

DISTRICT OF WEST VANCOUVER
 750 17TH STREET, WEST VANCOUVER BC V7V 3T3

COUNCIL REPORT

8.

Date:	September 9, 2020
From:	Heather Keith, Environmental Protection Lead
Subject:	LiDAR Tree Canopy Study
File:	0332-04

RECOMMENDATION

THAT the report dated September 9, 2020 titled "LiDAR Tree Canopy Study" be received for information.

RECOMMENDATION

THAT Council direct staff to update Interim Tree Bylaw No. 4892, 2016, with amendments to manage the tree canopy and improve permitting process for tree work.

RECOMMENDATION

THAT staff be directed to include a funding request in the 2021 budget to obtain LiDAR data to compare with the 2013 and 2018 data already acquired.

RECOMMENDATION

THAT staff be directed to include a funding request in the 2021 budget to develop an Urban Forest Management Plan.

1.0 Purpose

The purpose of this report is to provide the results of the LiDAR Tree Canopy Study to Council and outline proposed next steps for the ongoing management of the tree canopy.

2.0 Legislation/Bylaw/Policy

2.1 Legislation

Under Section 8 of the *Community Charter*, Council may by bylaw regulate, prohibit, and impose requirements relative to trees and the protection of the natural environment.

2.2 Bylaw

Interim Tree Bylaw No. 4892, 2016 was adopted by Council in April 2016 as an interim measure intended to regulate trees on private property.

3.0 Official Community Plan

The *Official Community Plan (Bylaw No. 4985, 2018)* recognizes the value of the natural environment and provides high-level policies regarding strengthening existing environmental regulations and facilitating the protection, restoration and enhancement of the community's natural assets. This includes:

- Recognizing the impact that trees have on the form and character of the built environment with Development Permit Area guidelines promoting preservation of existing healthy trees, retention of mature trees and vegetation and planting of trees; and
- Policy 2.6.5: "Balance tree retention, replacement or compensation for their ecological value with consideration to access to sunlight and significant public views".

In addition, objective 3.3 of Council's 2020-2021 Strategic plan is to "Develop an Urban Forest Management Plan and decide whether to amend the Interim Tree Bylaw".

4.0 Financial Implications

A 2021 budget request of approximately \$35,000 will be required to collect LiDAR data in 2021 to enable comparison against the data obtained from 2013 and 2018.

A 2021 budget request of approximately \$80,000 will be required for staff to engage a third-party consultant to develop an Urban Forest Management Plan.

These budget requests would be brought forward as part of the District-wide budget process for 2021. Staff are recommending that LiDAR data be collected in spring 2021 for consistency with data collection in previous years and that the development of the Urban Forest Management Plan also begin in 2021.

5.0 Background

5.1 Previous Decisions

At the May 27, 2019 Council meeting, staff provided Council with the Interim Tree Bylaw Working Group's final recommendations report, staff analysis of the working group's recommendations, and amendments to the Interim Tree Bylaw incorporating some Working Group recommendations.

At this meeting, Council passed the following motion:

1. "THAT staff:
 - (a) be directed to modify proposed "Interim Tree Bylaw No. 4892, 2016, Amendment Bylaw No. 5023, 2019" to:
 - Protect existing trees over 35 cm DBH;
 - Require replacement trees when hazardous trees are removed;

- Require replacement trees when protected trees are removed;
- Allow every homeowner, by permit, to remove:
 - One protected tree over 35 cm DBH every three years in Ambleside and Dundarave;
 - One protected tree over 35 cm DBH per year in the rest of West Vancouver; and
 - A reasonable number of trees over 35 cm DBH per year for multi-family developments; and

(b) bring proposed "Interim Tree Bylaw No. 4892, 2016, Amendment Bylaw No. 5023, 2019" forward for Council's consideration as modified.

2. THAT Council direct staff to:
 - i. use Lidar data to establish a tree canopy baseline and prepare an Urban Forest Management Plan; and
 - ii. (as amended) report back to Council regarding the efficacy of the Interim Tree Bylaw in maintaining tree canopy cover and propose policy recommendations for a new bylaw as required to maintain canopy cover.
3. THAT Council direct staff to update the District's Fees and Charges bylaw to add a fee for a tree removal permit for protected trees on private property.
4. THAT Council direct staff to prepare educational guidelines for tree protection and management on private property based on Interim Tree Bylaw Working Group recommendations."

The current report responds specifically to item 2.i and 2.ii of the above motion.

5.2 History

On July 16, 2019, staff brought forward the "Interim Tree Bylaw No. 4892, 2016, Amendment Bylaw No. 5023, 2019", for Council consideration, with the proposed amendments as listed in Section 5.1. Council approved the budget for the LiDAR tree canopy study but did not approve the amendments to the Interim Tree Bylaw.

An application fee for a private property tree permit was added to Fees and Charges Bylaw No. 5025, 2019, and was implemented on January 1, 2020. The fee is \$300, which is now consistent with the fee for a municipal property tree permit and an environmental development permit for tree work.

The tree canopy study is now complete and a summary of the analysis comparing 2013 and 2018 LiDAR data is presented in this report.

6.0 Analysis

6.1 Tree Canopy Cover Study

The tree canopy analysis was completed using LiDAR (light detecting and ranging) data. LiDAR is a survey method that measures distance to a target with a laser light that reflects back to a sensor. The return times and wavelengths help to form a three-dimensional point cloud representation of target objects.

The LiDAR used in the tree canopy analysis was collected by plane in late April of 2013 and 2018. The data were then classified by McElhanney Consultants into the following vegetation categories with three different height thresholds:

- Low (0 to 2 metres);
- Medium, (2 to 8 metres); and
- High (8 metres and above).

The District's GIS Department used the classified vegetation data to generate raster images representing the medium and high tree canopy height categories from 2013 and 2018. The medium and high categories were selected to represent the mature tree canopy cover in the District. The "high" category was used as representative of trees that are near to or have reached the protected tree size (i.e., 75 cm DBH) under the Interim Tree Bylaw, to assess the efficacy of the bylaw regulations to protect these trees.

The raster images were further broken down by BC Assessment Area (BCAA) neighbourhoods within "existing neighbourhoods" (i.e. the area where the Interim Tree Bylaw applies). Although the Interim Tree Bylaw does not apply to the Upper Lands ("future neighbourhoods") Development Permit Areas, the analysis was conducted both with and without these Development Permit Areas (DPAs) to ensure the entire District was captured in the analysis.

Using the two sets of data, the tree canopy analysis included comparisons between years by neighbourhood and type of land ownership, including private property, road allowances (includes boulevards), District-owned land (includes parks), and other lands of various provincial and federal ownerships.

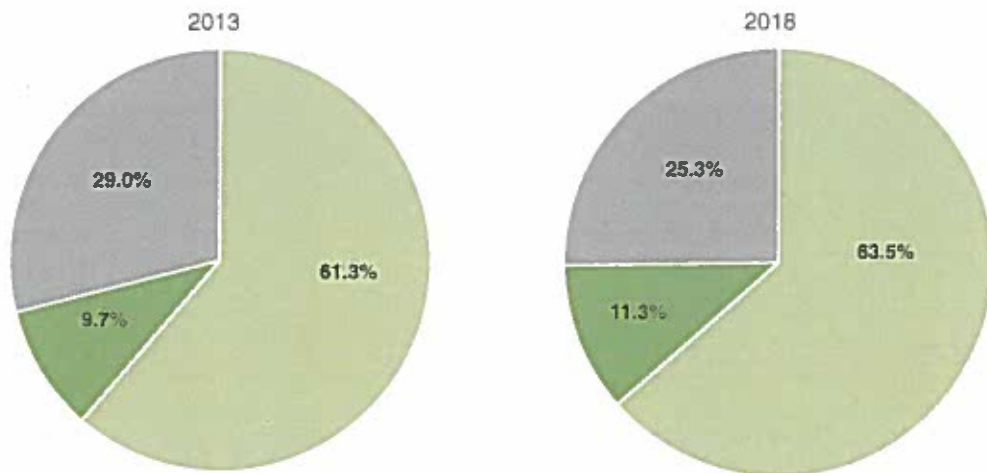
A map of the BCAA neighbourhoods and delineation of land ownership is provided in **Appendix A**.

6.2 Tree Canopy Cover Results

Overall Results

The results of the study showed that the total canopy cover (trees >2 metres in height) for the entire District was 71.0% in 2013 and 74.8% in 2018 (Figure 1).

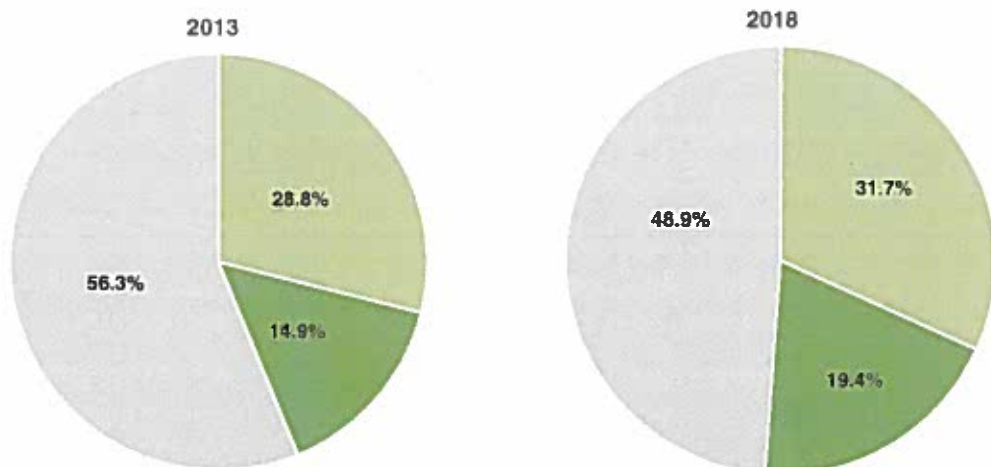
Figure 1 Comparison of percent tree canopy cover between 2013 and 2018 on all land types in the District of West Vancouver.



Note: Dark Green – Light Green – Large canopy cover (>8 m in height); Medium canopy cover (2 to 8 m in height); Grey – no canopy cover (zero cover or canopy <2 m in height).

The total canopy cover when just looking at lands within BCAA neighbourhoods was 51.1% in 2018 compared to 43.7% in 2013 (Figure 2).

Figure 2 Comparison of percent tree canopy cover between 2013 and 2018 on all land types in BCAA neighbourhoods in the District of West Vancouver.



Note: Dark Green – Light Green – Large canopy cover (>8 m in height); Medium canopy cover (2 to 8 m in height); Grey – no canopy cover (zero cover or canopy <2 m in height).

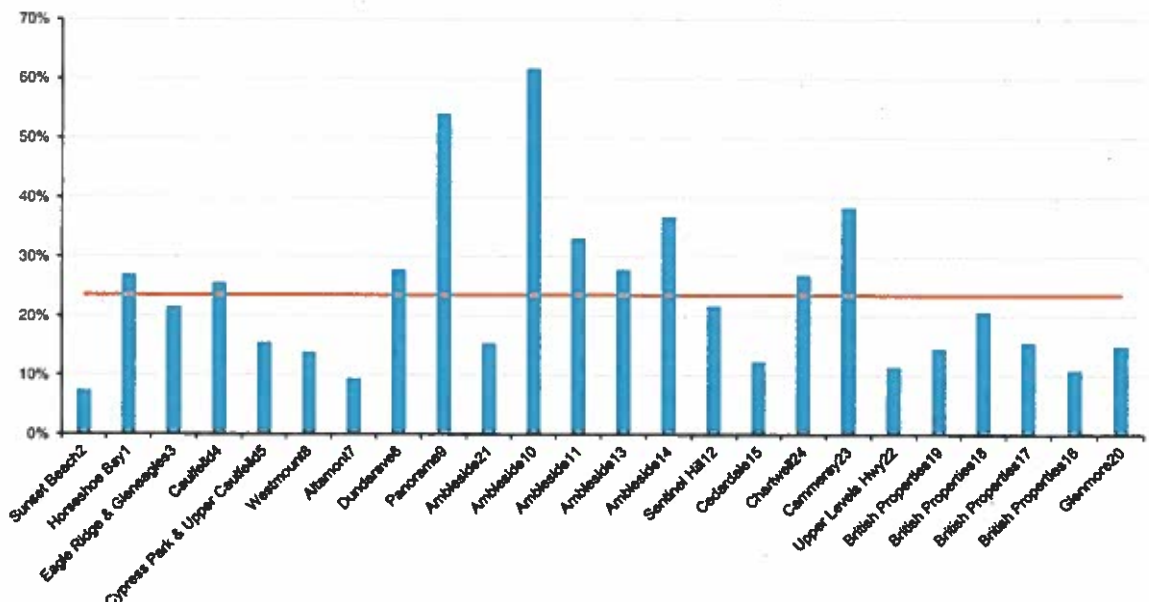
Private Property Results

The study specifically looked at canopy cover on private property given that this is the land type where the Interim Tree Bylaw applies.

On private property (see Figures 3 and 4 below), there was an increase of 19.6% in total canopy cover (trees >2 m in height) as well as a 9.3% increase in canopy cover from larger trees (trees >8 m in height) from 2013 to 2018. The relative proportion of the canopy cover from large trees on private property in existing neighbourhoods was slightly lower in 2018 (52.9%) compared to 2013 (53.8%) suggesting that the growth in canopy of larger trees on private property, although still positive, is not consistent with canopy growth on other types of land (e.g., road allowances and DWV-owned land). This could be attributed to increased tree removals or pruning of larger size trees on private property. This observation was particularly evident in some neighbourhoods in the Ambleside, Dundareve, and British Properties areas, where the percent increase in canopy cover over time was less than the District average (Figure 3 and Figure 4).

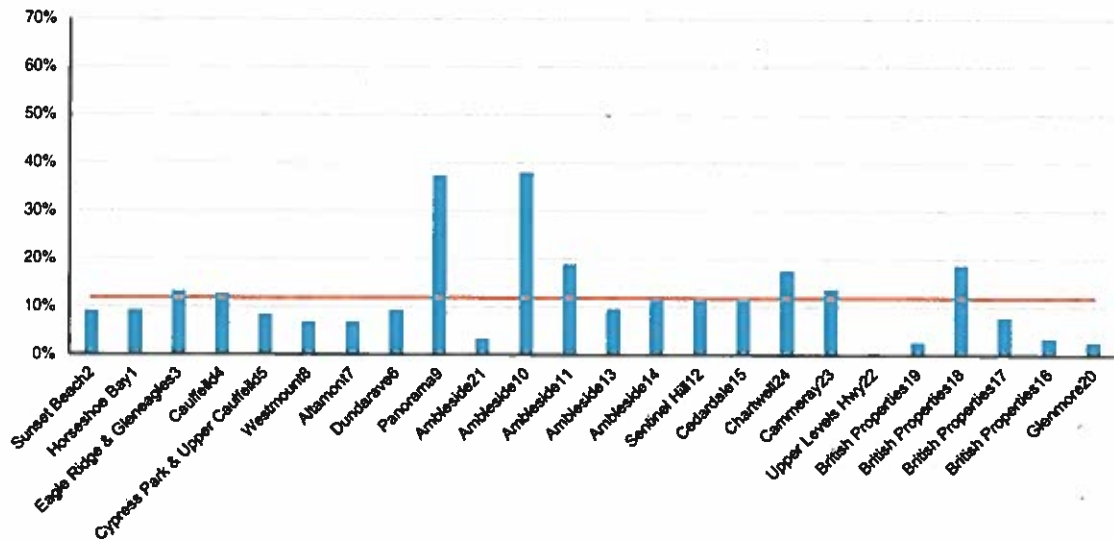
It should be noted that despite the slower growth in canopy over time in some neighbourhoods, there was still an increase in canopy cover in all neighbourhoods from 2013 to 2018.

Figure 3 Percent change in total canopy cover (trees >2 m in height) on private property from 2013 to 2018 across BCAA neighbourhoods.



Note: Orange is the average tree canopy cover change across all BCAA neighbourhoods.

Figure 4 Percent change in large tree canopy cover (trees >8 m in height) on private property from 2013 to 2018 across BCAA neighbourhoods.



Note: Orange is the average tree canopy cover change across all BCAA neighbourhoods.

Appendix B provides a map of the tree canopy cover in 2018 for the entire District.

Appendix C provides a map of each BCAA neighbourhood and the Upper Lands Development Permits Areas showing the loss and gain of tree canopy between 2013 and 2018.

6.3 Efficacy of the Interim Tree Bylaw

The tree canopy study showed an increase in tree canopy cover on private property from 2013 to 2018. Staff are not currently recommending any major changes to the Interim Tree Bylaw (i.e., no changes to the protected tree size) as the data do not support the need to increase regulations on tree removals. That being said, if the tree canopy cover in 2018 is used as a baseline to maintain, then there will also not be any recommendations to increase flexibility for property owners to remove trees, such as an annual exemption tree concept, which may result in a decrease in canopy cover over time.

However, staff do recognize and understand concerns from residents and the former Interim Tree Bylaw Working Group members with respect to tree work in the District, particularly in relation to development activities. In applying the current Interim Tree Bylaw since 2016, staff have identified some limitations to the effective regulation of tree work in the District. As such, staff will propose amendments to the existing Bylaw through a subsequent Council report and meeting pertaining to:

- clarity of definitions with respect to pruning standards and when a permit is required;
- application submission requirements;
- restrictions during the bird nesting season;
- requirements during development to improve compliance with tree protection measures;
- additional tree species to be added to the protected tree list (e.g., Pacific yew, Pacific dogwood, Yellow cedar, Shore pine);
- addition of creek trees to the protected tree list;
- tree permitting requirements to address wildfire hazard risk; and
- replanting requirements.

Staff recommend that these amendments be brought forward to Council with the recommendation that staff will continue to monitor the tree canopy over time as the District acquires more LiDAR data to verify that the bylaw is effective.

6.4 Tree Canopy Cover Monitoring and Urban Forest Management Plan

The collection of LiDAR data for continued monitoring of the tree canopy cover in the District would verify whether the existing tree canopy cover is being maintained, the ongoing efficacy of the tree bylaw, and a scientific basis for any adjustments to the bylaw as required. In addition, the acquisition of LiDAR data in 2021 to compare to 2018 would capture a period of time when the Interim Tree Bylaw was completely in effect. Between 2013 and 2018, there was almost four where no restrictions on tree removals on private property existed, which does not accurately capture the current status and growth of the tree canopy cover now that the Interim Tree Bylaw is in effect.

An Urban Forest Management Plan (UFMP) will also help to ensure the maintenance of the tree canopy cover by setting goals, objectives, and actions for tree management and establishing best practices across multiple bylaws affecting trees on private and public lands. The plan would include a comprehensive approach to establish tree canopy goals and targets, planting initiatives, and other strategies to compensate for potential tree canopy loss. In addition, the UFMP would also provide information on the condition and maintenance requirements of the District's forest asset, which is an objective of the District's Natural Capital Assets Inventory work.

6.5 Sustainability

Trees provide a range of important ecosystem services including shading, carbon storage, and stormwater management functions (i.e., trees reduce heat gain in summer, heat loss in winter, reduce runoff, filter water before it enters watercourses, add nutrients to the soil, convert carbon dioxide into oxygen, and provide wildlife habitat and aesthetic benefits). The tree canopy, measured as the percentage of ground covered by leaf canopy as

seen from overhead, is an ecological health indicator for all of the human health, ecosystem services, economic and aesthetic values that trees generate in the District.

6.6 Public Engagement and Outreach

Significant public engagement occurred during the citizen-led Interim Tree Bylaw Working Group process.

Future public outreach will include educational information on the District website with respect to tree protection and tree maintenance, as well as the ongoing communication of initiatives and regulations as they relate to the tree canopy cover and the Interim Tree Bylaw.

6.7 Other Communication, Consultation, and Research

The District adopted the Community Wildfire Protection Plan (CWPP) in 2019, which includes a number of recommendations related to reducing wildfire risk across the District, such as landscaping and tree maintenance requirements. The tree canopy cover objectives for the District as well as any amendments to the Interim Tree Bylaw will need to align with the CWPP.

7.0 Options

7.1 Recommended Options

That:

Council receive this report for information; direct staff to propose amendments to the Interim Tree Bylaw based on the results of the tree canopy cover study and housekeeping improvements based on experience of using the bylaw; and direct staff to include funding requests in the 2021 budget to obtain LiDAR data and develop an Urban Forest Management Plan.

7.2 Considered Options

Defer amendment to the Interim Tree Bylaw pending receipt of additional information (to be specified).

Defer obtaining future LiDAR data and the development of an Urban Forest Management Plan pending receipt of additional information (to be specified).

8.0 Conclusion

The tree canopy study responded to Council's motion and assisted in determining the efficacy of the Interim Tree Bylaw. Future tree canopy cover monitoring, the development of an Urban Forest Management Plan, and minor amendments to the Interim Tree Bylaw, have been proposed to ensure the maintenance of the tree canopy cover in the District.

Author:

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Heather Keith, Environmental Protection Lead

Concurrence:

David Hawkins

David Hawkins, Manager, Community Planning and Sustainability

Appendices:

A – Map of the District of West Vancouver showing land ownership categories and BCAA neighbourhood boundaries.

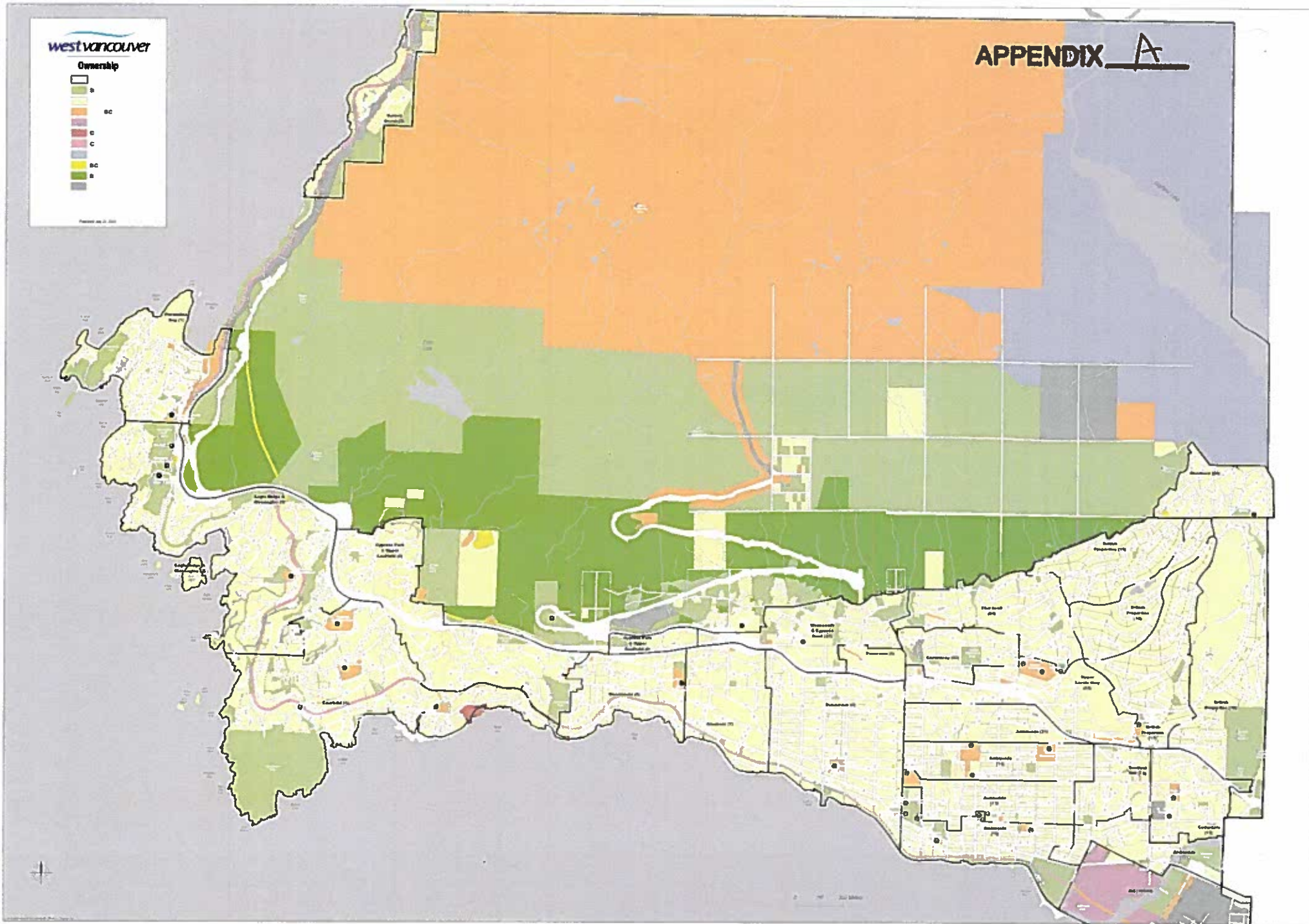
B – Map of the District of West Vancouver showing the tree canopy cover in 2018.

C – Maps of BCAA neighbourhoods and Upper Lands Development Permit Areas showing the percent change in tree canopy cover from 2013 to 2018.

Ownership



February 2011



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west vancouver

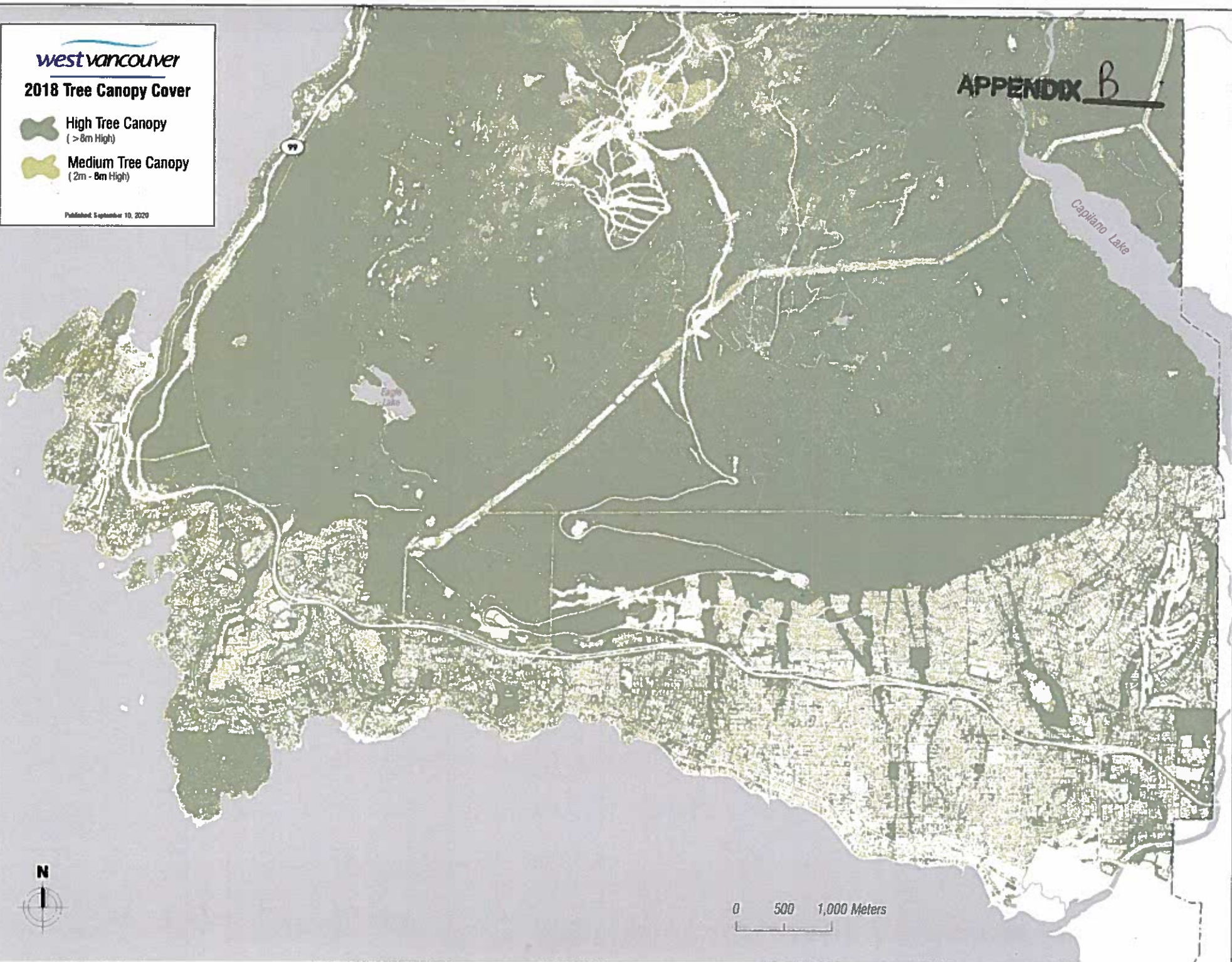
2018 Tree Canopy Cover

 High Tree Canopy
(> 8m High)

 Medium Tree Canopy
(2m - 8m High)

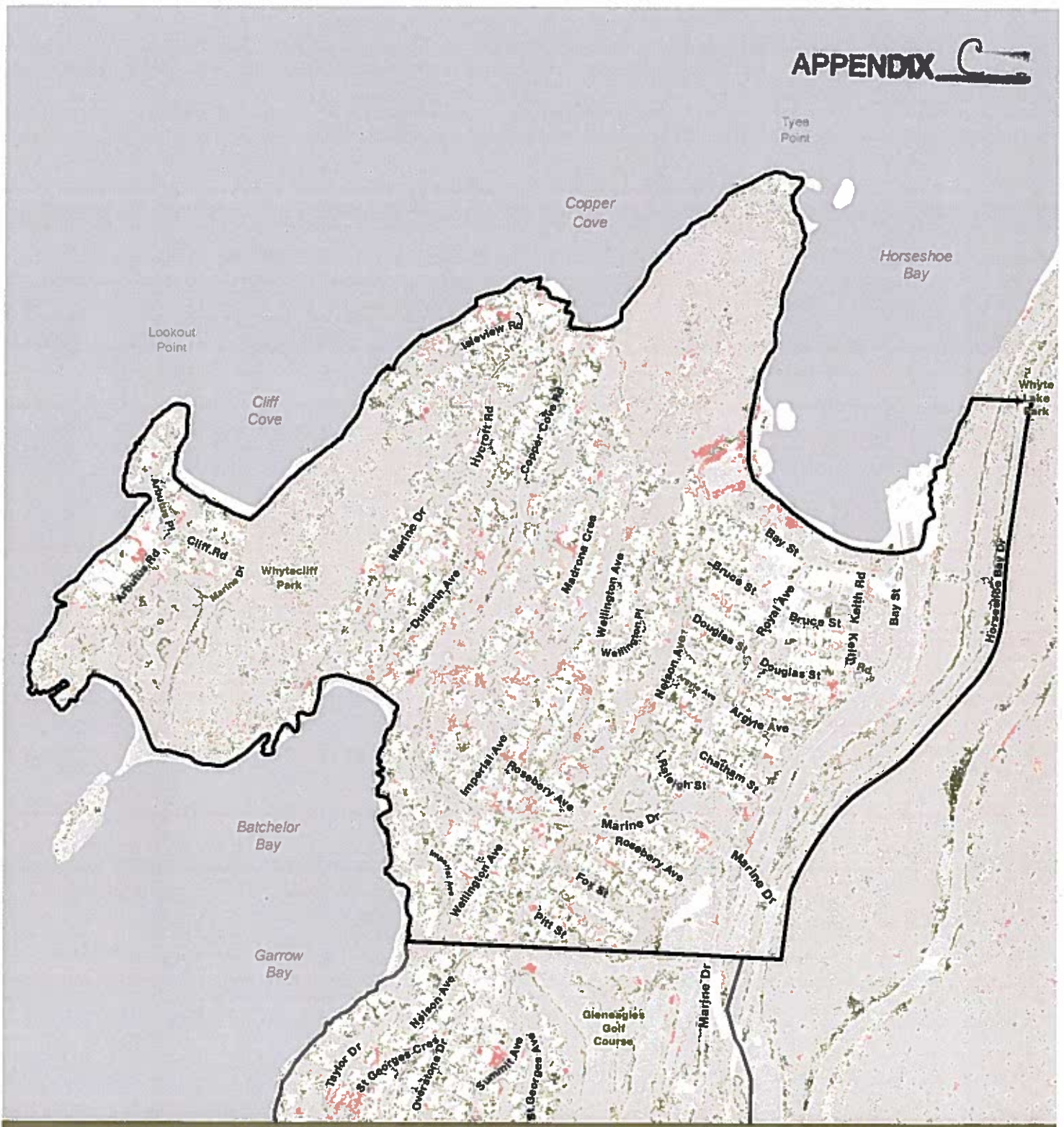
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APPENDIX B



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TREE CANOPY COVER COMPARISON: Horseshoe Bay 1

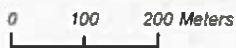
**Tree Canopy Cover Change
2013 vs 2018**



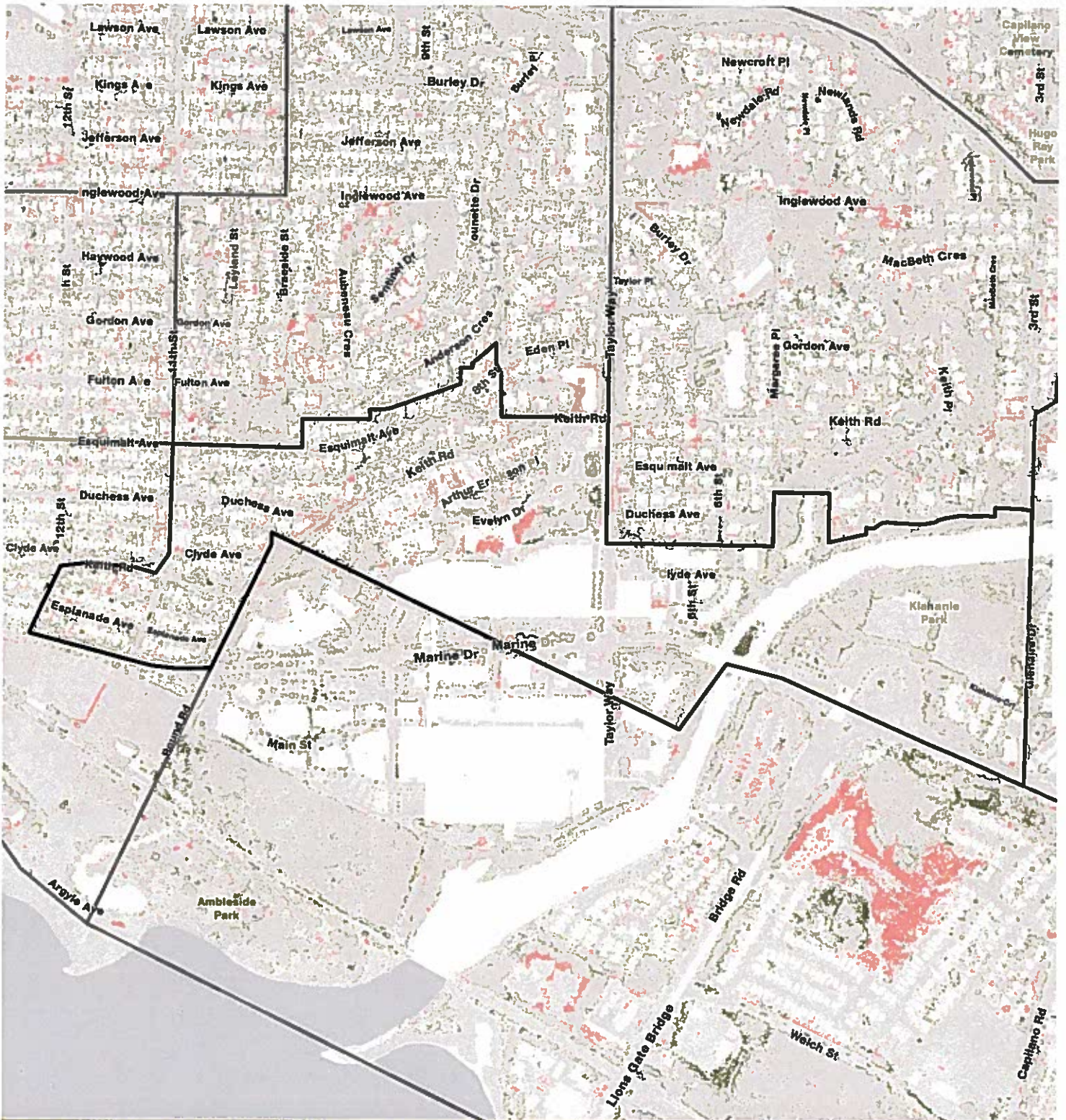


TREE CANOPY COVER COMPARISON: Ambleside 10

**Tree Canopy Cover Change
2013 vs 2018**

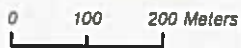


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TREE CANOPY COVER COMPARISON: Ambleside 11

**Tree Canopy Cover Change
2013 vs 2018**



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TREE CANOPY COVER COMPARISON: Sentinel Hill 12

**Tree Canopy Cover Change
2013 vs 2018**

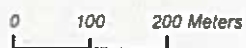


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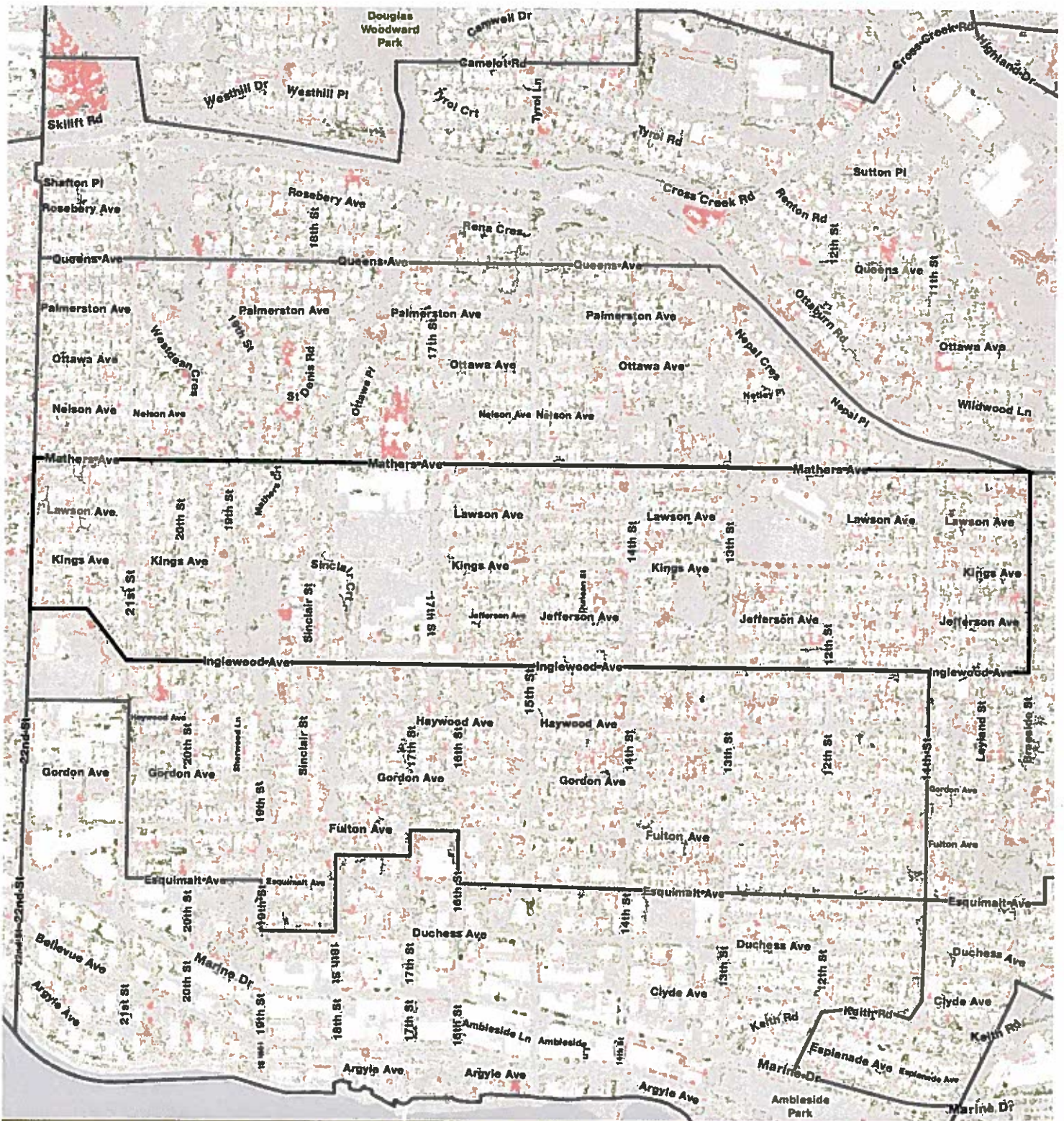


TREE CANOPY COVER COMPARISON: Ambleside 13

**Tree Canopy Cover Change
2013 vs 2018**

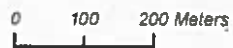


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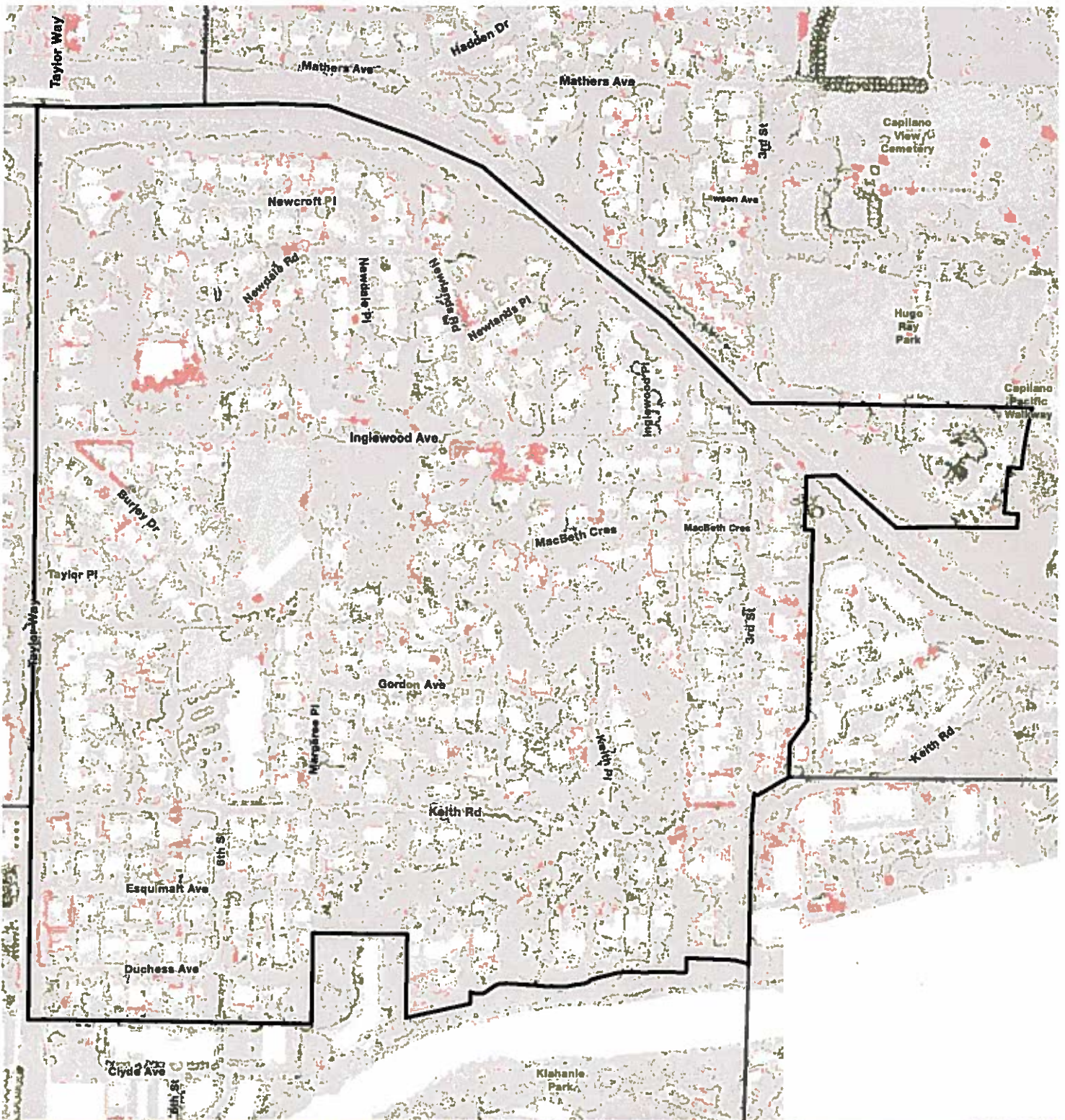


TREE CANOPY COVER COMPARISON: Ambleside 14

**Tree Canopy Cover Change
2013 vs 2018**



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TREE CANOPY COVER COMPARISON: Cedardale 15

**Tree Canopy Cover Change
2013 vs 2018**



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TREE CANOPY COVER COMPARISON: British Properties 16

**Tree Canopy Cover Change
2013 vs 2018**





TREE CANOPY COVER COMPARISON: British Properties 17

**Tree Canopy Cover Change
2013 vs 2018**



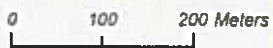
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TREE CANOPY COVER COMPARISON: British Properties 18

**Tree Canopy Cover Change
2013 vs 2018**

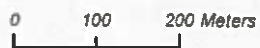


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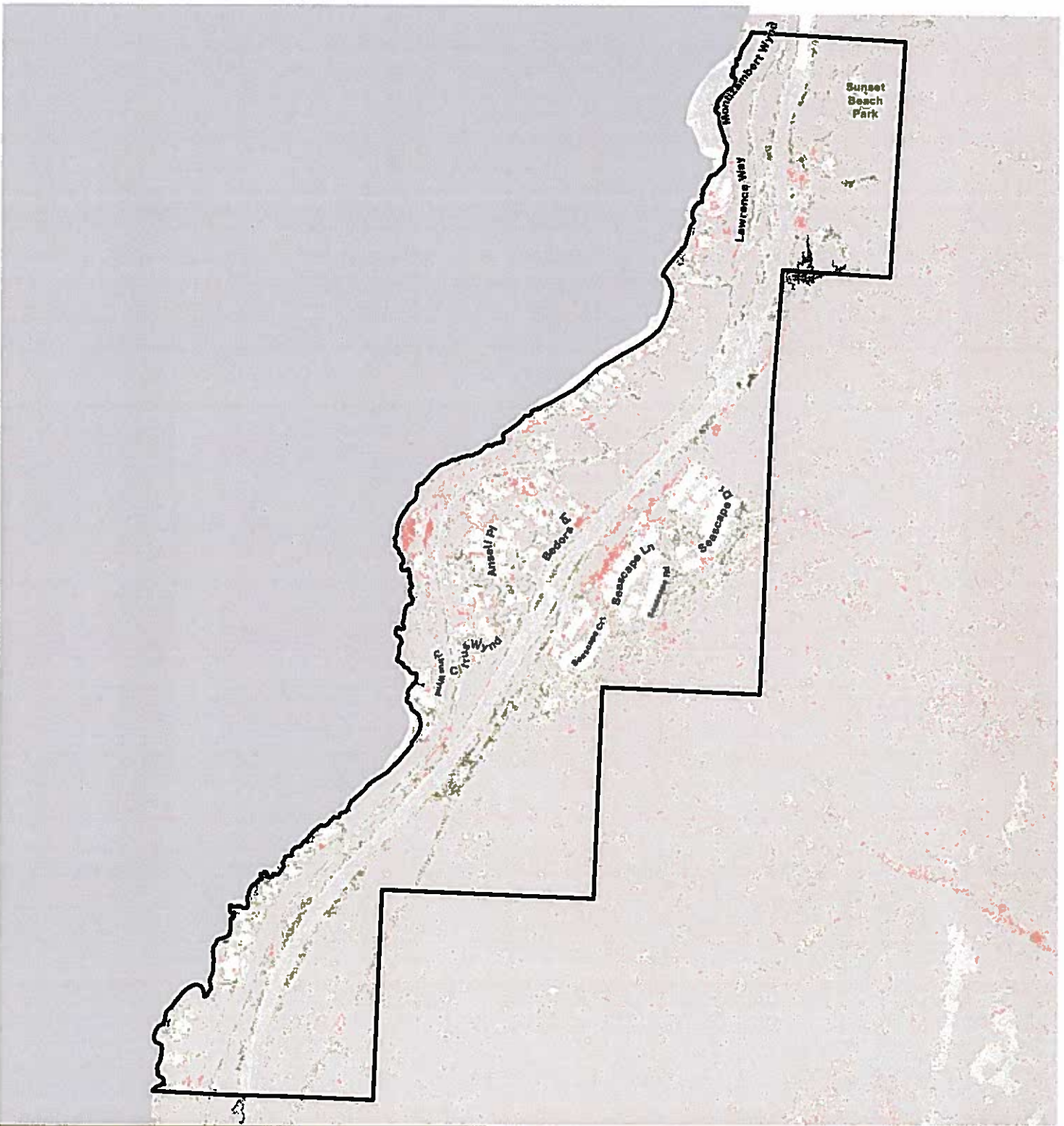


TREE CANOPY COVER COMPARISON: British Properties 19

**Tree Canopy Cover Change
2013 vs 2018**



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TREE CANOPY COVER COMPARISON: Sunset Beach 2

**Tree Canopy Cover Change
2013 vs 2018**



0 100 200 Meters

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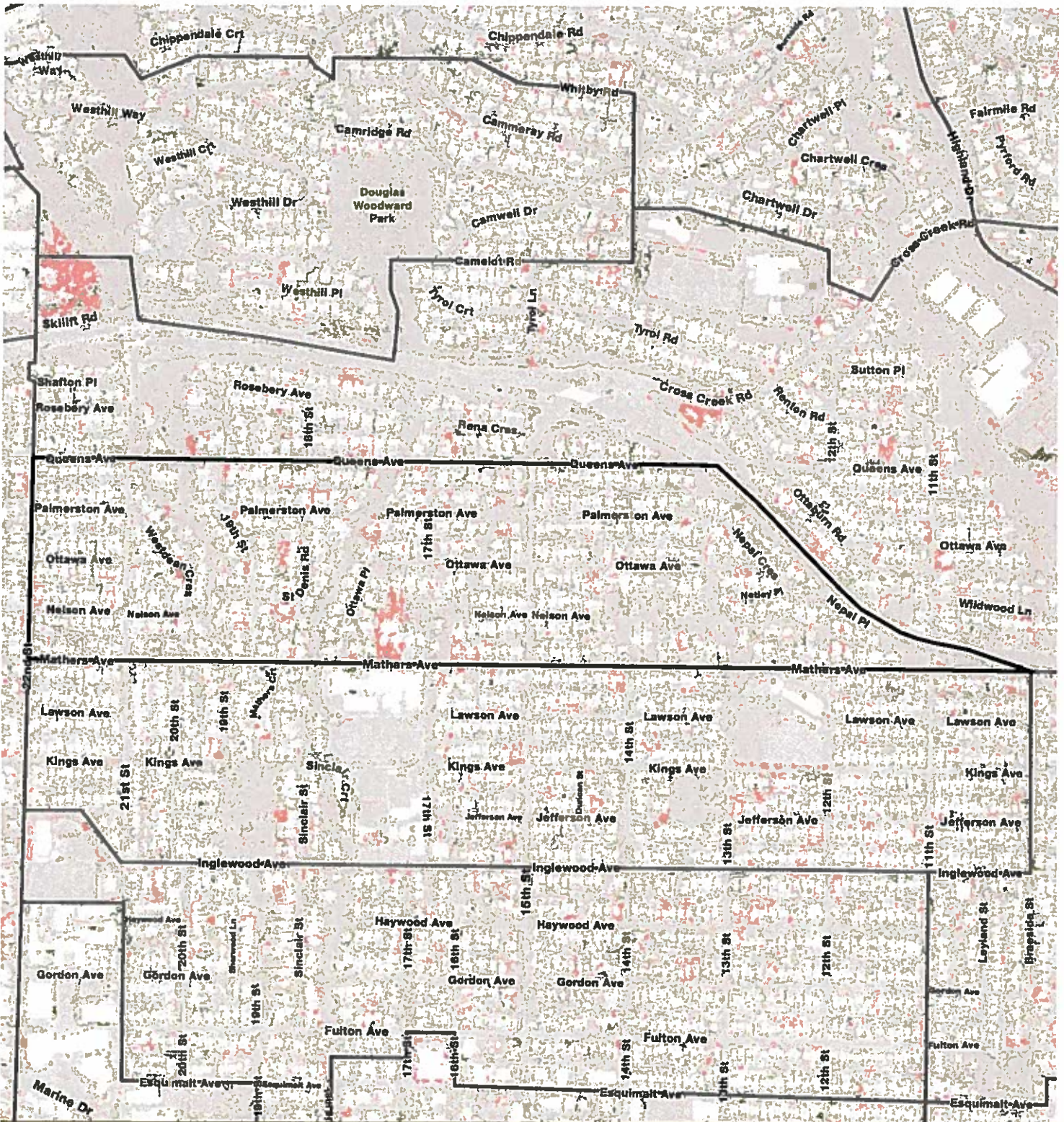
TREE CANOPY COVER COMPARISON: Glenmore 20

**Tree Canopy Cover Change
2013 vs 2018**



0 100 200 Meters

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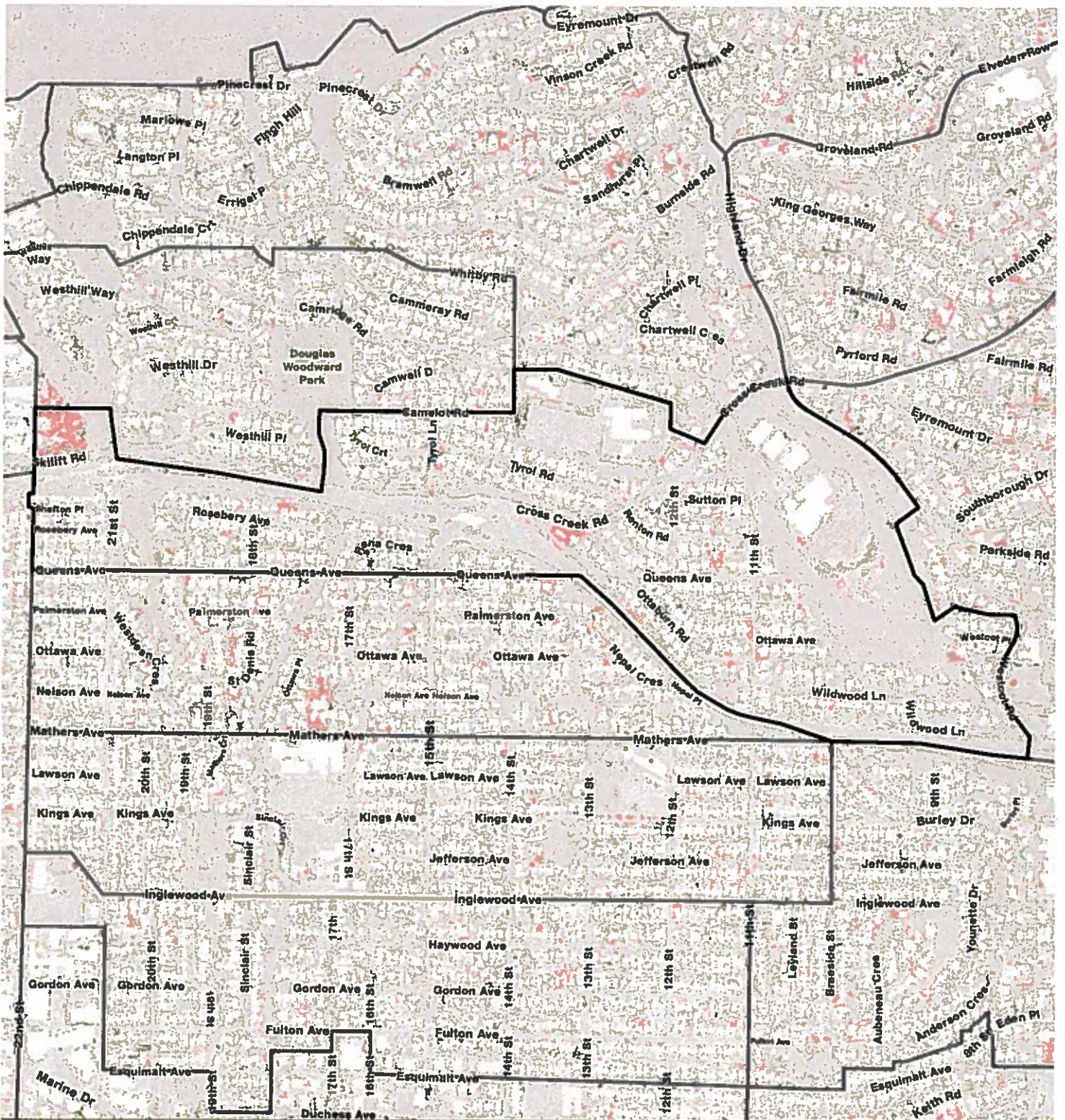
TREE CANOPY COVER COMPARISON: Ambleside 21

**Tree Canopy Cover Change
2013 vs 2018**



0 100 200 Meters

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TREE CANOPY COVER COMPARISON: Upper Levels Hwy 22

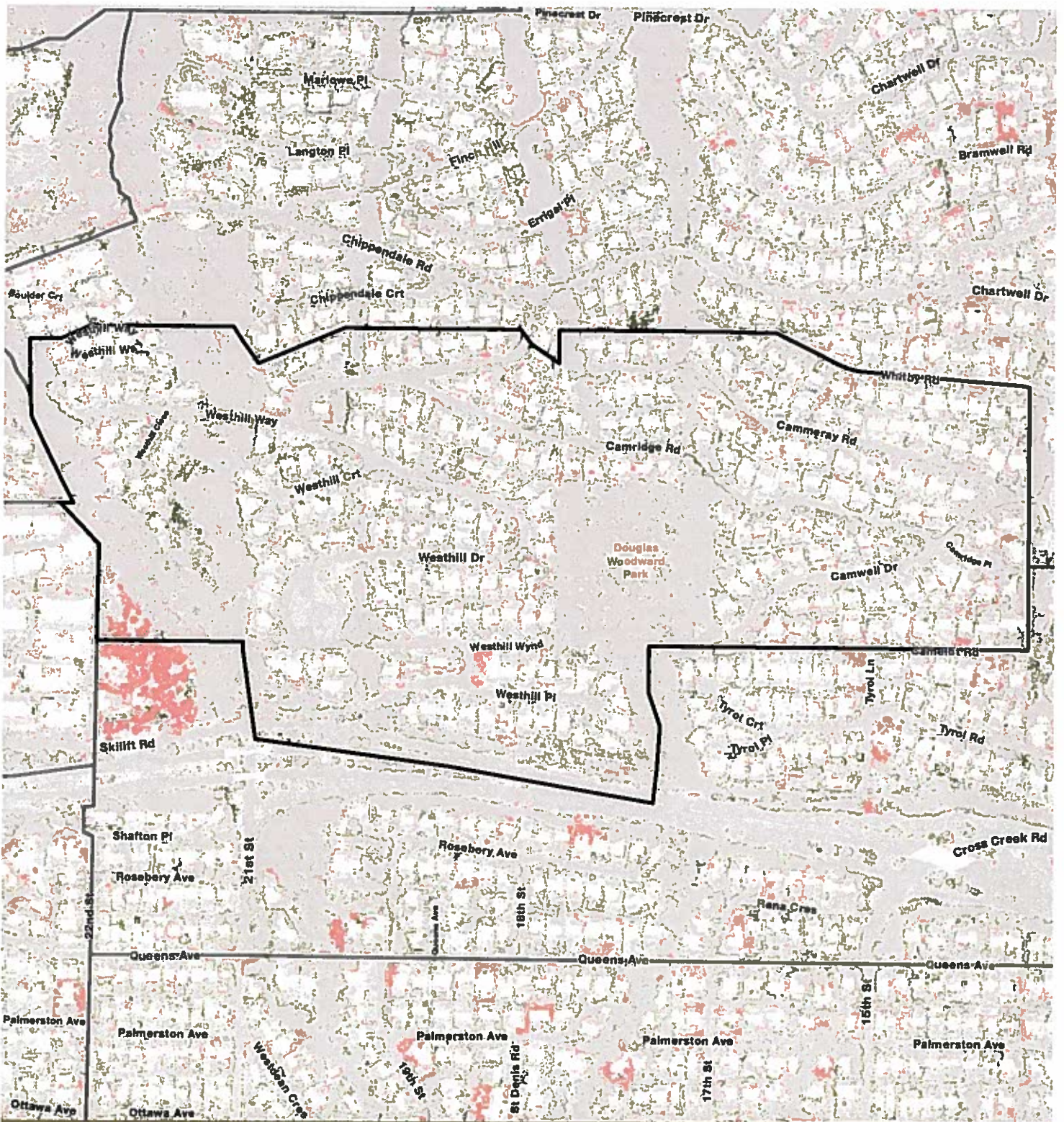
**Tree Canopy Cover Change
2013 vs 2018**



- Gain**
- No Gain or Loss**
- Loss**

0 100 200 Meters

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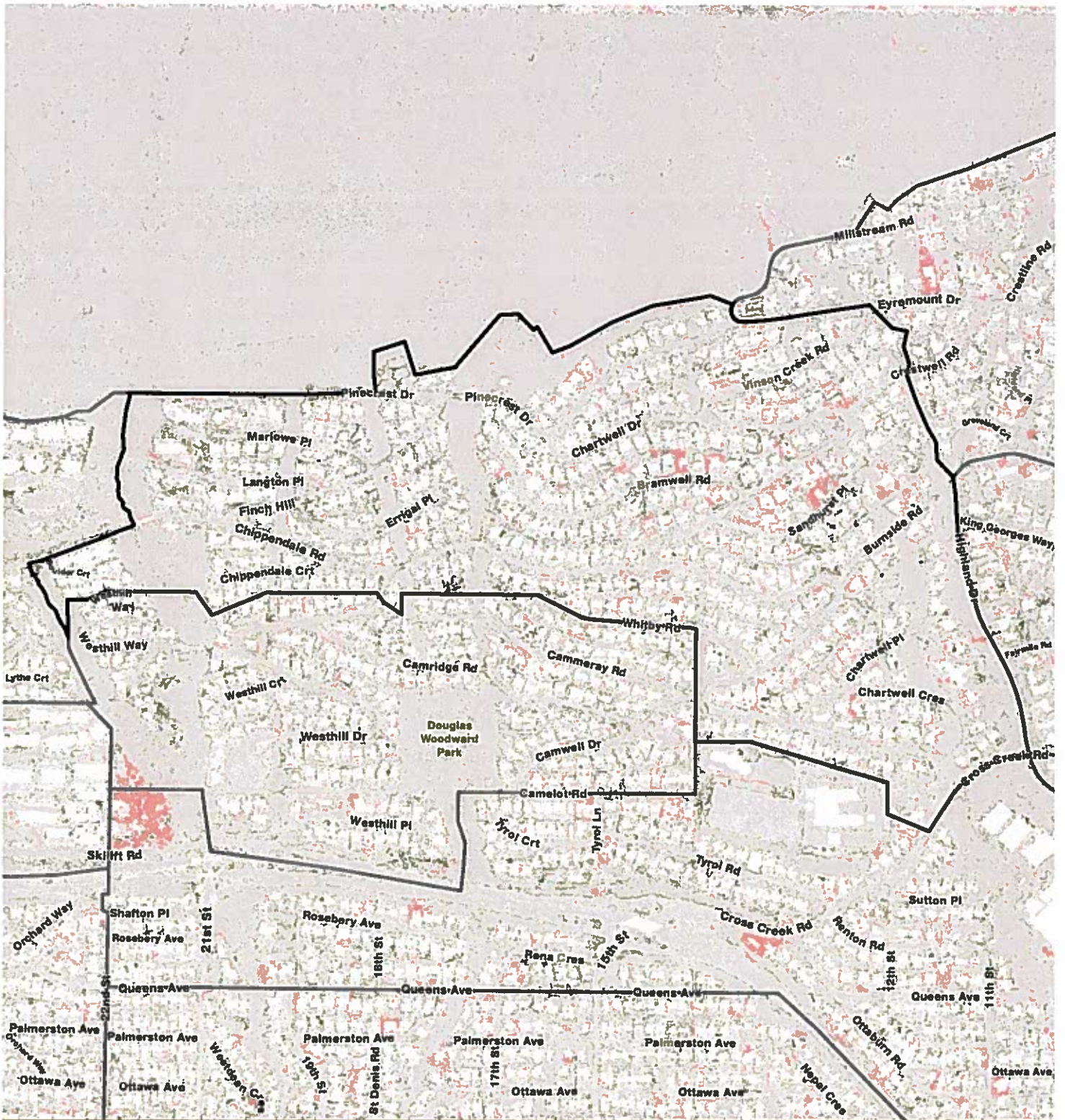


TREE CANOPY COVER COMPARISON: Cammeray 23

**Tree Canopy Cover Change
2013 vs 2018**

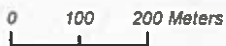


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TREE CANOPY COVER COMPARISON: Chartwell 24

**Tree Canopy Cover Change
2013 vs 2018**

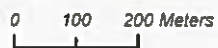


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TREE CANOPY COVER COMPARISON: Wentworth & Cypress Bowl 25

**Tree Canopy Cover Change
2013 vs 2018**



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TREE CANOPY COVER COMPARISON: Eagle Ridge & Gleneagles 3

**Tree Canopy Cover Change
2013 vs 2018**



0 100 200 Meters

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TREE CANOPY COVER COMPARISON: Caulfeild 4

**Tree Canopy Cover Change
2013 vs 2018**



0 100 200 Meters

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TREE CANOPY COVER COMPARISON: Cypress Park & Upper Caulfeild 5

**Tree Canopy Cover Change
2013 vs 2018**



0 100 200 Meters

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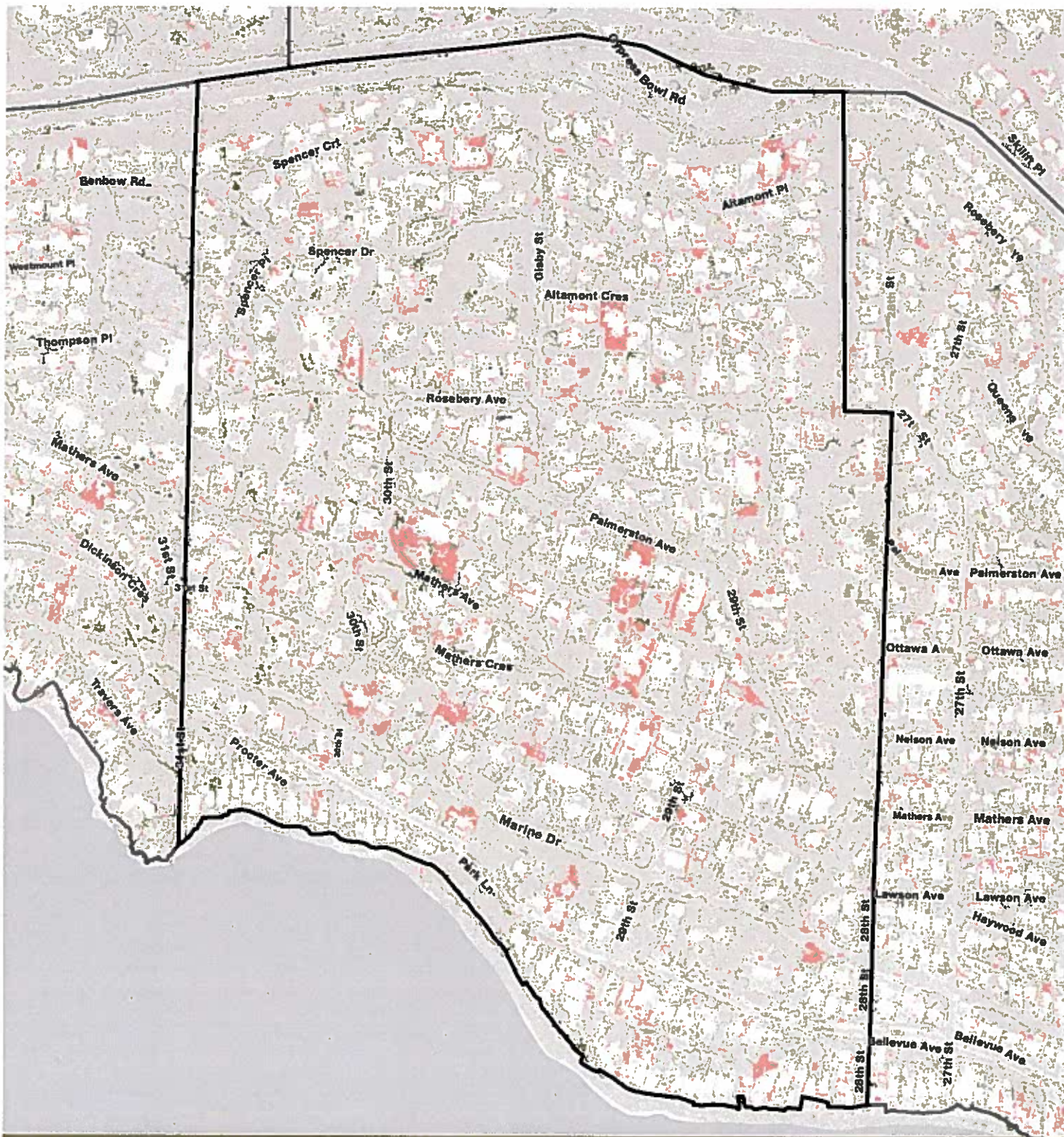


TREE CANOPY COVER COMPARISON: Dundarave 6

**Tree Canopy Cover Change
2013 vs 2018**



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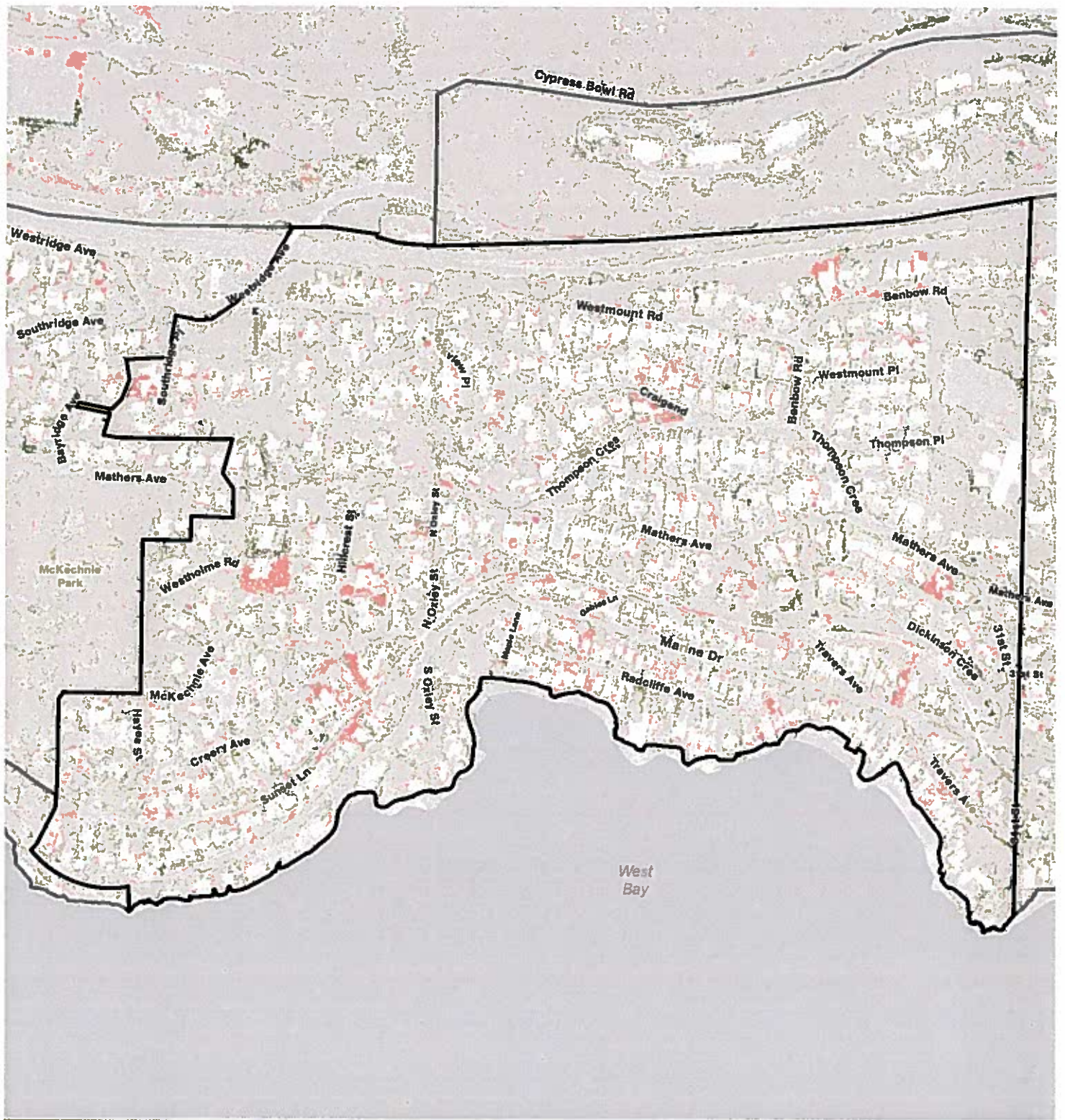


TREE CANOPY COVER COMPARISON: Altamont 7

**Tree Canopy Cover Change
2013 vs 2018**

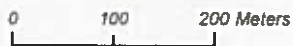


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TREE CANOPY COVER COMPARISON: Westmount 8

**Tree Canopy Cover Change
2013 vs 2018**

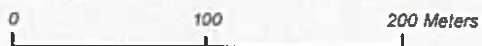


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TREE CANOPY COVER COMPARISON: Panorama 9

**Tree Canopy Cover Change
2013 vs 2018**



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