M E M O / N O T E D E S E R V I C E

To / Destinataire	Mayor and Members of Council	File/N° de fichier:
From / Expéditeur	Nichole Hoover-Bienasz, Director, Climate Change and Resiliency Services Andrea Lanthier-Seymour, Associate Director Parks Maintenance and Forestry Services	
Subject / Objet	Five Year Tree Canopy Update (2017 – 2022)	Date: September 4, 2025

The purpose of this memorandum is to provide an update to Members of Council on the results of the Five-Year Update to Ottawa's Tree Canopy Mapping (2017 – 2022). The memo outlines the key findings, provides context for interpretation of the results, discusses the implications of the results, and outlines the next steps.

Background

Ottawa's Official Plan sets a target of 40 per cent tree canopy cover in the urban area and no net loss of rural forests. To track progress, the Urban Forest Management Plan calls for canopy mapping every five years, more frequent than the 10-year cycle used in most jurisdictions, so that new methods can detect meaningful changes sooner.

The City partnered with the Ville de Gatineau and the National Capital Commission on the first National Capital Region Tree Inventory in 2017, completed by the University of Vermont, and again on the 2022 update. Data for the update was collected in 2022, with University of Vermont's analysis finalized in early 2025 after delays related to contractor staffing and additional data checks.

During the 2022 analysis, University of Vermont discovered an error in how Ottawa's 2017 canopy cover was calculated, for the urban area specifically. Correcting this reduced the estimated 2017 canopy cover from 31 per cent to 28 per cent, though the underlying mapping from 2017 remains accurate.

Methodology

The methodology uses best practices employed around the world to identify and delineate trees and tree canopy.

- Infrared aerial photography is used to detect areas that reflect light at the frequency of green vegetation.
- Aerial LiDAR (light detection and ranging) surveys provide a 3D model of the height of objects, like trees, above the ground.
- An automated computer tool (eCognition) uses this data, along with other geospatial information like building footprints, to identify trees and areas of contiguous tree canopy based on instructions from the GIS user (*e.g.*, "the object is green and has a height of 2 metres or more above ground.")
- Manual quality control is carried out at a scale of 1:1000 to look for gross errors.

Errors are unavoidable in tree and tree canopy inventories. There is no perfect method. Both the 2017 and 2022 canopy cover mapping contain discernible errors when zoomed in at higher scales such as 1:1000. Despite the errors, the data is the most accurate mapping of Ottawa's tree canopy available. See Appendix C for more details.

This methodology provides a balance between level of effort (cost) and accuracy, taking into consideration Ottawa's and the Capital Region's very large area.

Results of the 2022 Canopy Cover Update

Between 2017 and 2022, Ottawa's overall tree canopy increased from 34 per cent to 36 per cent, driven mainly by growth in rural areas. Rural canopy cover rose from 36 per cent to 39 per cent, supported by the rapid growth of younger forests, natural regeneration, and reforestation projects such as the City's Green Acres program. This is a positive outcome given the significant challenges over this period, including the impacts of the 2022 derecho and other major storm events (2018 tornado), ongoing climate-related stressors, and increasing development pressure from intensification to meet Ottawa's housing and growth targets.

Within the urban boundary, results were more mixed. Excluding the National Capital Commission Greenbelt, canopy cover declined slightly from 21.5 per cent to 20.6 per cent, though this change may be within the margin of error. Even so, some urban wards experienced meaningful decreases. Losses were most noticeable in developing suburbs where land is cleared for construction, as well as in areas affected by severe weather, infrastructure projects like LRT construction, infill development, and the removal of individual trees due to natural mortality, pests, or homeowner choices.

At the same time, canopy gains in the urban area came from the gradual growth of existing trees, reforestation projects, and new plantings on both public and private land. Although the growth of individual trees over five years is modest, collectively it helped offset much of the loss. Overall, the City's canopy cover remains stable, but continued implementation of the Urban Forest Management Plan and Tree Planting Strategy is important to achieving the long-term canopy targets.

See Appendix A and B for more details.

Challenges and Opportunities for Growing Ottawa's Tree Canopy

Ottawa's long-term goal of 40 per cent urban tree canopy is achievable, but it faces challenges. Tree loss is immediate, while it can take decades for new plantings to make a visible impact. With ongoing greenfield and infill development, urban canopy cover may remain flat, or even decline, for the next decade. Retaining mature trees provides the greatest short-term benefit, and when removal is unavoidable, successful compensation depends on having adequate space, soil depth, and soil quality to support healthy new growth.

Policy and regulatory tools are essential. The proposed new Zoning By-law includes requirements to ensure space for trees in new developments while promoting greater supply and density of housing. Continued involvement of forestry staff in development review and the implementation of the Tree Protection By-law will help make these policies effective. Building stronger collaboration with the development industry will be key to striking a balance between a robust tree canopy and a robust, affordable housing supply. Public education will also be important, since much of Ottawa's future canopy growth will depend on private property owners valuing, protecting, and planting trees.

The Tree Planting Strategy outlines early actions to replace lost trees and expand the urban forest, including:
- A new program to replace an additional 500 lost street trees starting in 2025 and scaling up to 1000 additional replacement trees annually.
- *Plant Your Place*, which will provide 1,200 larger saplings to residents each year, plus a targeted program for priority neighbourhoods beginning with 50 trees on Ottawa Community Housing sites in 2025.
- An expanded Tree Dedication Program to support commemorative plantings.
- Larger-scale plantings in parks and greenspaces, often in partnership with community groups.

In rural areas, canopy cover has increased overall, though losses occurred in some farmland, aggregate sites, and rural industrial areas. Many of these lands are subject to long-term restoration requirements or are part of Ottawa's food and resource economy. Growth has been strongest in the City's Natural Heritage System, where both public and private stewardship is active. Programs such as Green Acres, the Rural Clean Water Program, and the Environmental Land Acquisition and Stewardship Program, along with strong community stewardship, will continue to support the growth and long-term maintenance of the rural canopy.

Next Steps

A companion memorandum on the results of the Tree Equity Score Analysis will be issued alongside this one. Members of Council will also receive ward-specific information sheets summarizing tree canopy data, which will also be made available on Ottawa.ca. An update on the City's Tree Planting Strategy is scheduled for the Environment and Climate Change Committee on September 16, 2025, and staff are hosting information sessions for Councillors and their offices on all three topics in advance of that meeting.

Ottawa.ca will be updated with summaries of both the Tree Canopy Study and the Tree Equity Analysis. The full canopy data and tree equity results will also be uploaded to the City's Open Data Portal and GeoOttawa.

Looking ahead, Forestry Services and Natural Systems will collaborate with other departments, Councillors, and community organizations to develop tailored planting action plans in 2026–2027 for priority neighbourhoods identified in the Tree Equity Score Analysis. These plans will build on existing programs but will also reflect each community's unique character, resources, and needs.

The next canopy cover update will begin in 2027, and staff will report back on progress through the next Urban Forest Management Plan update in early 2027.

For any questions or additional details, please reach out to Nick Stow, Program Manager, Natural Systems at Nick.Stow@ottawa.ca or Martha Copestake, Senior Planning Forester at Martha.Copestake@ottawa.ca .

Sincerely,

Nichole Hoover-Bienasz
Director, Climate Change and Resiliency Services
Strategic Initiatives Department
Nichole.Bienasz@ottawa.ca

Andrea Lanthier-Seymour,
Associate Director, Forestry Services
Public Works Department
Andrea.Lanthier@ottawa.ca


CC: Wendy Stephanson, City Manager
       Debbie Stewart, General Manager, Strategic Initiatives
       Alain Gonthier, General Manager, Public Works
       Senior Leadership Team
       Jocelyne Turner, Public Information and Media Relations

1. Appendix A: 2017 and 2022 Canopy Cover Maps
2. Appendix B: Canopy Cover by Transect and Ward
3. Appendix C: Errors

APPENDIX A: 2017 AND 2022 CANOPY COVER MAPS

2022 Tree Canopy
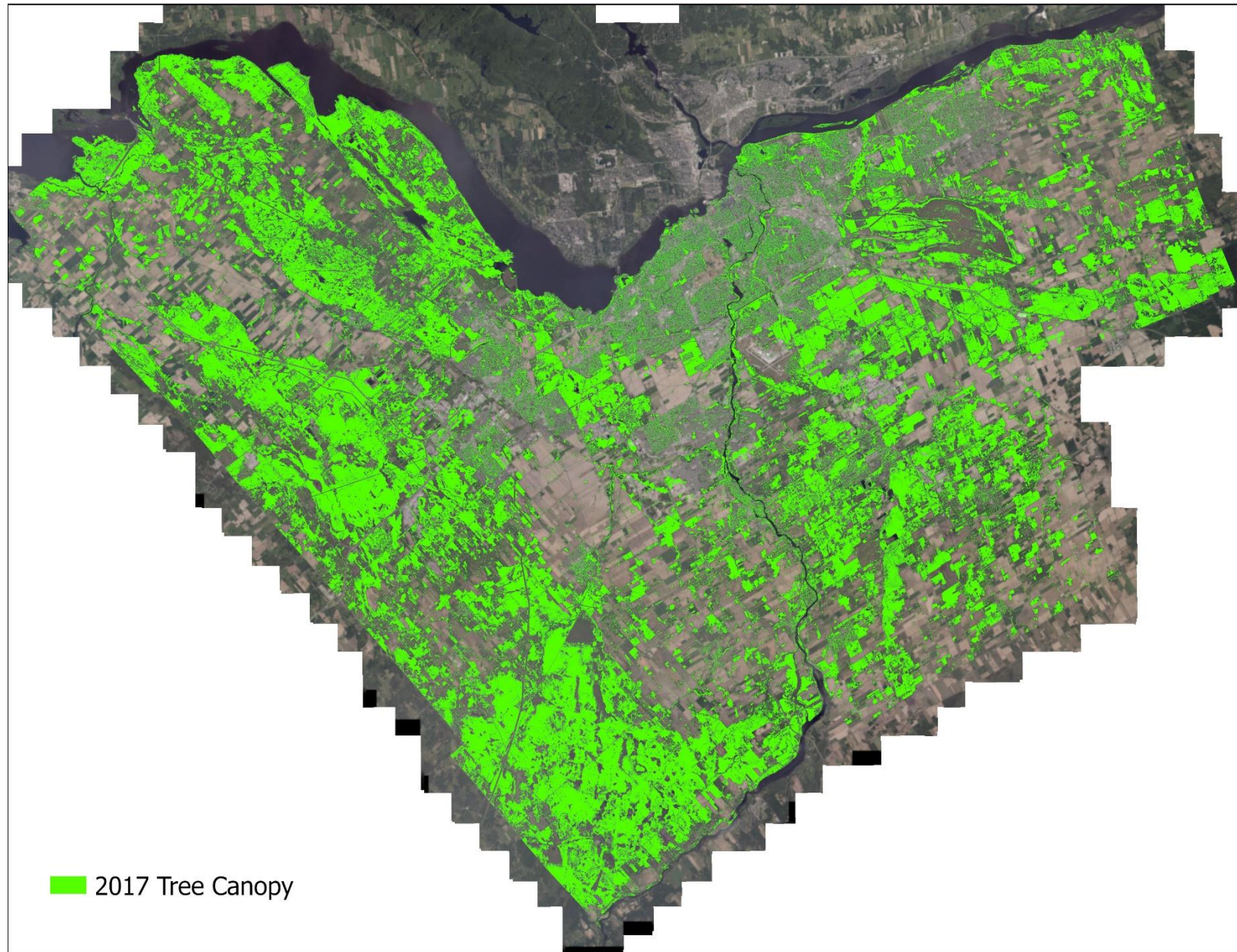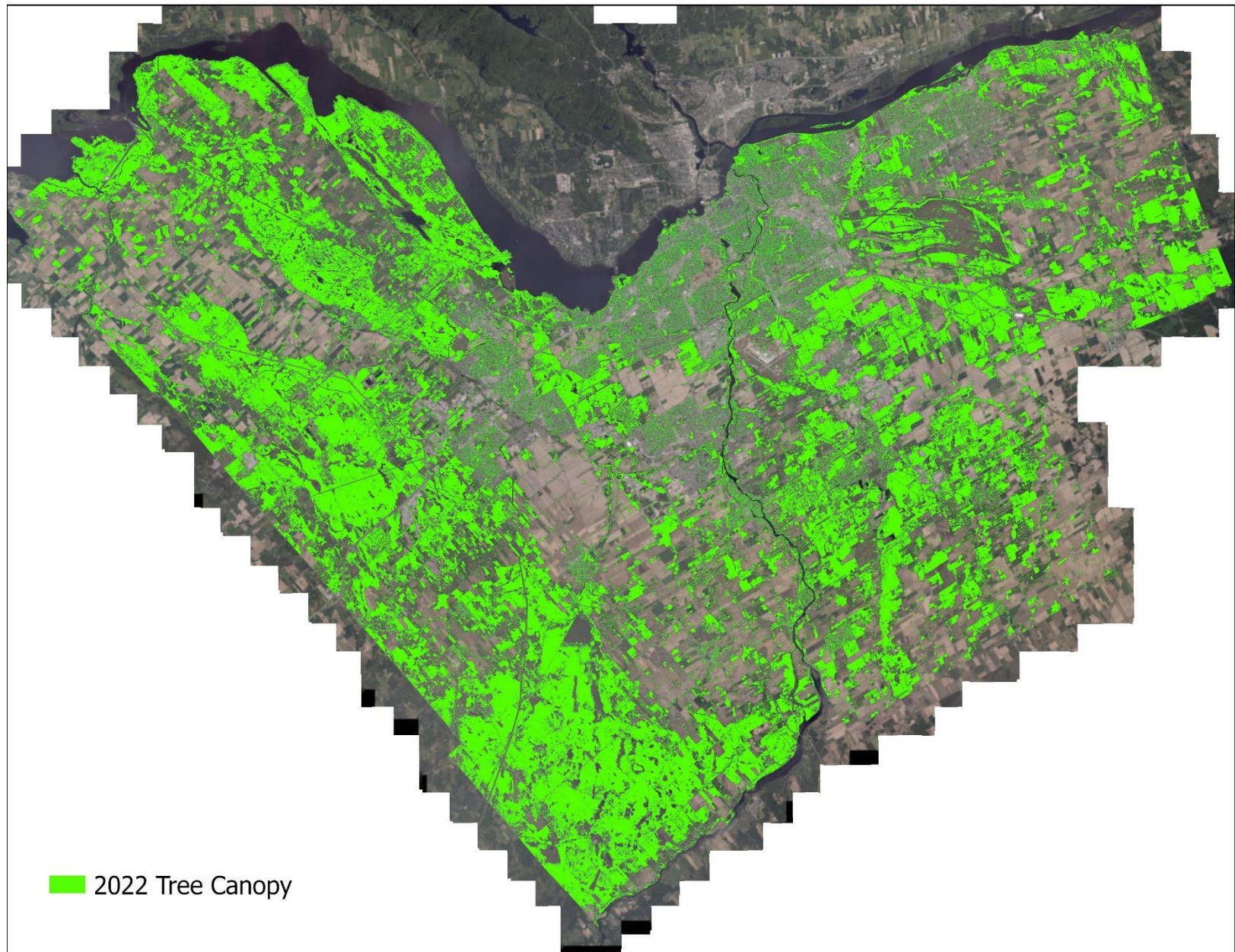
APPENDIX B: CANOPY COVER BY TRANSECT AND WARD

Table 1: Canopy Cover by Transect

Geography	2017 Canopy Cover	2022 Canopy Cover
City Wide	34%	36%
Urban Boundary (2017)	28%	28%
Urban Boundary (2025)	28%	28%
Downtown Core Transect	16%	16%
Inner Urban Transect	26%	25%
Outer Urban Transect	23%	22%
Greenbelt Transect	42%	42%
Suburban Transect	18%	17%
Rural Transect	36%	39%

*Green highlighting suggests an increase. Yellow highlighting suggests a decrease.

Table 2: Canopy Cover by Ward

Ward Number	Ward Name	2017 Canopy Cover (%)	2022 Canopy Cover (%)	Absolute Change in Canopy Cover (% of ward)[1]	Relative Change in Canopy Cover (% of 2017 canopy area)[2]
1	Orleans East-Cumberland	33	35	1.78	5.45
2	Orleans West-Innes	34	34	0.28	0.81
3	Barrhaven West	19	17	-1.71	-9.21
4	Kanata North	20	20	0.23	1.17
5	West Carleton-March	40	43	3.20	8.11
6	Stittsville	19	17	-2.24	-11.57
7	Bay	35	35	0.63	1.81
8	College	42	40	-1.56	-3.74
9	Knoxdale Merivale	21	20	-1.34	-6.45

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[1] **Absolute Change in Canopy Cover (%)** is the change in the percentage of the ward that is covered by tree canopy. For example, if 10% of the ward was covered in 2017 and 12% of the ward is covered in 2022, 2% more area in the ward is covered by tree canopy.

[2] **Relative Change in Canopy Cover (%)** looks at how much the actual canopy cover changed. For example, if the area of canopy cover is 100 hectares and reduces to 97 hectares, this is a 3% decrease in the relative canopy cover. The relative canopy cover does not look at the entire area of the ward, only the area of canopy cover.

Ward Number	Ward Name	2017 Canopy Cover (%)	2022 Canopy Cover (%)	Absolute Change in Canopy Cover (% of ward)[1]	Relative Change in Canopy Cover (% of 2017 canopy area)[2]
10	Gloucester-Southgate	38	38	-0.50	-1.29
11	Beacon Hill-Cyrville	25	25	-0.08	-0.31
12	Rideau-Vanier	21	21	-0.15	-0.72
13	Rideau-Rockcliffe	30	30	-0.27	-0.89
14	Somerset	14	14	-0.39	-2.77
15	Kitchissippi	27	25	-1.90	-7.16
16	River	26	25	-0.66	-2.56
17	Capital	25	24	-0.99	-3.90
18	Alta Vista	22	22	-0.41	-1.86
19	Orleans South-Navan	20	22	1.91	9.35
20	Osgoode	33	35	1.70	5.12
21	Rideau-Jock	38	41	2.96	7.70
22	Riverside South-Findlay Creek	32	29	-3.23	-10.06
23	Kanata South	20	20	0.10	0.50
24	Barrhaven East	15	16	1.50	10.33

APPENDIX C: INHERENT ERROR

Errors are unavoidable in tree and tree canopy inventories. Both the 2017 and 2022 canopy cover mapping contain discernible errors when zoomed in at higher scales such as 1:1000. Despite the errors, the data is the most accurate mapping of Ottawa's tree canopy available.

Automated GIS tools like eCognition do not identify trees. They use colour, height, and other data to identify and classify objects as trees based on instructions from a GIS user. Their advantage lies in being able to process and classify large amounts of data cost-effectively. In general, however, they are more prone to error than experienced human observers.

The main cause of error is that the City's schedule for acquisition of leaf-on aerial photography data does not match the schedule for acquisition of LiDAR data. There may be a difference of one or two years between the data sets. Staff will work to minimize these discrepancies in future updates. Other main sources of error are:

- Shadows, which can hide small trees and other objects in aerial photography.
- Parallax, which is the apparent shift in the position of an object when observed from an angle rather than directly overhead.

The combination of shadows and parallax can confuse both human observers and automated computer tools, leading to such errors as the merging of trees with non-tree objects.

The most common types of error in the tree canopy mapping are:

- Failure to capture recent changes occurring between the LiDAR and aerial photography, such as tree planting or removal.
- Misidentification of tall objects within shadows as trees.
- Identification of small, non-tree objects as trees (e.g. streetlights).
- Inclusion of some building parts, like eaves or balconies, as part of tree canopies due to parallax.

The methodology included manual review of the tree data at a scale of 1:1000 to identify gross errors or omissions. It was not practical or affordable to examine and manually correct the millions of individual objects in the data set. However, two automated corrections were employed to address systemic errors.

- Deletion of every "tree" object with an area of 2 m^2 or smaller from both the 2017 and 2022 data to remove things like streetlamps, playground equipment, and powerlines.
- Adjustment of the eCognition algorithm to prevent sloped roofs from being identified as tree canopy due to parallax.

Removal of objects less than 2 m^2 in area likely deleted newly-planted saplings in some areas. The correction for sloped roofs likely eliminated some areas of tree canopy overhanging roofs. Consequently, staff believe that the canopy cover measures are conservative, likely underestimating canopy cover.

A precise estimate of error is not available for the project, because it would require extensive and costly ground-based sampling. However, staff believe that a reasonable estimate of error is 0.5 percent to 1 percent for any individual measurement.