effort. The development of innovative solutions is needed including:

- the installation of new planting cut-outs in predominantly paved areas of the city;
- integration of trees into green infrastructure assets to offset stormwater peak-flows;
- conversion to species better-suited to climate change and abiotic stressors; and
- identification of cross-departmental synergies and collaboration.

With competing priorities related to retaining existing mature trees during redevelopment and prevalence of zero-lot-line development, retention of existing trees and space for new trees on private lands in a densifying city will also be an ongoing imperative and challenge.

NEXT STEPS

Park Board staff will work to update the baseline and target numbers in the Urban Forest Strategy. Separate canopy targets will be established for parks and streets, and for private lands (City Planning jurisdiction) through consultation with the City's Engineering and Planning, Urban Design and Sustainability departments, to achieve a total city-wide canopy cover of 30%. These overall and detailed canopy cover targets will be tailored to different land-types and housing typologies as identified in the Vancouver Plan initiative currently in development.

In addition, staff will assess the potential carbon benefits of achieving the 30% canopy target and will incorporate that in the carbon sequestration nature-based climate solution and carbon reduction targets for Big Move 6 in the Climate Emergency Action Plan, as part of an update to be presented to City council in late 2021.

Staff will continue working with Metro Vancouver, academic institutions and the nursery industry to advance efforts that tailor species selection to adapt to climate change.

Staff will also begin to consider urban forest project submissions for the 2023-2026 capital plan to continue to advance on the proposed new city-wide canopy cover target.

CONCLUSION

Park Board remains committed to protecting, expanding and maintaining the urban forest and fulfilling risk management obligations. Subject to the Board's approval of recommendations outlined in this report, equity and climate action work will guide the coming decades of urban forest planning and management seeking a new 30% city-wide canopy cover target.

New data and analysis will prioritize urban forest projects, species selection, and urban forest successional planning. This work will be pivotal in the Park Board and City's role in addressing the climate emergency, providing residents and workers a liveable city, and enhancing habitat for birds, insects and urban wildlife.

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