

**METRO VANCOUVER REGIONAL DISTRICT
REGIONAL PLANNING COMMITTEE**

REGULAR MEETING

June 9, 2021

9:00 AM

28th Floor Boardroom, 4730 Kingsway, Burnaby, British Columbia

A G E N D A¹

1. ADOPTION OF THE AGENDA

1.1 June 9, 2021 Regular Meeting Agenda

That the Regional Planning Committee adopt the agenda for its regular meeting scheduled for June 9, 2021, as circulated.

2. ADOPTION OF THE MINUTES

2.1 May 7, 2021, Regular Meeting Minutes

That the Regional Planning Committee adopt the minutes of its regular meeting held May 7, 2021, as circulated.

3. DELEGATIONS

4. INVITED PRESENTATIONS

5. REPORTS FROM COMMITTEE OR STAFF

5.1 Draft *Metro 2050*: Referral for Comment

That the MVRD Board refer the draft of *Metro 2050* attached to the report titled “Draft *Metro 2050*: Referral for Comment”, dated May 25, 2021 for comment including to the following:

- i. signatories to the regional growth strategy including: Mayors and Councils of Metro Vancouver member jurisdictions; the TransLink Board; the Squamish-Lillooet Regional District Board; the Fraser Valley Regional District Board; and
- ii. other members of the *Metro 2050* Intergovernmental Advisory Committee including: in region First Nations; the Province of BC; the Agricultural Land Commission; Vancouver Coastal Health; Fraser Health; BC Housing; BC Hydro; University Endowment Lands; Bowen Island; City of Abbotsford; City of

¹ Note: Recommendation is shown under each item, where applicable.

Chilliwack; District of Mission; Integrated Partnership for Regional Emergency Management; Simon Fraser University; Kwantlen Polytechnic University; University of British Columbia; Vancouver Fraser Port Authority; Transport Canada; Canada Mortgage and Housing Corporation; and Vancouver International Airport Authority.

5.2 2021 Agriculture Awareness Grant Recommendations

That the MVRD Board award the annual Agriculture Awareness Grants to the following eleven non-profit organizations as described in the report dated May 11, 2021, titled “2021 Agriculture Awareness Grant Recommendations”:

- i. BC Agriculture in the Classroom Foundation, for the “Take a Bite of BC” project in the amount of \$6,000;
- ii. BC Chicken Growers’ Association, for the “Poultry in Motion Educational Mini Barn” project in the amount of \$6,000;
- iii. Delta Farmland and Wildlife Trust, for the “Agriculture and Conservation in the Fraser River Estuary Videos” in the amount of \$6,000;
- iv. FarmFolk CityFolk, for “BC Seed Gathering” in the amount of \$6,000;
- v. Growing Chefs Society, for “Metro Vancouver Edible Education” in the amount of \$3,500;
- vi. Grow Local Society, for the “Power of Produce Club”, in the amount of \$3,600;
- vii. Langley Environmental Partners Society, for the “Langley Eats Local” project in the amount of \$4,400;
- viii. Maple Ridge Pitt Meadows Agricultural Association, for the “Maple Ridge Pitt Meadows Country Fest” in the amount of \$1,500;
- ix. Open Science Network Society, for the “Digital Agriculture in Metro Vancouver” project in the amount of 3,000;
- x. Pacific Immigrant Resources Society, for the “Needs Assessment & Educational Campaign on Food Literacy and Metro” project in the amount of \$6,000; and
- xi. The Sharing Farm, for the “Interpretive Signage at the Sharing Farm” in the amount of \$4,000.

5.3 Evaluation of Regional Ecosystem Connectivity Study

That the MVRD Board receive for information the report dated May 19, 2021, titled “Evaluation of Regional Ecosystem Connectivity Study”.

5.4 Metro Vancouver Tree Regulations Toolkit

That the MVRD Board receive for information the report dated May 14, 2021, titled “Metro Vancouver Tree Regulations Toolkit”.

5.5 2021 American Planning Association National Conference

Verbal Update

Designated Speaker: Jonathan Coté, Mayor, New Westminster and Chair of the Metro Vancouver Regional Planning Committee

5.6 Manager's Report

That the Regional Planning Committee receive for information the report dated May 20, 2021, titled "Manager's Report".

6. INFORMATION ITEMS

7. OTHER BUSINESS

8. BUSINESS ARISING FROM DELEGATIONS

9. RESOLUTION TO CLOSE MEETING

Note: The Committee must state by resolution the basis under section 90 of the Community Charter on which the meeting is being closed. If a member wishes to add an item, the basis must be included below.

10. ADJOURNMENT/CONCLUSION

That the Regional Planning Committee adjourn/conclude its regular meeting of June 9, 2021.

Membership:

Coté, Jonathan (C) - New Westminster
Froese, Jack (VC) - Langley Township
Copeland, Dan - Delta
Dueck, Judy - Maple Ridge
Gamboli, Nora - West Vancouver

Guerra, Laurie - Surrey
Hurley, Mike - Burnaby
Kirby-Yung, Sarah - Vancouver
McEwen, John - Anmore
Muri, Lisa - North Vancouver District

Steves, Harold - Richmond
Vagramov, Rob - Port Moody
van den Broek, Val - Langley City
West, Brad - Port Coquitlam

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**METRO VANCOUVER REGIONAL DISTRICT
REGIONAL PLANNING COMMITTEE**

Minutes of the Regular Meeting of the Metro Vancouver Regional District (MVRD) Regional Planning Committee held at 9:06 a.m. on Friday, May 7, 2021 in the 28th Floor Boardroom, 4730 Kingsway, Burnaby, British Columbia.

MEMBERS PRESENT:

Chair, Mayor Jonathan Coté*, New Westminster
 Vice Chair, Mayor Jack Froese*, Langley Township
 Councillor Dan Copeland*, Delta
 Councillor Judy Dueck*, Maple Ridge
 Councillor Nora Gambioli*, West Vancouver
 Councillor Laurie Guerra*, Surrey
 Mayor Mike Hurley*, Burnaby
 Councillor Sarah Kirby-Yung*, Vancouver
 Mayor John McEwen*, Anmore
 Councillor Lisa Muri*, North Vancouver District
 Councillor Harold Steves*, Richmond
 Mayor Rob Vagramov*, Port Moody
 Mayor Val van den Broek*, Langley City
 Mayor Brad West*, Port Coquitlam

MEMBERS ABSENT:

None.

STAFF PRESENT:

Heather McNell, General Manager, Regional Planning and Housing Services
 Amelia White, Legislative Services Coordinator, Board and Information Services

1. ADOPTION OF THE AGENDA

1.1 May 7, 2021 Regular Meeting Agenda

It was MOVED and SECONDED

That the Regional Planning Committee:

- a) amend the agenda for its regular meeting scheduled for May 7, 2021, by varying the agenda order to consider:
 - i. Item 5.2 after Item 4.1 Invited Presentation – Russell Whitehead and Christopher Kuno;
 - ii. Item 5.3 after Item 4.2 Invited Presentation – Adrian Lightstone; and
- b) adopt the agenda as amended.

CARRIED

*denotes electronic meeting participation as authorized by Section 3.6.2 of the *Procedure Bylaw*

2. ADOPTION OF THE MINUTES

2.1 April 9, 2021 Regular Meeting Minutes

It was MOVED and SECONDED

That the Regional Planning Committee adopt the minutes of its regular meeting held April 9, 2021, as circulated.

CARRIED

3. DELEGATIONS

No items presented.

4. INVITED PRESENTATIONS

4.1 Russell Whitehead, Associate Vice President, and Christopher Kuno, Senior Consultant, Colliers Strategy and Consulting

Russell Whitehead and Christopher Kuno spoke to members regarding the Metro Vancouver Industrial Intensification Analysis, highlighting an overview of their study, a summary of their considerations and findings, potential challenges and proposing a series of recommendations.

Members were provided with a presentation titled “Metro Vancouver Industrial Intensification Analysis”, which is retained with the May 7, 2021 Regional Planning Committee agenda.

Agenda Order Varied

Pursuant to Item 1. Adoption of the Agenda, the order of the agenda was varied to consider Item 5.2 at this point.

5. REPORTS FROM COMMITTEE OR STAFF

5.2 Metro Vancouver Industrial Lands Intensification Analysis Study

Report dated April 12, 2021, from Eric Aderneck, Senior Planner, Regional Planning and Housing Services, providing information to the Regional Planning Committee on the completed Industrial Lands Intensification Analysis Study.

It was MOVED and SECONDED

That the MVRD Board receive for information the report dated April 12, 2021, titled “Metro Vancouver Industrial Lands Intensification Analysis Study”.

CARRIED

Agenda Order Resumed

The order of the agenda resumed with Item 4.2 being before the Committee.

4. INVITED PRESENTATIONS

4.2 **Adrian Lightstone, National Manager, Advisory Services, WSP**

Adrian Lightstone spoke to members regarding the Metro 2050 Regional Resilience Framework Study, highlighting the project context and objectives, the components of a resilience framework, the shock and stress groups, the assessment approach and the proposed recommendations for Metro Vancouver and TransLink.

Members were provided with a presentation titled “Metro Vancouver Regional Resilience Framework: Project Overview”, which is retained with the May 7, 2021 Regional Planning Committee agenda.

Agenda Order Varied

Pursuant to Item 1. Adoption of the Agenda, the order of the agenda was varied to consider Item 5.3 at this point.

5. REPORTS FROM COMMITTEE OR STAFF

5.3 ***Metro 2050* Regional Resilience Framework Study**

Report dated April 11, 2021, from Mark Seinen, Senior Planner, Regional Planning and Housing Services, conveying the *Metro 2050* Regional Resilience Framework to the Regional Planning Committee for information and providing a summary of opportunities to integrate the findings into *Metro 2050* and other future regional planning work.

It was MOVED and SECONDED

That the MVRD Board receive for information the report dated April 11, 2021, titled “*Metro 2050* Regional Resilience Framework Study”.

CARRIED

Agenda Order Resumed

The order of the agenda resumed with Item 5.1 being before the Committee.

5.1 ***Metro 2050* Draft Policy Language: Goal 4 – Provide Diverse and Affordable Housing Choices and Goal 5 – Support Sustainable Transportation Choices**

Report dated April 1, 2021, from Erin Rennie, Senior Planner, Regional Planning and Housing Services, providing the Regional Planning Committee with the opportunity to review and comment on the draft content of Goal 4 and Goal 5 of *Metro 2050*, the updated regional growth strategy.

Members were provided a presentation on the *Metro 2040* proposed policy changes that would be reflected in *Metro 2050*.

Members discussed the proposed policy changes to Goal 4 and noted the following:

- the need for long-term housing options for homeless people
- the need for a control mechanism to assist in keeping affordable housing economical
- consideration for tenants who have to re-locate
- desire to see the implementation strategy for each of the *Metro 2050* Goals
- concerns about land speculation, vacant homes and the increase in assessment values

Members discussed the proposed policy changes to Goal 5 and noted the following:

- the need for transportation options in the Campbell Heights area in Surrey
- the need to ensure that growth corridors are aligned with the proposed growth projections
- additional language around micro-mobility and other modes of transportation
- consideration of how changes, such as working from home and moving, due to the COVID-19 pandemic, may continue or shift in the future

Presentation material titled “*Metro 2050* Draft Goal 4 (Housing) and Goal 5 (Transport): Proposed Content in the RGS Update” is retained with the May 7, 2021 Regional Planning Committee agenda.

It was MOVED and SECONDED

That the MVRD Board receive for information the report dated April 1, 2021, titled “*Metro 2050* Draft Policy Language: Goal 4 – Provide Diverse and Affordable Housing Choices and Goal 5 – Support Sustainable Transportation Choices”.

CARRIED

5.4 Manager’s Report

Report dated April 27, 2021, from Heather McNell, General Manager, Regional Planning and Housing Services, providing an update on the Regional Planning Committee 2021 Work Plan.

It was MOVED and SECONDED

That the Regional Planning Committee receive for information the report dated April 27, 2021, titled “Manager’s Report”.

CARRIED

6. INFORMATION ITEMS

6.1 Best Management Practices for Invasive Species Hedge Bindweed and American Bullfrog

It was MOVED and SECONDED

That the Regional Planning Committee receive for information the report dated March 22, 2021 titled, "Best Management Practices for Invasive Species Hedge Bindweed and American Bullfrog".

CARRIED

7. OTHER BUSINESS

No items presented.

8. BUSINESS ARISING FROM DELEGATIONS

No items presented.

9. RESOLUTION TO CLOSE MEETING

No items presented.

10. ADJOURNMENT/CONCLUSION

It was MOVED and SECONDED

That Regional Planning Committee conclude its regular meeting of May 7, 2021.

CARRIED

(Time: 10:27 a.m.)

Amelia White,
Legislative Services Coordinator

Jonathan Côté, Chair

45441779 FINAL

To: Regional Planning Committee

From: Sean Galloway, Director, Regional Planning and Electoral Area Services and
Erin Rennie, Senior Planner, Regional Planning and Housing Services

Date: May 25, 2021 Meeting Date: June 9, 2021

Subject: **Draft *Metro 2050*: Referral for Comment**

RECOMMENDATION

That the MVRD Board refer the draft of *Metro 2050* attached to the report titled “Draft *Metro 2050*: Referral for Comment”, dated May 25, 2021 for comment including to the following:

- i. signatories to the regional growth strategy including: Mayors and Councils of Metro Vancouver member jurisdictions; the TransLink Board; the Squamish-Lillooet Regional District Board; the Fraser Valley Regional District Board; and
- ii. other members of the *Metro 2050* Intergovernmental Advisory Committee including: in region First Nations; the Province of BC; the Agricultural Land Commission; Vancouver Coastal Health; Fraser Health; BC Housing; BC Hydro; University Endowment Lands; Bowen Island; City of Abbotsford; City of Chilliwack; District of Mission; Integrated Partnership for Regional Emergency Management; Simon Fraser University; Kwantlen Polytechnic University; University of British Columbia; Vancouver Fraser Port Authority; Transport Canada; Canada Mortgage and Housing Corporation; and Vancouver International Airport Authority.

EXECUTIVE SUMMARY

A draft of *Metro 2050*, the update to the current regional growth strategy, is being presented to the Regional Planning Committee and MVRD Board for consideration and referral for comment. *Metro 2050* contains: updates to the regional vision; growth projections to the year 2050; updated descriptions of the main regional policy tools (such as the Urban Containment Boundary); updates to the five goals and Implementation section with supporting strategies and policy actions; updates to the performance monitoring indicators; a new glossary of terms; and updated maps.

The new and amended policy actions have been reviewed by the *Metro 2050* Intergovernmental Advisory Committee and Regional Planning Committee, each providing feedback. This feedback was considered and, in addition to feedback from other stakeholders, helped to improve the policies contained in this draft version of *Metro 2050*. The Board’s referral will initiate a five-month comment period between July and the end of November. During this time, Metro Vancouver will provide opportunities for engagement and comment, including formal presentations to affected local government councils or boards and public information meetings.

PURPOSE

To provide the Regional Planning Committee and MVRD Board with the draft of *Metro 2050* (Attachment 1) and a recommendation to refer the draft of *Metro 2050* out for comment.

BACKGROUND

On April 26, 2019, the MVRD Board passed a resolution to initiate a comprehensive update to *Metro Vancouver 2040: Shaping our Future (Metro 2040)*, the regional growth strategy (Reference 1). Over the intervening 24 months, staff have implemented a robust Engagement Plan (Reference 2 and 3) including 11 themed Policy Reviews to identify opportunities to enhance policies in the regional growth strategy and address identified policy gaps (Reference 4).

Between January and May of 2021 staff worked closely with member jurisdiction staff, First Nations and other regional stakeholders through the *Metro 2050* Intergovernmental Advisory Committee to develop the content of *Metro 2050*. Drafts of each of the goal areas were presented to the Regional Planning Committee and the Board between March and May 2021 (References 5, 6, and 7). The draft *Metro 2050* is now being provided to the Regional Planning Committee and MVRD Board with a recommendation to commence a comment period to provide an opportunity for member jurisdictions, First Nations, other regional stakeholders, and the public to provide feedback on the draft of *Metro 2050*.

METRO 2050 DEVELOPMENT PROCESS

Between April 2019 and December 2020, staff engaged member jurisdiction staff and other regional stakeholders on 11 themed Policy Reviews to explore the existing *Metro 2040* policies and identify opportunities for improvement. In addition, during this period Metro Vancouver staff engaged with First Nations through one-on-one meetings, and with the general public through a series of *Metro 2040* Public Dialogue sessions, an online comment form, and a public webinar. The engagement and analysis that took place during this period resulted in Policy Review Recommendations that were endorsed or received by the MVRD Board between September 2020 and January 2021 as the basis for policy and content development.

Beginning in January 2021, staff met monthly with the *Metro 2050* Intergovernmental Advisory Committee (IAC) to present draft *Metro 2050* policy content on a goal by goal basis for consideration, dialogue, and feedback. IAC members provided feedback on the content through Virtual Open Houses and IAC Comment Forms. Approximately 100 Goal-Based Comment Forms were submitted by IAC members on the draft content. This content was also presented to the Regional Planning Committee and MVRD Board in March, April, and May of this year for questions and comments. Comments received during this period were considered and improved the policy content in the attached draft *Metro 2050*.

IMPORTANT THEMES AND NEW CONTENT IN METRO 2050

Climate Action through Reduction of Greenhouse Gas Emissions

Actions to reduce greenhouse gas (GHG) emissions have been integrated across the five goal areas. Goal 1 includes supportive policies to limit development outside the Urban Containment Boundary and outside Urban Centres and Major Transit Growth Corridors. Goal 3 includes new GHG monitoring actions for Metro Vancouver and for member jurisdictions to demonstrate how they will contribute to the regional target of carbon neutrality by 2050. Goal 5 emphasizes the use of Transportation Demand Management to reduce driving, encourages the acceleration of active transportation buildout, and supports the expansion of the transit system aligned with planned growth.

Bolstering Climate Change and Natural Hazard Resiliency

In recognition of the multiple natural hazards and climate change impacts the region is exposed to, *Metro 2050* contains a greater emphasis on adaptation actions such as encouraging the adoption of local flood hazard policies, discouraging new development in areas with known and unmitigated hazards, and an action for Metro Vancouver to lead the preparation of a multi-hazard risk assessment and map.

Promoting and Supporting Affordable Housing

Because of the ongoing housing affordability crisis in the Metro Vancouver region, *Metro 2050* contains a Goal and three new strategies dedicated solely to housing policies. These policy actions in particular emphasize: the need to expand the supply of transit-oriented, affordable rental housing; the expansion of housing supply to meet a variety of needs; protecting renters; and providing options for people experiencing or at risk of homelessness and people with very low incomes. There are also multiple new advocacy actions calling on senior levels of government to fund and legislate new measures enabling local governments to take stronger action on housing.

Protecting and Connecting Nature

Goal 3 contains two new regional targets for all members to work toward while respecting the context of their local community. First, a target to protect 50% of the region's land base for nature (40% is protected now), and second, to expand the region's tree canopy cover within the Urban Containment Boundary from 32% to 40%.

New Policy Actions Related to Indigenous Relations – Towards Reconciliation

Building on Metro Vancouver's ongoing work to improve relationships with local First Nations and to advance Reconciliation, *Metro 2050* contains an Acknowledgement of Indigenous Territory, map layers showing Indigenous reserve and treaty lands, and new policies supporting better coordination, collaboration, data and information sharing, and supportive planning research with in-region First Nations.

Major Transit Growth Corridors – Supporting Coordinated Transit -Oriented Development

To make transit-oriented development more coordinated across the region and easier for member jurisdictions, *Metro 2050* includes a new Major Transit Growth Corridor map. These corridors will replace the Frequent Transit Network as the organizing framework for transit oriented growth in the region, working together and in support of Urban Centres and TransLink's Major Transit Network. Going forward, the intent is that new Frequent Transit Development Areas, identified by member jurisdictions, will be located within the Major Transit Growth Corridors. This supports member jurisdictions in determining where, how, and when growth and development density are distributed, while supporting the regional need for greater coordination of growth and services, including transit, along the region's key corridors, and while supporting medium density forms and improved transit-oriented housing choices. In addition, this approach supports the further integration between *Metro 2050* and *Transport 2050*.

Integrating Social Equity

Consideration of social equity outcomes has been a part of the regional growth strategy, but is now unambiguously noted as an objective of the strategy and included in the *Metro 2050*'s Challenges and Opportunities section, definition in the Glossary, introductory reflections in each of the goal

introductions explaining the linkage between the policy area and social equity, and consideration throughout the development of new and updated content. There are policy actions that support greater social equity in the region particularly related to housing affordability, tenant protection, the expansion of green infrastructure, the provision of child care, climate change resiliency, and the development of complete communities that will contribute to continuing to build a region that is more fair and equitable for all.

OVERVIEW OF THE DRAFT METRO 2050 CONTENT

Metro 2050 is intended to build on the successes of *Metro 2040*. It reinforces and enhances existing policy directions, extends the timeframe out to the year 2050, fills identified policy gaps, and responds to new and emerging policy issues. The new and updated policy language implements the recommendations of the *Metro 2040* Policy Reviews.

Sections A and B: Introduction to Metro Vancouver and the Region

Metro 2050 begins with an introduction to Metro Vancouver, including an Acknowledgement of Indigenous Territory. A short description of Metro Vancouver's organizational structure and corporate mission is followed by the region's corporate commitment to "Building a Resilient Region". As in *Metro 2040*, *Metro 2050* includes a description of the Scope and Linkages to Other Plans, Context, and overview of Challenges and Opportunities.

Section C: Introduction to the Regional Growth Strategy

Section C provides an Introduction that includes the Vision, Guiding Regional Planning Principles, and a Responding to the Challenges section which is an overview of the five *Metro 2050* goals.

Section D: Urban Containment Boundary, Regional Land Use Designations, and Overlays

Section D includes the descriptions of the core policy "tools" in the regional growth strategy including: the Urban Containment Boundary, the six regional land use designations, the Major Transit Growth Corridors, and the four structuring overlays (i.e. Urban Centres, Frequent Transit Development Areas, Trade-Oriented Lands, and Natural Resource Areas). This section is an important section of the regional growth strategy as it helps to inform the implementation of many of the policy actions and the review and acceptance of future Regional Context Statements.

Regional Growth Projections

The next section presents the Regional Growth Projections; includes a description of the approach Metro Vancouver takes to preparing the long-term population, dwelling unit and employment growth projections; and highlights some of the important trends that are anticipated in this region over the next 30 years. Whereas *Metro 2040* included municipal level projections as an appendix, *Metro 2050* introduces the Regional Growth Projections in the front of the document, as the anticipated growth is the principal reason for planning together as a region over the long term. Also new to this section is the "sub-regional" approach to growth projections, where the region has been divided into six sub-regions and the 30 year projections for growth are presented at the sub-regional level. This sub-regional approach has the advantage of being less sensitive to the short-term oscillations and corrections that tend to happen within individual member jurisdictions, and changes in the housing market and economy. A principal benefit will be that the data behind the projections will be more accurate and *Metro 2050* will not need to be frequently amended to keep the projections current. Going forward, individual member jurisdiction projections will still be prepared as a service to member jurisdictions, and will be reported out annually, outside of the regional growth strategy.

Complementing the growth projections are the Urban Centre and Frequent Transit Development Area Growth Targets (Table 2). These targets are unchanged from *Metro 2040*; these targets will be updated to extend them out to the year 2050 at a later date, following an engagement process involving all member jurisdictions.

Section E: Goals, Strategies and Actions

Just as with *Metro 2040* and Metro Vancouver's other departmental management plans, the policy actions in *Metro 2050* are organized into goals that are supported by strategies. Under each strategy there are policy actions for the regional growth strategy's signatories; i.e. Metro Vancouver, member jurisdictions, and TransLink. Some of Metro Vancouver's policy actions are now "advocacy actions", which include requesting actions of other levels of government or other government agencies that are not signatories to *Metro 2050*.

It is noted that a primary difference in the goal structure of *Metro 2050* is that Goal 4 has become "Provide Diverse and Affordable Housing Choices" and now includes three strategies about housing. The content of *Metro 2040* Strategy 4.2 "Develop healthy and complete communities with access to a range of services and amenities" has been moved to Goal 1 as a new Strategy 1.3 entitled "Develop resilient, healthy, connected, and complete communities with a range of services and amenities".

Many policy actions in *Metro 2050* are identical or very similar to those that the MVRD Board confirmed are working well in *Metro 2040*. The new or revised policy actions are based on learnings and research over 10 years of implementation, on input from member jurisdictions, and on the endorsed policy recommendations coming out of the *Metro 2040* Policy Review process (Reference 4).

Section F: Implementation

The Implementation section describes the procedures for implementing and amending the regional growth strategy. It includes details about what Regional Context Statements will contain, and information about flexibility, Special Study Areas, and how Metro Vancouver will work with other government agencies. The same three amendment types, and the procedures for each, continue to be described, with the requirement for a regional public hearing being removed from the Type 2 amendment process being the only change (per previous MVRD Board direction).

Section G: Performance Monitoring

The Performance Monitoring section outlines the performance indicators that will be monitored to help evaluate progress towards the goals, strategies, and targets set out in *Metro 2050*. There are now 29 indicators listed in *Metro 2050*, up from the 23 that were listed in *Metro 2040*. Most performance measures are the same as those in *Metro 2040*, while some have been refined or replaced based on continued improvements in available data. As with *Metro 2040*, the performance monitoring program with all the details about how the monitoring will be done will be in an Implementation Guideline prepared after the adoption of *Metro 2050*. Performance on the indicators will continue to be reported out annually to the MVRD Board through a staff report and on an ongoing basis through an online dashboard on the Metro Vancouver website.

Section H: Glossary of Terms

New to *Metro 2050* is a glossary of terms. The terms have been included as they are considered specific to *Metro 2050*, and necessary to correctly interpret the meaning of and implement certain

policy actions. If not included in the Glossary, Implementation Section, or defined by other legislation, the common understanding of a term should be assumed.

Section I: Maps

For ease of use, all the maps have been combined into one section at the back of the regional growth strategy. These maps are small scale depictions of the official maps which are to be housed on the Metro Vancouver website. The same parcel-based map data from *Metro 2040* has been used to create the *Metro 2050* maps meaning no changes have been made to the location of any of the land use designations, the Urban Containment Boundary, the Urban Centres and Frequent Transit Development Areas, or the Special Study Areas. The style, colours, line weights, and contextual information of the maps has been updated to support a better user experience and make the maps easier to read and more useful.

Map 4 has been updated to include the exact boundaries of the Urban Centres and Frequent Transit Development Areas; no changes have been made to the location or boundaries. Map 5 “Major Transit Growth Corridors” and Map 11 “Sensitive Ecosystem Inventory” are new maps being introduced in *Metro 2050*.

The maps also now include Indigenous reserve and treaty lands and the names of each First Nation with lands in the region, with no regional land use designation being applied. It is noted that the way in which Indigenous lands are depicted on the *Metro 2050* maps is still to be confirmed, as it is a topic for the ongoing discussions with in-region First Nations.

NEXT STEPS

Metro Vancouver staff are recommending that the MVRD Board refer the draft *Metro 2050* for comment. Subject to the Board’s direction, the comment period will be between July and the end of November 2021. Written notification of the referral will be sent to member jurisdictions, the Fraser Valley and Squamish Lillooet Regional Districts, TransLink, and other Metro 2050 IAC members including in region First Nations, inviting comments on the draft. The comment period is intended to end on November 26, 2021 so that the regional growth strategy bylaw can be finalized for initial consideration by the MVRD Board in January 2022 in accordance with the Board approved timeline. The comment period will also provide an opportunity to assess general support for the overall direction articulated in *Metro 2050*, and, if necessary, to consider amending the timeline to allow for additional engagement. Extending the *Metro 2050* timeline would create a project risk and the adoption phase would need to take place after the 2022 local government election.

Metro 2050 IAC Policy Working Groups

During the Summer and early Fall of 2021, Metro Vancouver staff will be convening a series of optional “working group” sessions for *Metro 2050* Intergovernmental Advisory Committee members focused on specific topic areas of *Metro 2050*. The objective of the sessions will be to discuss, in depth, the particular “big move” topic areas and any concerns, ideas, or comments associated with each to support the preparation of the formal comments. The topics may include but not limited to: Major Transit Growth Corridors; affordable housing targets; updated Urban Centre framework, permitting residential within employment areas near rapid transit stations; and the Sensitive Ecosystem Inventory. In addition, one of the working groups will focus on supporting the engagement of First Nations.

Council Presentations and Comments

Metro Vancouver staff are scheduling *Metro 2050* presentations to all member jurisdiction councils, and the Boards of the Fraser Valley and Squamish-Lillooet Regional Districts and TransLink during September, October, and November of 2021 to engage directly with the signatories of the regional growth strategy. Member jurisdictions are requested to work with Metro Vancouver staff to schedule these presentations as soon as possible to avoid conflicts.

Public Engagement

Although the general public is not the primary engagement audience during this phase of *Metro 2050* development, the public will be invited to review and provide comment on the draft as well. The draft will be available on the *Metro 2050* webpage of the Metro Vancouver website, and members of the public will have the option to submit comments by email or through a simple online comment form. Videos providing an overview of *Metro 2050* will be released and promoted over social media, and staff are also preparing and will host a public webinar in the Fall of 2021. Member jurisdictions have the option of co-hosting a joint public information meeting in conjunction with the council presentations in the fall of 2021, providing additional opportunities for locally focused public engagement on the draft of *Metro 2050*.

Adopting Metro 2050

The formal acceptance and adoption period is scheduled to begin in January of 2022 when a regional growth strategy bylaw will be considered for first and second reading by the Regional Planning Committee and MVRD Board, and a regional public hearing held and third reading considered in February of 2022. The period between March and May of 2022 will be the opportunity for member jurisdiction councils, and the Boards of the Fraser Valley and Squamish-Lillooet Regional Districts and TransLink, to consider acceptance of *Metro 2050* by resolution. In June of 2022, at the end of the acceptance period, the *Metro 2050* bylaw will be presented to the MVRD Board for consideration of adoption.

Regional Context Statements

Current Regional Context Statements will continue to be in effect after the adoption of *Metro 2050* until a new Regional Context Statement is prepared, submitted and accepted by the MVRD Board. Following the adoption of *Metro 2050*, starting in June of 2022 member jurisdictions will have two years (to July 2024) to submit a new Regional Context Statement that demonstrates how their respective Official Community Plan (or equivalent) is generally consistent, or will work towards consistency with *Metro 2050* over time.

ALTERNATIVES

1. That the MVRD Board refer the draft of *Metro 2050* attached to the report titled “Draft *Metro 2050*: Referral for Comment”, dated May 25, 2021 for comment including to the following:
 - i. signatories to the regional growth strategy including: Mayors and Councils of Metro Vancouver member jurisdictions; the TransLink Board; the Squamish-Lillooet Regional District Board; the Fraser Valley Regional District Board; and
 - ii. other members of the *Metro 2050* Intergovernmental Advisory Committee including: in region First Nations; the Province of BC; the Agricultural Land Commission; Vancouver Coastal Health; Fraser Health; BC Housing; BC Hydro; University Endowment Lands; Bowen Island; City of Abbotsford; City of Chilliwack; District of Mission; Integrated Partnership for Regional Emergency Management; Simon Fraser University; Kwantlen Polytechnic

University; University of British Columbia; Vancouver Fraser Port Authority; Transport Canada; Canada Mortgage and Housing Corporation; and Vancouver International Airport Authority.

2. That the MVRD Board receive for information the report dated May 25, 2021, titled, “Draft *Metro 2050*: Referral for Comment” and provide alternative direction to staff.

FINANCIAL IMPLICATIONS

If the Board chooses Alternative 1, the draft of *Metro 2050* will be referred out for comment and Metro Vancouver staff will carry out the engagement activities described in the report. There are no significant costs associated with these activities, and all engagement costs will be carried out as part of the Board-approved Regional Planning budget for 2021. The 2022 Phase 3 Adoption period will necessitate a number of expenses associated with a Regional Public Hearing which are estimated to total approximately \$45,000. If the Board chooses Alternative 2, the draft of *Metro 2050* will not be referred out for comment and this will make it unlikely that *Metro 2050* will be adopted before the 2022 local government election period.

CONCLUSION

This report presents the draft of *Metro 2050*, the update to the regional growth strategy, to the MVRD Board for referral for comment. The draft was informed by the extensive input from member jurisdictions, the members of the *Metro 2050* Intergovernmental Advisory Committee, and other regional stakeholders. The Board’s referral will initiate a five-month comment period on the draft regional growth strategy. This draft of *Metro 2050* includes goals, strategies, and policy actions that will help the region accommodate the growth that is anticipated to come to Metro Vancouver over the next 30 years in a way that promotes resiliency, sustainability, prosperity, livability, and equity for all.

Attachments (45986709)

1. Draft *Metro 2050*, the regional growth strategy, for comment (May 2021)
2. Summary of Proposed Changes Made to *Metro 2050* Policy Actions by Goal Area

References

1. [Towards Metro 2050: Updating Metro Vancouver 2040: Shaping our Future \(April 2019\)](#)
2. [Metro 2050 Engagement Plan \(September 2019\)](#)
3. [Metro 2050 Phase 1 Engagement Report \(March 2021\)](#)
4. [Metro 2050 Q1 2021 Status Update \(April 2021\)](#)
5. [Metro 2050 Draft Policy Language - Goals 1 and 2 \(March 2021\)](#)
6. [Metro 2050 Draft Policy Language – Goal 3: Protect the Environment and Respond to Climate Change Impacts and the Implementation Section \(April 2019\)](#)
7. [Metro 2050 Draft Policy Language: Goal 4 – Provide Diverse and Affordable Housing Choices and Goal 5 – Support Sustainable Transportation Choices \(May 2021\)](#)

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Metro 2050

Regional Growth Strategy



DRAFT

Metro 2050

4730 Kingsway, Burnaby, BC, V5H 0C6
metrovanancouver.org

June, 2021

45986709

Acknowledgement of Indigenous Territory

Metro Vancouver acknowledges that the region's residents live, work, and learn on the shared territories of many Indigenous peoples, including ten local First Nations: Katzie, Kwantlen, Kwikwetlem, Matsqui, Musqueam, Qayqayt, Semiahmoo, Squamish, Tsawwassen, and Tsleil-Waututh.

Metro Vancouver respects the diverse and distinct histories, languages, and cultures of First Nations, Métis, and Inuit, which collectively enrich our lives and the region.

Metro Vancouver

Metro Vancouver is a federation of 21 municipalities, one Electoral Area and one Treaty First Nation, working collaboratively in planning and providing vital utility and local government services to about 2.75 million residents. Essential services include the provision of drinking water, sewage treatment, and solid waste disposal, along with regional services like parks, affordable housing, land use planning, and air quality management that help keep the region one of the most livable in the world.

FIGURE 1. METRO VANCOUVER ENTITIES AND SERVICES



Mission

Metro Vancouver's mission is framed around three broad roles:

1. Serve as a Regional Federation

Serve as the main political forum for discussion of significant community issues at the regional level, and facilitate the collaboration of members in delivering the services best provided at the regional level.

2. Deliver Core Services

Provide regional utility services related to drinking water, liquid waste, and solid waste to members. Provide regional services, including parks and affordable housing, directly to residents and act as the local government for Electoral Area A.

3. Plan for the Region

Carry out planning and regulatory responsibilities related to the three utility services as well as air quality, regional planning, regional parks, Electoral Area A, affordable housing, regional economic prosperity, and regional emergency management.

Building a Resilient Region

Building the resilience of the region is at the heart of Metro Vancouver's work. Each of Metro Vancouver's regional plans and strategies adopts a vision, guiding principles, goals, strategies, actions, and key performance measures that will support a more resilient, low carbon and equitable future. Metro Vancouver's interconnected plans and strategies are guided by the Board Strategic Plan, which provides strategic direction for each of Metro Vancouver's legislated areas of responsibility and the Long-Term Financial Plan which projects total expenditures for capital projects and operations that sustain important regional services and infrastructure. Together these documents outline Metro Vancouver's policy commitments and specific contributions to achieving a resilient region.

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A. Metro 2050 Scope and Linkages to Other Plans

Regional Growth Strategies: Legislative Authority

The *Local Government Act* establishes authority for regional districts to prepare a regional growth strategy, which is intended to “promote human settlement that is socially, economically and environmentally healthy and that makes efficient use of public facilities and services, land and other resources.”

Metro Vancouver’s Management Plans

Metro Vancouver’s regional growth strategy, *Metro 2050*, is one plan among a suite of interconnected management plans developed around Metro Vancouver’s Board Strategic Plan. The regional growth strategy uses land use policies to guide the future development of the region and support the efficient provision of transportation, regional infrastructure, and community services; it helps support the region’s priorities, mandates, and long-term commitments to sustainability and resiliency, in combination with other management plans.

The regional growth strategy provides the land use framework for planning related to regional utilities (water, liquid waste, and solid waste), transportation, housing, and air quality. Reciprocally, the *Drinking Water Management Plan*, *Integrated Liquid Waste and Resource Management Plan*, and *Integrated Solid Waste and Resource Management Plan* set the utility frameworks within which the regional growth strategy must be developed. Housing policies in the regional growth strategy are implemented in part through

the *Metro Vancouver Housing 10-Year Plan*, while the environmental and active transportation policies have important linkages with the *Regional Parks Plan*, *Ecological Health Framework*, and *Regional Greenways 2050*. The regional growth strategy helps improve air quality and reduce greenhouse gas emissions, as called for in the *Clean Air Plan* and *Climate 2050*, by encouraging growth patterns that facilitate energy efficient built form and travel patterns. Finally, the economic actions in the regional growth strategy support a prosperous economy through the implementation of the *Regional Industrial Lands Strategy* and *Regional Economic Prosperity Service*.

Metro Vancouver and TransLink: Working Together for a Livable Region

Metro Vancouver has a unique relationship with its sister agency, TransLink, the regional transportation authority responsible for planning, managing, and operating the regional transportation system. TransLink is required by the *South Coast British Columbia Transportation Authority Act* to support Metro Vancouver’s regional growth strategy, air quality and greenhouse gas reduction objectives, and the economic development of the region. TransLink’s long-range plan, *Transport 2050*, sets out transportation strategies for the road and transit networks as well as other matters affecting the regional transportation system. The regional growth strategy and regional transportation plan must support each plan’s policy frameworks to be successful.

Metro Vancouver acknowledges TransLink's mandate is to prepare and implement regional transportation system plans and demand management strategies. The mandate of the Mayors' Council on Regional Transportation includes approving long-term, 30 year transportation strategies and 10 year investment plans.

Metro Vancouver's role in regional transportation planning is to:

- communicate its objectives for the regional transportation system to TransLink;
- provide transportation planning input through the provision of land use, growth management and air quality information and forecasts and, as appropriate, the evaluation of land use and vehicle emissions impacts; and
- provide advice and input to TransLink and the Mayors' Council in the fulfillment of their roles in light of regional objectives and the circumstances of the day.

Metro Vancouver and TransLink share a commitment to coordination, information-sharing, and pursuing joint policy research on topics of mutual interest such as walkability, parking, new mobility, social equity, and resiliency.

Working Together with First Nations

Metro Vancouver engages and collaborates with local First Nations on matters of shared regional planning interest. With regards to the regional growth strategy, this includes engaging with First Nations on regional growth strategy updates, amendments, and projections, as well as on key planning initiatives. It may also include opportunities to partner or collaborate on regional planning projects such as corridor studies or inventories. Metro Vancouver shares regional planning reports and data and is available to serve as a planning resource. Metro Vancouver strives to work towards better relationships with Indigenous groups and encourages member jurisdictions to also foster improved relationships.

Metro Vancouver acknowledges that regional growth has impacts on Indigenous territories. Metro Vancouver also respects that, as federal lands, First Nations reserve lands are not subject to the land use policies in the regional growth strategy. However, if and when First Nations develop land management plans, Metro Vancouver, the respective First Nations, and adjacent member jurisdictions will endeavour to engage, collaborate, and coordinate with one another at an early stage to ensure, to the extent possible, that the regional growth strategy, municipal Official Community Plans, regional transportation plans, and First Nations' land management plans are all mutually respectful and supportive.



Working Together with Federal and Provincial Governments and Other Regional Stakeholders

An important part of successful regional planning is collaboration and building inter-jurisdictional partnerships. Metro Vancouver works with other important partners including the Federal Government and the Province, other authorities and agencies, residents, non-profit organizations and business associations on all aspects of the regional growth strategy where there are shared or overlapping interests. Metro Vancouver strives to foster strong relationships with other government agencies and regional stakeholders, seeks to find opportunities for collaboration, and shares information for the benefit of all, while respecting unique jurisdictional responsibilities.

Due to Canada's federal system, there are federal, provincial, and local jurisdictions and responsibilities that interplay and have significant impacts on how people live and use the region. While some jurisdiction is clearly separate, others can be shared or overlapping. The Federal Government has jurisdiction and funding responsibilities for federal trade and transportation facilities, such as ports and airports, while the Province is responsible for transportation planning, education, agriculture, child care, and health care, all of which have significant impacts on how people live and use the region. Both the Federal Government and the Province are responsible for funding programs that enable the creation of affordable and supportive housing and for taking action on climate change. Metro Vancouver's collaboration with regional stakeholders includes the role of convening and fostering dialogue with and among health authorities, port and airport authorities, post-secondary educational institutions, the Agricultural Land Commission, housing providers, industry groups, and the non-profit sector.

B. Introduction to the Region

Context for the Regional Growth Strategy

Geographic Context: Surrounded by Natural Beauty, but Constrained

Located in the southwestern corner of the British Columbia mainland, the Metro Vancouver region is a diverse urban place rich in natural beauty. Situated on the Salish Sea, bisected by the Fraser River, and flanked by the Cascade Mountains to the north, the region's natural features have contributed to its position as a major international port, an important location for agricultural production, and one of the most desirable places to live in Canada. These features, as well as the international border to the south, lead to a constrained land base that strengthens the imperative for regional planning and growth management. Consequently, the regional federation has a long history of thoughtfully considering how to accommodate population and economic growth with limited land for expansion.

Indigenous Context: A Rich Indigenous History and Vibrant Modern Presence

For thousands of years, Indigenous peoples have lived on, and stewarded, their respective and shared territories that collectively have also become known as the Metro Vancouver region. Today there are ten First Nations with communities located within the Metro Vancouver region: Katzie First Nation, Kwantlen First Nation, Kwikwetlem First Nation, Matsqui First Nation, Musqueam Indian Band, Qayqayt First Nation, Semiahmoo First Nation, Squamish Nation, Tsawwassen First Nation, and Tsleil-Waututh Nation. In addition, there are many other Indigenous Nations and organizations located outside the boundaries of

Metro Vancouver, having land and territorial interests that include the Metro Vancouver region. Further, many First Nation peoples from other areas of Canada, as well as Inuit and Métis peoples, live within this region.

Social Context: A Culturally Diverse Region

Metro Vancouver is the largest region in British Columbia with over 53% of the province's population. Metro Vancouver is an ethnically diverse region with approximately 49% of the population of European heritage, 20% Chinese, 12% South Asian, 5% Filipino, 2.5% Indigenous, and a wide variety of other cultural backgrounds. This cultural diversity has, and continues to, enrich the region and helps make the region an attractive place to live and supports tourism, immigration, and investment.

Housing is one of the most important social and economic issues in Metro Vancouver. Land values and housing prices in the region are very high and have led to associated housing challenges, including barriers to accessing housing in both the rental and ownership markets, many households spending more than 30% of their gross income on housing, lack of supply across the housing continuum, low rental vacancy rates, and a high rate of homelessness.

Climate Change and Natural Hazards Context: Vulnerable to Impacts and Risks

Metro Vancouver is situated on the Fraser River delta, amongst many forested areas and steep slopes, and in one of the most seismically active zones in Canada. As a result, the region is susceptible to a variety of natural hazards, including earthquakes, wildfires, landslides, and floods. Climate change is already affecting Metro Vancouver, and the impacts

are projected to become more frequent and severe over time, increasingly affecting the communities, infrastructure, and natural environment within the region. Climate change can also amplify the impacts of natural hazards; for instance, sea level rise can increase the severity of coastal floods, heavier rainfall events can influence the likelihood of floods and landslides, and warmer temperatures combined with longer drought periods can increase the risk of wildfires.

Challenges and Opportunities

Metro Vancouver's population has grown substantially over the past decades, adding more than one million people in a generation. This strong population growth is projected to continue, therefore the key challenge will be to accommodate growth in ways that advance both livability and sustainability. To accomplish this, the regional growth strategy strives to address the following issues:

Accommodating Growth to Advance Livability and Sustainability

The region is expected to continue to grow by about 35,000 residents per year. Accommodating growth within a land-constrained region implies greater density of development. Carefully structured, with the right diversity and mix of land uses, regional planning can reduce congestion, improve the efficiency of transportation infrastructure, improve the economics of public services, increase the viability of local businesses and retail services, foster the creation of vibrant centres for culture and community activities, and maintain an attractive urban environment.

Building Resilient, Healthy, and Complete Communities

As the region's population both grows and ages, ensuring access to the key elements of healthy, social and complete communities becomes more challenging. Access to amenities like local shops, personal services, community activities, recreation, green spaces, employment, culture, entertainment, and a safe and attractive public realm can improve community health, social connectedness, and resiliency. This requires careful planning, primarily at the local scale, but also regionally. Complete communities can also help with other challenges, such as climate change, by encouraging active transportation and reducing the need to commute or travel long distances to access employment, amenities, or services.

Ensuring Housing for All

Ensuring affordable and appropriate housing that meets a variety of needs across the housing continuum is an ongoing challenge. While the region's housing market continues to evolve, stresses of high prices and low supply have evolved over the past decade to the point where there is extreme pressure on both ownership and rental tenure, and heightened public concern over the impacts of housing challenges on the region's social and economic well-being. Strong regional policy and performance measures pertaining to housing can help to increase the supply of all forms and tenures of housing, and reduce pressures on the housing market.

Supporting Economic Prosperity

Metro Vancouver's economy benefits from a highly varied and specialized base of employment activities, including international trade and logistics; manufacturing; professional and business services; film and television production; tourism and hospitality; education and knowledge creation; agriculture; and emerging technology-driven sectors, such as apparel technology, agri-tech, clean technology, digital media, medical technology, and new mobility. The region connects with, and serves, a resource-rich province and has strong gateway links to the North American and Asia-Pacific regions. An intent of the regional growth strategy is to provide an adequate supply of jobs-producing research, and industrial and commercial space throughout the region for new and expanding industrial and employment uses. This could include research and development, incubation and acceleration, production, and export, located according to their needs, and in a manner that supports an efficient transportation system on which the economy depends.

Advancing Social Equity

Social equity in Metro Vancouver is considered to be the promotion of justice and fairness and the removal of systemic barriers that may cause or aggravate disparities experienced by different groups of people. This can include consideration of the many dimensions of identity, such as socioeconomic status, race, ethnicity, sex, age, disability, gender, sexuality, religion, indigeneity, class, and other equity-related issues.

Economic and social inequity can contribute to broad health and social problems as well as a wide variety of other challenges. In Metro Vancouver, incorporating social equity into regional growth planning practice is crucial to ensuring that the region moves forward in an equitable and inclusive manner. Improving social equity will also support the region's other objectives including resiliency, sustainability, livability, and prosperity for all. Some of the key social equity concerns in the Metro Vancouver region that relate to the regional growth strategy include: access to green space, employment, and transit; housing adequacy, suitability, and affordability; vulnerability to climate change impacts and natural hazards; and the displacement impacts that are the result of redevelopment.

Ensuring Resilience

Metro Vancouver is vulnerable to a variety of shocks and stressors. Regional resilience is the capacity of communities and organizations to prepare, avoid, absorb, recover, and adapt to the effects of shocks and stresses in an efficient manner through the preservation, restoration, and adaptation of essential services and functions, while learning from shocks and stresses to build a more resilient place. Proactive growth management policies can promote land use and built form patterns that reduce exposure to risk, help communities prepare for future shocks, and ensure that residents have the necessary community and social assets located close to where they live and work.

Reconciliation with Indigenous Peoples

Working towards reconciliation introduces a cross-jurisdictional consideration for regional districts, since the primary intergovernmental relationship for First Nations is with the Federal Government. While the regional growth strategy does not apply to reserve lands, it potentially impacts them. In further fostering relationships with First Nations and understanding the various challenges, opportunities, and impacts on all partners, we can collectively move forward and be inclusive of all residents of the region.

Protecting the Environment

Many natural assets in Metro Vancouver are of national and international significance. Managed carefully, they also provide essential ecosystem services such as clean air, fresh water, and nutritious food. The challenge is to protect and restore the integrity of these assets for the benefit of current and future generations in the face of a growing population, associated development, and a changing climate. Regional policy that emphasizes protecting, connecting, and enhancing ecosystems and integrating best practices across disciplines can help address this challenge.

Preparing for Climate Change and Natural Hazards

The major natural hazards in Metro Vancouver include earthquakes, floods, and landslides. The risks associated with these hazards are often worsened by climate change. By 2050, the region is projected to experience sea level rise; warmer temperatures; longer summer drought periods; increased precipitation in the fall, winter, and spring; a reduced annual snowpack; and more frequent extreme weather events. The challenge will be to prepare for the anticipated impacts of climate change and regional natural hazards, while also reducing

regional greenhouse gas emissions and achieving a carbon neutral region by the year 2050. Emerging global issues such as climate change displacement may impact population and influence land use and growth management planning in the Metro Vancouver region. An example of a policy approach focused on preparing for the impacts of climate change and natural hazards includes avoiding locating new settlements and infrastructure in locations with known and unmitigated hazards and, where settlements already exist, mitigating those hazards to minimize risk to people and property.

Protecting Agricultural Land to Support Food Production

Local production of food is dependent on a protected land base for agriculture. Metro Vancouver has approximately 60,000 hectares in the provincial Agricultural Land Reserve, and that land is a vital asset for the economic viability of the region, the agricultural sector in particular, along with supporting local food production for future generations. The ongoing importance of producing fresh, local food contributes to a secure food supply, economic resilience, and supports other co-benefits such as ecosystem services. Yet land speculation and the conversion pressures from other land uses on agricultural lands continues to threaten the resilience of agriculture in the region. The impacts of climate change are also projected to have significant impacts on the agricultural industry. Effective growth management policy includes strategies to protect and enhance agricultural lands and support agricultural viability over the long-term.

Improving Accessibility and Mobility and Reducing Congestion

Metro Vancouver has some of the highest levels of transit ridership, walking, and cycling in Canada. However, sustainable mode share varies significantly across the region, the majority of trips are still taken by private motor vehicle, and transportation remains the region's largest source of greenhouse gas emissions. Shaping infrastructure, street design, and population growth in a way that supports sustainable transportation choices are keys to reaching the region's carbon neutrality target by 2050. Strategies include investing in transit and active transportation, supporting the creation of complete and walkable communities, directing growth towards transit-oriented areas, and managing transportation demand through parking requirements, transportation user pricing, and other means.

Changing Generational Preferences and Behaviours

Younger and older generations often have different perspectives and preferences regarding: housing type, tenure, and location; transportation choice; employment; proximity to amenities and services; and recreational opportunities. In addition, macroeconomic trends have delayed or limited many opportunities for employment and home ownership while technological innovation has impacted consumer behaviour. The result has been a general trend towards living in more urban environments, making more environmentally-sensitive choices, and prioritizing access over ownership. Other trends that are being seen include smaller family sizes, lower personal savings, higher educational attainment, older age of household formation, and lower rates of home and car ownership. An awareness and consideration of changing generational preferences and behaviours will support better long-range planning as well as regional prosperity through improved labour force recruitment and retention.



C. Introduction to the Regional Growth Strategy

Metro 2050 Vision

Metro Vancouver is a region of diverse and complete communities connected by sustainable transportation choices where residents take pride in vibrant neighbourhoods that offer a range of opportunities to live, work, play, and learn, and where natural, agricultural, and employment lands are protected and enhanced.

Shaping long-term growth and development in the region is essential to meeting this vision in a way that protects the natural environment, fosters community well-being, fuels economic prosperity, provides local food security, improves social equity, provides diverse and affordable housing choices, ensures the efficient provision of utilities and transit, reduces greenhouse gasses, and contributes to resiliency to climate change impacts and natural hazards.

Guiding Regional Planning Principles

Metro 2050 is guided by the following five principles:

1. Put growth in the right places;
2. Protect important lands;
3. Develop complete communities;
4. Provide mobility, housing, and employment choices; and
5. Support the efficient provision of infrastructure.





Responding to the Challenges: *Metro 2050* Goals

To respond to the challenges faced by the region, the regional growth strategy sets out a series of strategies and actions for Metro Vancouver and member jurisdictions arranged under five key overarching goals intended to achieve the desired outcomes.

Goal 1. Create a Compact Urban Area

Metro Vancouver's growth is focused inside an Urban Containment Boundary, within which are a variety of complete communities with access to a range of housing choices, and close to employment opportunities, amenities, and services. Concentrating growth in a network of transit-oriented centres and corridors helps reduce greenhouse gas emissions and pollution, and supports the efficient use of land and an efficient transportation network.

Goal 2. Support a Sustainable Economy

The objective is to protect and optimize the land base and transportation systems that are required to ensure the viability of business sectors. This means supporting regional employment and economic growth, including the established and new emerging sectors and businesses. This is best achieved through the long-term protection of Industrial, Employment, and Agricultural lands, and ensuring that supports are in place to allow commerce to flourish in Urban Centres throughout the region, and heavy and light industrial activities on Industrial lands, connected by a diverse and reliable transportation system.



Goal 3. Protect the Environment and Respond to Climate Change and Natural Hazards

The region's vital ecosystems provide essential services for all life. A connected network of protected Conservation and Recreation lands and other green spaces throughout the region provides opportunities to enhance physical and mental health, supports biodiversity, and increases community resilience. The strategies also help Metro Vancouver and its member jurisdictions contribute to meeting the regional greenhouse gas emission reduction targets, and prepare for the anticipated impacts of climate change and natural hazards.

Goal 4. Provide Diverse and Affordable Housing Choices

Metro Vancouver is a region of communities with a diverse and affordable range of housing choices suitable for residents at any stage of their lives, including a variety of unit types, sizes, tenures, prices, and locations. There is an increased supply of purpose-built rental housing, particularly in proximity to transit, and there are robust tenant protections in place to mitigate the impacts of renovation and redevelopment on renters. Residents experiencing or at risk of homelessness and those with lower incomes or special needs can access permanent, affordable, and supportive housing in neighbourhoods across the region.

Goal 5. Support Sustainable Transportation Choices

Metro Vancouver's compact, transit-oriented urban form supports a range of sustainable transportation choices. This pattern of development expands the opportunities for transit, walking, cycling, and multiple-occupancy vehicles, which reduces greenhouse gas emissions, household expenditure on transportation, and improves air quality. The region's road, transit, rail, and waterway networks play vital roles in serving and shaping regional development, providing linkages among the region's communities and providing vital goods movement networks.

D. Urban Containment Boundary, Regional Land Use Designations, Overlays, and Projections

The following tools, regional land use designations, and overlays are key to achieving the five goals of the regional growth strategy. They establish a long-term regional land use framework and provide the basis for defining land use matters of regional significance.

The intent statements for the regional land use designations and overlays are to be read in conjunction with applicable strategies and actions under each goal and are to be supported by member jurisdictions in their Regional Context Statements. The boundaries for the regional designations are established on a parcel-based map maintained by Metro Vancouver and are depicted on the Regional Land Use Designations map (Map 2).

Once defined by member jurisdictions, the locations of Urban Centre and Frequent Transit Development Area overlays are shown on Maps 4 and 5. The parcel-based boundaries of Urban Centre and Frequent Transit Development Area overlays, as determined by member jurisdictions, will be depicted on a reference map, which will be maintained by Metro Vancouver Regional District.

Urban Containment Boundary

The Urban Containment Boundary is a stable, long-term, regionally defined area for urban development that protects Agricultural, Conservation and Recreation, and Rural lands from developments requiring utility infrastructure and from auto-oriented, dispersed development patterns. Locating housing, regional transportation, and other infrastructure investments within the Urban Containment Boundary supports land development patterns that can protect food producing land, reduce energy demand and greenhouse gas emissions from commuter traffic, and secures land that stores carbon and helps communities adapt to climate change. Residential and employment infill development is encouraged within the Urban Containment Boundary.



Urban Land Use Designations

General Urban

General Urban lands are intended for residential neighbourhoods and centres, and are supported by shopping, services, institutions, recreational facilities and parks. Within General Urban lands, commercial, employment, and residential development should be focused in Urban Centres and Frequent Transit Development Areas. Higher density trip-generating development is to be directed to Urban Centres and Frequent Transit Development Areas. Neighbourhood-serving shops and services are encouraged in General Urban lands outside of Urban Centres and Frequent Transit Development Areas. General Urban lands are intended to emphasize place-making, an enriched public realm, and promote transit-oriented communities, where transit, multiple-occupancy vehicles, cycling, and walking are the preferred modes of transportation.

Industrial

Industrial lands are intended for heavy and light industrial activities, including: distribution, warehousing, repair, construction yards, infrastructure, outdoor storage, wholesale, manufacturing, trade, e-commerce, emerging technology-driven forms of industry, and appropriately-related and scaled accessory uses.

The intensification and densification of industrial activities and forms, as contextually appropriate to the surrounding area, are encouraged. Limited industrial-serving commercial uses that support the primary industrial functions are appropriate. Residential uses are not intended.

Employment

Employment lands are intended for light industrial, commercial, and other employment-related uses to help meet the needs of the local and regional economic activities, and complement the planned functions of Urban Centres and Frequent Transit Development Areas.

Employment lands that are located within Urban Centres and Frequent Transit Development Areas provide locations for a range and mix of employment activities and more intensive forms of commercial development.

Residential uses are not intended on Employment lands, with the exception of sites located within 200 metres of rapid transit stations within Urban Centres or Frequent Transit Development Areas where residential (with an emphasis on affordable, rental) is permitted on the upper floors of mid- to high-rise buildings, as appropriate, while commercial and light industrial uses are to be located on the ground or lower floors.

Employment lands located outside of Urban Centres and Frequent Transit Development Areas are primarily intended for: light industrial and commercial uses that require larger-format buildings, which may have particular goods movement needs and impacts; generally lower employment densities and lower transit-generating uses; and uses and forms that are not consistent with the character of a dense transit-oriented neighbourhood, Urban Centre, or Frequent Transit Development Area.

Non-Urban Land Use Designations

Rural

Rural lands are intended to protect the existing character, landscapes, and environmental qualities of rural communities outside the Urban Containment Boundary. Land uses in these areas include low density forms of residential, agricultural uses and small scale commercial, industrial, institutional uses that do not require the provision of urban services such as sewerage or transit. As such, Rural lands are not intended as future urban development areas and generally will not have access to regional sewerage services. Rural designated land generally comprise natural areas, agricultural lands, lands with low-intensity residential or built environments that are historical, remote, or not contiguous with the urban area, and may have topographic constraints.

Agricultural

Agricultural lands are intended for agriculture production and agricultural-related uses that are compatible with farming operations and directly support the local agricultural industry. Lands designated as Agricultural reinforce the provincial Agricultural Land Reserve and local land use plans that protect the region's agricultural land base. These lands are protected to encourage agricultural activities over the long-term.

Conservation and Recreation

Conservation and Recreation lands are intended to protect significant ecological and recreation assets, including: drinking water supply areas, environmental conservation areas, wildlife management areas and ecological reserves, forests, wetlands, riparian areas, major parks and outdoor recreation areas (e.g. ski hills and other tourist recreation areas), and other ecosystems that may be vulnerable to climate change and natural hazard impacts, or that provide buffers to climate change impacts or natural hazard impacts for communities. These lands are protected and managed to ensure they continue providing vital ecosystem services for the benefit of current and future generations.

Regional Overlays and the Major Transit Growth Corridors

Within the Urban Containment Boundary, Urban Centres and Frequent Transit Development Areas may be overlaid on any regional land use designation. Urban Centre and Frequent Transit Development Area overlays and policies enable higher density residential and commercial development for General Urban lands, and higher density commercial and industrial development for Employment lands. Where overlays cover lands other than those designated General Urban or Employment, the intent and policies of the underlying regional land use designations still apply.

Urban Centres

Urban Centres are intended to be the region's primary focal points for concentrated growth and transit service. They are intended as priority locations for employment and services, higher density forms, mixed residential tenures, affordable housing options, commercial, cultural, entertainment, institutional, and mixed uses. Urban Centres are intended to emphasize place-making, an enriched public realm, and promote transit-oriented communities, where transit, cycling, and walking are the preferred modes of transportation. Urban Centres are priority locations for services and amenities that support a growing population.

Maps 4 and 5 show the location of Urban Centres. Urban Centres boundaries are identified by member jurisdictions in their Regional Context Statements in a manner generally consistent with the guidelines in Table 3 (Guidelines for Urban Centres and Frequent Transit Development Areas). As per Table 3, there are different types of Urban Centres with different scales of expected activity and growth.

Major Transit Growth Corridors

Major Transit Growth Corridors are areas along TransLink's Major Transit Network where member jurisdictions, in consultation with Metro Vancouver and TransLink, may identify new Frequent Transit Development Areas (FTDAs). These corridors are intended to extend approximately 1 kilometre from the roadway centreline in both directions. The intent of these corridors is to provide an overall structure for the region in an effort to support the regional planning principle of directing portions of growth towards Urban Centres and areas around transit. Further local planning will be needed along these corridors to ensure that human settlement patterns support complete communities in an appropriate local context.

The Major Transit Growth Corridors have been identified as good potential locations for regionally-significant levels of transit-oriented growth based on a consideration of the following principles: anchored by Urban Centres or FTDAs, connected by the Major Transit Network, generally resilient to natural hazards, accessible to jobs and services, and walkable. Major Transit Growth Corridors are not an overlay; rather, they are an organizing principle to support the identification of FTDAs. The Major Transit Growth Corridors are also a growth monitoring tool to assess performance on transit-oriented development objectives.

Frequent Transit Development Areas

Frequent Transit Development Areas (FTDAs) are intended to be additional priority locations to accommodate concentrated growth in higher density forms of development. They are identified by member jurisdictions and located at appropriate locations within the Major Transit Growth Corridors. FTDAs complement the network of Urban Centres, and are characterized by higher density forms of residential, commercial, and mixed uses, and may contain community, cultural and institutional uses. Urban design for these areas promotes transit-oriented communities where transit, cycling, and walking are the preferred modes of transportation.

Identifying FTDAs within the Major Transit Growth Corridors 1) provides greater certainty and integration between local, regional, and transit plans, and 2) supports transit-oriented development planning across jurisdictional boundaries.

Maps 4 and 5 show the location of FTDAs. The FTDA boundaries are established by member jurisdictions in Regional Context Statements in a manner generally consistent with the guidelines in Table 3 (Guidelines for Urban Centres and Frequent Transit Development Areas). There are two types of FTDAs: Corridor FTDAs which are linear areas within a Major Transit Growth Corridor; and Station Area FTDAs which are nodal areas surrounding a rapid transit station. Corridor FTDAs are intended to accommodate medium development densities and forms that are consistent with bus-based rapid transit, while Station Area FTDAs are intended to accommodate higher development densities and forms that are consistent with rail-based rapid transit.

Trade-Oriented Lands Overlay

The Trade-Oriented Lands Overlay is intended for Industrial lands that are required to support goods movement in, out and through the Metro Vancouver region, and that keep British Columbia and Canada connected to the global supply chain.

These important areas are occupied by such uses as: terminal facilities, distribution centres, warehouses, container storage, and freight forwarding activities that serve a national trade function and contribute to the provincial and regional economies. These operations generally require large sites and are located near major transportation infrastructure corridors and terminals.

Industrial lands with a Trade-Oriented Lands Overlay are not intended for stratification tenure or small lot subdivision.

Natural Resource Areas Overlay

Natural Resource Areas are intended to illustrate existing provincially-approved natural resource uses within the Conservation and Recreation regional land use designation that may not be entirely consistent with the designation, but continue to reflect its long-term intent. These uses include a landfill; quarries; lands with active forest tenure managed licences; and wastewater and drinking water treatment facilities. Metro Vancouver creates and maintains this overlay.

Growth Projections

The population, housing, and employment growth projections are included in the regional growth strategy as a collaborative guide for land use and infrastructure planning for Metro Vancouver member jurisdictions, and other regional agencies. The growth projections are provided as a reference, and are not specific growth targets for the region, sub-regional areas, or member jurisdictions.

Regional Projections

Metro 2050 forecasts indicate that over the next thirty years, Metro Vancouver will need to accommodate approximately one million more residents. This means that the region will also require approximately 500,000 additional housing units and almost 500,000 additional jobs. The regional growth strategy focuses on encouraging this growth to Urban Centres and Frequent Transit Development Areas to support complete and walkable communities. It is projected that between 2021 and 2050, most housing and employment growth will occur in these key areas, aligning with the *Metro 2050* growth targets.

In 2016, Metro Vancouver's population was just under 2.6 million. Growth over the next thirty years is projected to add about one million people to reach 3.8 million by the year 2050 (Figure 2).

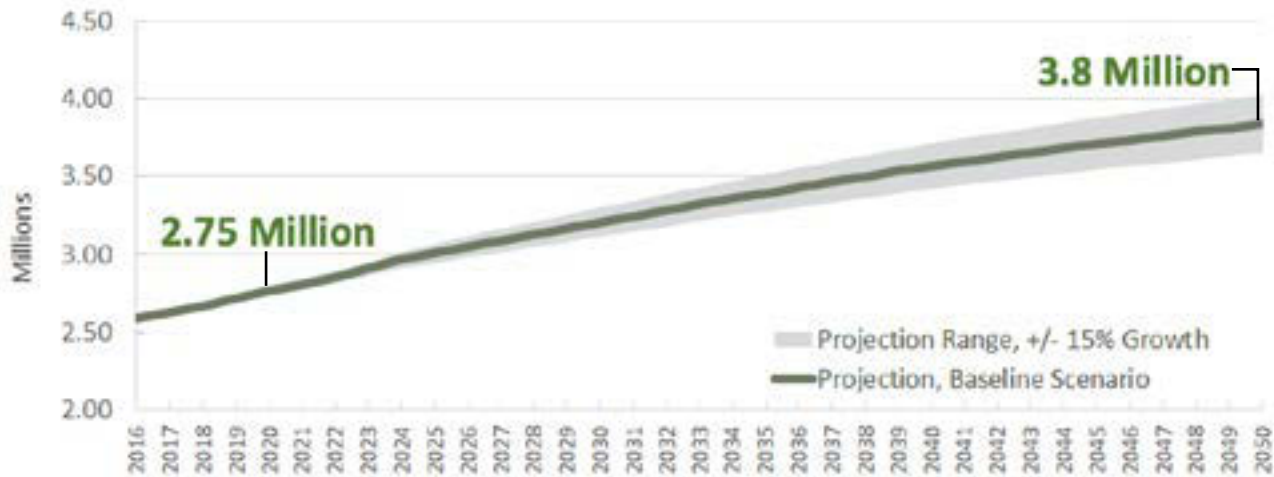
Similar to the majority of Canadian cities, Metro Vancouver's population is aging. While the percentage of seniors (aged 65 and over) comprised 14.7% of the total population in 2016, this is projected to increase to 22% by 2050. The aging population will have a significant impact on the demand for services in the region, from seniors' housing, health-care, accessible public transit, and many other aspects.

Strong population growth is an indicator of strong housing growth. To accommodate projected growth, the region will require an additional 500,000 dwelling units. Apartments are projected to make up over 50% of future growth, followed by multi-attached units. Single-detached housing will grow; however, minimally as locations for additional housing are exhausted.

In 2016, the average number of people living in a household in Metro Vancouver was 2.54 persons. Household size has been decreasing over the last two census periods. This trend is projected to continue and is expected to reach 2.38 by 2050 for all housing structure types. This shift will impact the number of new units required to accommodate the projected population.

Employment growth tends to follow strong population growth, and Metro Vancouver is expected to gain approximately 500,000 additional jobs by the year 2050, for a total of 1.9 million jobs (Table 1), with a population-to-employment ratio of 0.5. Commercial services will continue to grow and will make up about 50% of total future jobs. New jobs in public administration and other employment sectors will each make up approximately a quarter of job growth. The primary resource sector is projected to remain at a very low level for the region.

FIGURE 2. PROJECTED POPULATION TO 2050 FOR METRO VANCOUVER



Sub-Regional Projections

To establish a long-term regional growth management framework, the regional growth strategy provides population, dwelling unit, and employment projections at a sub-regional level (Figure 3) to help frame growth distribution across the region and support the following principles:

- support Metro Vancouver utility, TransLink and member jurisdiction long-term capital planning and infrastructure investment programs;
- establish a baseline in setting future growth targets for the Urban Centres and Frequent Transit Development Areas within sub-regions;
- provide flexibility for member jurisdictions in preparing and adjusting local projections over time, and to guide long-range policy planning; and
- achieve greater resiliency to changes in residential and employment market demands.

Metro 2050's sub-regions are:

1. **North Shore** (City of North Vancouver, Districts of North Vancouver and West Vancouver, Electoral Area A, and Lions Bay);
2. **Burrard Peninsula** (Cities of Burnaby, New Westminster and Vancouver, UEL and UBC);
3. **Tri-Cities** (Cities of Coquitlam, Port Coquitlam and Port Moody, Villages of Anmore and Belcarra);
4. **South of Fraser – West** (Cities of Delta and Richmond, Tsawwassen First Nation);
5. **South of Fraser – East** (Cities of Langley, Surrey and White Rock, Langley Township); and
6. **North East** (Cities of Maple Ridge and Pitt Meadows).

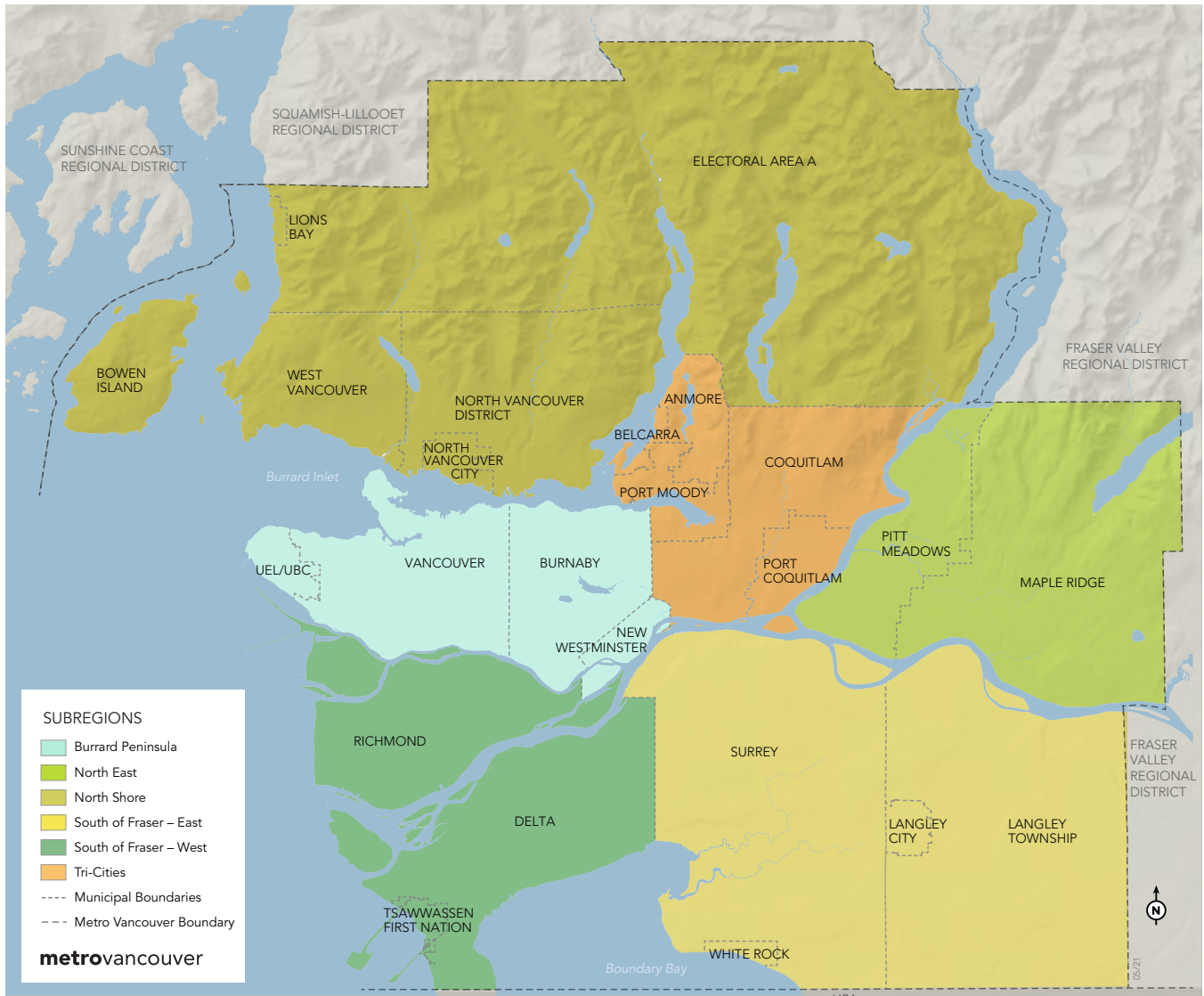
FIGURE 3. METRO VANCOUVER'S SUB-REGIONS FOR THE PURPOSES OF METRO 2050 PROJECTIONS

TABLE 1. REGIONAL AND SUB-REGIONAL PROJECTIONS BY DECADE TO 2050

POPULATION						
SUB-REGIONS		2016	2020	2030	2040	2050
	Metro Vancouver Total	2,593,200	2,767,000	3,206,100	3,564,100	3,836,800
	Burrard Peninsula	1,014,800	1,064,900	1,206,000	1,311,900	1,387,800
	North Shore	199,700	207,700	236,500	254,200	271,200
	South of Fraser – East	713,300	782,500	939,200	1,077,300	1,185,100
	South of Fraser – West	314,500	337,900	381,100	414,100	441,300
	North East	105,500	110,800	127,200	142,800	155,000
	Tri-Cities	245,300	263,100	316,100	363,800	396,500
DWELLING UNITS						
SUB-REGIONS		2016	2020	2030	2040	2050
	Metro Vancouver Total	1,000,500	1,075,500	1,287,700	1,460,500	1,589,400
	Burrard Peninsula	435,900	462,900	533,200	584,600	623,400
	North Shore	79,600	83,600	100,600	111,900	122,000
	South of Fraser – East	242,700	266,900	332,300	395,200	441,000
	South of Fraser – West	113,500	123,100	146,700	163,400	175,400
	North East	38,800	42,200	50,000	56,800	61,900
	Tri-Cities	90,000	96,800	124,800	148,600	165,700
EMPLOYMENT						
SUB-REGIONS		2016	2020	2030	2040	2050
	Metro Vancouver Total	1,342,200	1,420,100	1,621,600	1,775,300	1,883,600
	Burrard Peninsula	643,700	671,700	739,500	786,500	820,000
	North Shore	89,400	94,000	107,200	115,900	123,200
	South of Fraser – East	287,100	309,500	372,900	426,600	465,200
	South of Fraser – West	194,100	207,500	236,000	257,700	271,900
	North East	35,800	38,600	45,500	51,200	55,100
	Tri-Cities	92,000	98,900	120,500	137,500	148,200

To minimize urban sprawl and its negative impacts, support the protection of agricultural, industrial and ecologically important lands, and support the efficient provision of urban infrastructure, the regional growth strategy sets a target of containing 98% of the region's growth to areas within the Urban Containment Boundary.

To support the development of compact, complete, and transit-oriented communities within the Urban Containment Boundary, the regional growth strategy also includes targets for structuring growth to the network of Urban Centres and Frequent Transit Development Areas. It sets out a target of focusing 40% of the region's dwelling unit growth and 50% of the region's employment growth to areas within Urban Centres, and a target of focusing 28% of the region's dwelling unit growth and 27% of the region's employment growth to Frequent Transit Development Areas (Table 2).

TABLE 2. DWELLING UNIT AND EMPLOYMENT GROWTH TARGETS FOR URBAN CENTRES AND FREQUENT TRANSIT DEVELOPMENT AREAS***

REGIONAL TARGETS FOR RESIDENTIAL GROWTH BY LOCATION	
Location	Percent of Regional Dwelling Unit Growth 2006-2041
All Urban Centre Types	40%
Frequent Transit Development Areas**	28%
<i>Urban Centre Type Breakdown</i>	
• Metropolitan Core	5%
• Surrey Metro Core	6%
• Regional City Centres	16%
• Municipal Town Centres*	13%
REGIONAL TARGETS FOR EMPLOYMENT GROWTH BY LOCATION	
Location	Percent of Regional Employment Growth 2006-2041
All Urban Centre Types	50%
Frequent Transit Development Areas**	27%
<i>Urban Centre Type Breakdown</i>	
• Metropolitan Core	10%
• Surrey Metro Core	5%
• Regional City Centres	19%
• Municipal Town Centres*	16%

*Includes Municipal Town Centres and High Growth Municipal Town Centres

** Includes Corridor FTDA's and Station Area FTDA's

***This table provides guidance to assist in regional and local planning. It will be updated to extend the targets out to the year 2050 in an amendment following the adoption of *Metro 2050*.

E. Goals, Strategies & Actions

GOAL
1

Create a Compact Urban Area



Goal 1: Create a Compact Urban Area

A commitment to a compact urban area within the region reflects the recognition that sprawling urban development consumes the natural landscape, necessitates costly and inefficient urban infrastructure such as sewerage services and transit, contributes to negative health impacts, and adds to the global problem of greenhouse gasses thereby worsening climate change. Strategies under this goal delineate between urban and non-urban areas through the use of an Urban Containment Boundary.

To protect Rural, Conservation and Recreation, and Agricultural lands, it is critical to maintain the Urban Containment Boundary and to structure growth within it. This includes creating strong Urban Centres throughout the region that are well served by transit and the road network. These centres collectively make an important contribution to providing locations for employment and convenient access to shops and services close to home. Frequent Transit Development Areas, located in strategic areas within Major Transit Growth Corridors, provide an additional focus for growth, particularly for higher density residential, commercial, transit-oriented, and mixed use development. Major Transit Growth Corridors represent the priority locations for transit investment, housing and employment growth, and new Frequent Transit Development Areas, helping to bring additional certainty and greater coordination for member jurisdictions, TransLink and Metro Vancouver. Together, the Urban Centres and Frequent Transit Development Areas help shape transportation demand, optimize investments in the region's transportation system, and support the development of region-wide network of complete communities.

Complete communities are walkable, mixed use, and transit-oriented places where people can live, work, and play, at all stages of their lives. Compact and complete communities enable most people to have close access to a wide range of employment, health, social, cultural, educational and recreational services and amenities. This is integral to positive mental and physical health and well-being, and helps reduce greenhouse gas emissions and air pollution. These places also help create a strong sense of neighbourhood identity, social connection, and community resilience.

Equitable growth management includes a commitment to advancing equity to enhance sustainability, social cohesion, and overall living conditions for all, while intentionally working to mitigate negative consequences that are unique to each community.

Strategies to achieve this goal are:

- 1.1 Contain urban development within the Urban Containment Boundary
- 1.2 Focus growth in Urban Centres and Frequent Transit Development Areas
- 1.3 Develop resilient, healthy, connected, and complete communities with a range of services and amenities
- 1.4 Protect Rural Lands from urban development

Strategy 1.1 Contain urban development within the Urban Containment Boundary

Containing urban development, including job and housing growth, within the Urban Containment Boundary limits urban sprawl and supports the efficient and cost effective provision of infrastructure (such as water, sewerage, and transit) and services and amenities (such as schools, hospitals, community centres, and child care). The Urban Containment Boundary helps to protect important lands such as Conservation and Recreation, Agricultural and Rural lands from dispersed development patterns. Containing urban development also supports greenhouse gas emission reductions through trip reduction and trip avoidance, while protecting some of the region's important lands for food production and carbon sequestration and storage.

Metro Vancouver will:

1.1.1 Direct the Greater Vancouver Sewerage and Drainage District (GVS&DD) to not allow connections to regional sewerage services to lands with a Rural, Agricultural, or Conservation and Recreation regional land use designation. Notwithstanding this general rule, in the exceptional circumstances specified below, the Metro Vancouver Regional District (MVRD) Board will advise the GVS&DD Board that it may consider such a connection for existing development or for new development where, in the MVRD Board's opinion, that new development is consistent with the underlying regional land use designation, and where the MVRD Board determines either:

- a) that the connection to regional sewerage services is the only reasonable means of preventing or alleviating a public health or environmental contamination risk; or
- b) that the connection to regional sewerage services would have no significant impact on the goals of containing urban development within the Urban Containment Boundary, and protecting lands with a Rural, Agricultural, or Conservation and Recreation regional land use designation.

1.1.2 Accept Regional Context Statements that accommodate all urban development within the areas defined by the Urban Containment Boundary, and that meet or work towards Action 1.1.9.

1.1.3 In collaboration with member jurisdictions, develop an Implementation Guideline to guide the process by which member jurisdictions are to provide Metro Vancouver's Liquid Waste Services with specific, early, and ongoing information about plans for growth that may impact the regional sewer system, as well as plans to separate combined sewer systems.

1.1.4 Work collaboratively with the Federal Government, the Province, TransLink, BC Transit, and adjacent regional districts to study how interregional transportation connections can be supported and enhanced.

1.1.5 Ensure that sea level rise, flood risk, and other natural hazards have been considered and that a plan to mitigate any identified risks is in place when approving applications submitted by the respective member jurisdiction related to new sewers, drains or alterations, connections, or extensions of sewers or drains.

1.1.6 Work with First Nations to incorporate development plans and population, employment, and housing projections into the regional growth strategy to support potential infrastructure and utilities investments.

1.1.7 Advocate to the Federal Government and the Province requesting that they direct urban, commercial, and institutional facilities and investments to areas within the Urban Containment Boundary, and to Urban Centres.

1.1.8 Advocate to the Province to ensure that any transportation plans, strategies, and infrastructure investments do not encourage the dispersal of housing and employment growth outside the Urban Containment Boundary, consistent with the goals of the regional growth strategy.

Member jurisdictions will:

1.1.9 Adopt Regional Context Statements that:

a) Depict the Urban Containment Boundary on a map, generally consistent with the Regional Land Use Designations map (Map 2);

b) Provide member jurisdiction population, dwelling unit, and employment projections, with reference to guidelines contained in Table 1, and demonstrate how local plans will work towards accommodating the projected growth within the Urban Containment Boundary in accordance with the regional target of focusing 98% of residential growth inside the Urban Containment Boundary;

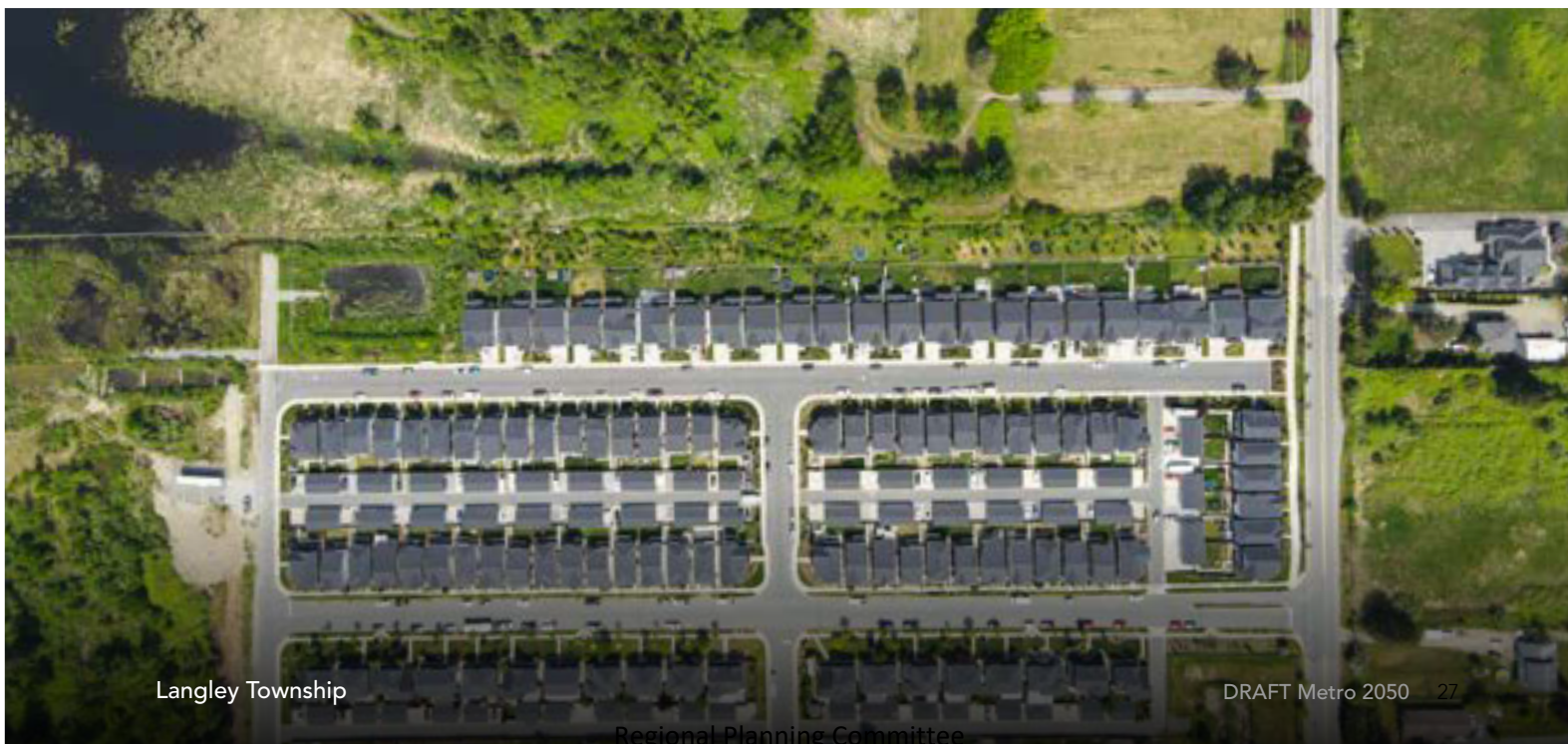
c) Include a commitment to liaise regularly with Metro Vancouver Liquid Waste Services to keep them apprised of the scale and timeframe of major development plans as well as specific plans to separate combined sewers;

d) Integrate land use planning policies with local and regional economic development strategies, particularly in the vicinity of the port and airports, to minimize potential exposure of residents to environmental noise and other harmful impacts.

TransLink will:

1.1.10 Continue to plan for a compact urban form within the Urban Containment Boundary when developing and implementing transportation plans, strategies, and investments.

1.1.11 Discourage the provision of infrastructure that would facilitate the dispersal of housing and employment growth outside the Urban Containment Boundary when preparing and implementing transportation plans, strategies, and investments.



Strategy 1.2 Focus growth in Urban Centres and Frequent Transit Development Areas

Focusing growth into a network of centres and corridors reduces greenhouse gas emissions both by supporting sustainable transportation options and by reducing the distances that people have to travel to make essential trips, all while improving the cost-efficiency of infrastructure investments. In addition, a compact built form is, on average, more land and energy efficient than other forms of development. Focusing growth into centres and corridors fosters the development of walkable, vibrant, and mixed use communities that can support a range of services and amenities.

Identifying Frequent Transit Development Areas in appropriate locations within Major Transit Growth Corridors ensures that growth is being directed to locations with high quality and frequent transit service. This provides greater certainty to residents, TransLink, and member jurisdictions, and ensures greater integration of land use and transportation planning.

Metro Vancouver will:

1.2.1 Explore, with member jurisdictions, other governments and agencies, the use of financial tools and other incentives to support the location of major commercial, office, retail, and institutional development in Urban Centres.

1.2.2 Work with member jurisdictions, TransLink, other governments and agencies to support the development and delivery of effective regional transportation networks and services that support the growth and development of Urban Centres, Frequent Transit Development Areas, and Major Transit Growth Corridors.

1.2.3 Maintain a reference map to provide updated information on the location and extent of Urban Centres, Major Transit Growth Corridors, and Frequent Transit Development Areas.

1.2.4 Monitor progress towards the targets set out in Table 2 (Metro Vancouver Dwelling Unit and Employment Growth Targets for Urban Centres and Frequent Transit Development Areas) for Urban Centres and Frequent Transit Development Areas.

1.2.5 Accept Regional Context Statements that prioritize growth and focus higher density development primarily in Urban Centres, additionally in Frequent Transit Development Areas, and that meet or work towards Action 1.2.24.

1.2.6 In consultation with TransLink, accept the identification of new Frequent Transit Development Areas located within Major Transit Growth Corridors identified on Map 5.

1.2.7 Work with TransLink, the Province, First Nations, and member jurisdictions to expand the supply of secure and affordable market and non-market rental housing within Major Transit Growth Corridors.

1.2.8 Consult with TransLink and utilize the required criteria set out in the Centre Type Classification Framework (Table 4) when reviewing Regional Context Statements for acceptance or proposed amendments to the regional growth strategy for the reclassification of Frequent Transit Development Areas or Urban Centres.

1.2.9 Only consider a new Urban Centre in the regional growth strategy where, in addition to meeting the criteria listed in Centre Type Classification Framework (Table 4), all of the following criteria have been met:

- a) it intersects with a Major Transit Growth Corridor identified on Map 5; and
- b) appropriate supporting local or neighbourhood plans have been completed by the respective member jurisdiction, that demonstrate how the future Urban Centre will accommodate the intended regionally-significant levels of employment and residential growth, and identify the adequate provision of park land, public spaces, and amenities to serve the anticipated growth.

1.2.10 Only consider the identification of a new Frequent Transit Development Area that is:

- a) within a Major Transit Growth Corridor; and
- b) outside known and unmitigated flood and other natural hazard risk areas.

1.2.11 Only consider reclassifying an Urban Centre or a Frequent Transit Development Area to a growth-intensive classification if it is located outside of known and unmitigated flood and natural hazard areas.

1.2.12 Develop an Implementation Guideline, in collaboration with member jurisdictions and TransLink, to be used as a resource to support transit-oriented planning throughout the region.

1.2.13 Implement the strategies and actions of the regional growth strategy that contribute to regional targets as shown on Table 2 to:

- a) focus 98% of the region's dwelling unit growth to areas within the Urban Containment Boundary;
- b) focus 40% of the region's dwelling unit growth and 50% of the region's employment growth to Urban Centres; and
- c) focus 28% of the region's dwelling unit growth and 27% of the region's employment growth to Frequent Transit Development Areas.

1.2.14 Monitor the region's total dwelling unit and employment growth that occurs in Major Transit Growth Corridors.

1.2.15 Work with First Nations and other appropriate agencies to ensure that new development and infrastructure investment is directed to areas that are transit-oriented and resilient to climate change impacts and natural hazards.

1.2.16 Advocate to the Federal Government and the Province requesting that they direct major office and institutional development, public service employment locations and other Major Trip-Generating uses to Urban Centres, Frequent Transit Development Areas, and locations within the Major Transit Growth Corridors, where appropriate. This may include, but is not necessarily limited to hospitals, post-secondary institutions, secondary schools, public-serving health care service facilities, and government-owned or funded affordable or supportive housing developments.

1.2.17 Advocate to the Federal Government and the Province that their procurement, disposition, and development of land holdings be consistent with the goals of the regional growth strategy.

1.2.18 Advocate to the Province that Metro Vancouver, member jurisdictions, TransLink, and other stakeholders be engaged early in the process on any initiatives pertaining to the planning of new or expanded major transit capital investments.

1.2.19 Advocate to the Province that any future or expanded rail-based rapid transit service:

- a) avoid locations that are exposed to unmitigated natural hazards and climate change risk;
- b) improve place-making, safety, access, and amenities for people on foot, on bikes, and for those using mobility aids; and
- c) support the safe and efficient movement of people, goods, and service vehicles, to, from, and within Urban Centres and Frequent Transit Development Areas.

1.2.20 Advocate to the Federal Government and the Province to support the coordination of growth, land use, and transportation planning at the regional scale through updates to legislation, regulations, partnerships, plans, agreements, and funding programs, including coordination between regional districts.

1.2.21 Advocate to the Federal Government and the Province to support the integration of regional land use and transportation by ensuring that all housing and transportation funding programs and initiatives for the region are consistent with the goals of the regional growth strategy.

1.2.22 Advocate to the Federal Government and the Province requesting that they support local community concerns and public health by ensuring that the Vancouver Fraser Port and airport operators continue with efforts to measure, report, and manage traffic, noise, air pollution, and vibration impacts on adjacent communities.

1.2.23 Advocate to the Province, Health Authorities, and TransLink, requesting continued efforts to develop guidance on community design, appropriate setbacks, and building standards along the Major Roads Network, Major Transit Network, railways, and Federal and Provincial Highways to minimize public exposure to unhealthy levels of noise, vibration, and pollution.

Member Jurisdictions will:

1.2.24 Adopt Regional Context Statements that:

- a) Provide dwelling unit and employment projections that indicate the member jurisdiction's share of planned growth and contribute to achieving the regional share of growth for Urban Centres, Frequent Transit Development Areas, and Major Transit Growth Corridors as set out in Table 2 (Metro Vancouver Dwelling Unit and Employment Growth Targets for Urban Centres, Frequent Transit Development Areas, and Major Transit Growth Corridors);
- b) Include policies for Urban Centres and Frequent Transit Development Areas that:
 - i) identify the location, boundaries, and types of Urban Centres and Frequent Transit Development Areas on a map that is consistent with the guidelines set out in Table 3 (Guidelines for Urban Centres and Frequent Transit Development Areas) and Map 4;
 - ii) focus and manage growth and development in Urban Centres and Frequent Transit Development Areas consistent with guidelines set out in Table 3 (Guidelines for Urban Centres and Frequent Transit Development Areas) and demonstrate how that growth will contribute to the Urban Centre and Frequent Transit Development Area targets set out in Table 2 and Action 1.2.13;
 - iii) encourage office development to Urban Centres through policies, economic development programs, or other financial incentives;

- iv) reduce residential and commercial parking requirements in Urban Centres and Frequent Transit Development Areas and consider the use of parking maximums;
 - v) consider the identification of appropriate measures and neighbourhood plans to accommodate urban densification and infill development in Urban Centres, Frequent Transit Development Areas, and Major Transit Growth Corridors in a resilient and equitable way (e.g. community vulnerability assessments, emergency services planning, tenant protection policies, and strategies to enhance community social connectedness and adaptive capacity);
 - vi) consider the support for provision of child care spaces in Urban Centres and Frequent Transit Development Areas;
 - vii) consider the implementation of green infrastructure;
 - viii) focus infrastructure and amenity investments (such as public works and civic and recreation facilities) in Urban Centres and Frequent Transit Development Areas, and at appropriate locations within Major Transit Growth Corridors;
 - ix) support the provision of community services and spaces for non-profit organizations; and
 - x) consider, where Urban Centres and Frequent Transit Development Areas overlap with Employment lands, higher density forms of commercial, light industrial; and only within 200 metres of rapid transit stations, consider residential uses (with an emphasis on affordable, rental units) on upper floors.
- c) Include policies for General Urban lands that:
- i) identify General Urban lands and their boundaries on a map generally consistent with Map 2;
 - ii) exclude new non-residential Major Trip-Generating uses, as defined in the Regional Context Statement, from those portions of General Urban lands outside of Urban Centres and Frequent Transit Development Areas and direct new non-residential Major Trip-Generating uses to Urban Centres and Frequent Transit Development Areas;
 - iii) encourage infill and intensification (e.g. row houses, townhouses, mid-rise apartments, laneway houses) within walking distance of the Frequent Transit Network, as appropriate; and
 - iv) encourage neighbourhood-serving commercial uses.
- d) with regards to Actions 1.2.16 and 1.2.24 c) ii), include a definition of “non-residential Major Trip-Generating uses” that includes, but is not limited to, the following uses: office or business parks, outlet shopping malls, post-secondary institutions, and large-format entertainment venues;
- e) consider the identification of new Frequent Transit Development Areas in appropriate locations for areas within Major Transit Growth Corridors, as part of the development of new or amended area or neighbourhood plans, or other community planning initiatives; and
- f) consider long-term growth and transportation planning coordination with adjacent municipalities, First Nations, TransLink, and Metro Vancouver for transit corridors that run through or along two or more adjacent jurisdictions.

TransLink will:

1.2.25 Develop procurement, disposition, and development plans and actions for land holdings that support the goals of the regional growth strategy and include the provision of affordable rental housing.

1.2.26 Collaborate with member jurisdictions and other stakeholders on the expansion of the Frequent Transit Network, Major Transit Network, and new transit stations, and avoid expansion of permanent transit infrastructure into hazardous areas. Where risk is unavoidable, such as in existing settlements, use risk-mitigation or climate change adaptation strategies in the expansion of transit infrastructure.

1.2.27 Work with member jurisdictions to support the safe and efficient movement of people, goods, and service vehicles, to, from, and within Urban Centres and Frequent Transit Development Areas (e.g. by enhancing the design and operation of the road network), where appropriate.

1.2.28 Continue to develop walking and biking infrastructure programs that prioritize improvements in Urban Centres and Frequent Transit Development Areas.



TABLE 3. GUIDELINES FOR URBAN CENTRES AND FREQUENT TRANSIT DEVELOPMENT AREAS

CENTRE TYPE	FUNCTION	GENERAL EXPECTATIONS	LOCATION
Urban Centre - All <i>(applies to Metro Core, Surrey Metro Centre, RCCs, HG-MTCs, and MTCs)</i>	<p>Primary hubs of activity.</p> <p>Accommodates significant regional residential and employment growth. Provides a range of amenities and services.</p> <p>Major Road Network access.</p> <p>Primary locations for Major Trip Generating Uses.</p>	<p>Complete communities with a balanced mix of housing, employment, services, and amenities. Primary focal points for concentrated growth in the region. High intersection densities. High quality, accessible walking and cycling environment. Provision of transit priority measures and other transit-supportive road infrastructure and operations. Industrial uses are maintained. Parks, green spaces, and public open spaces. The supply of affordable rental housing is protected and expanded.</p>	Locations identified on Map 4
Metro Core - Vancouver	<p>The Region's downtown. Region-serving uses (central business district).</p> <p>Accommodates significant levels of regional employment and residential growth. Principal centre of business, employment, cultural, and entertainment activity for the region.</p>	<p>Existing SkyTrain transit service. High degree of cycling connectivity and cycling network completeness. High walkability index score. Office uses. Region-serving uses. Provision of transit priority measures and other transit-supportive road infrastructure and operations.</p>	Vancouver
Metro Centre - Surrey	<p>Centre of activity South of the Fraser River.</p> <p>Accommodates significant levels of regional employment and residential growth.</p>	<p>Existing SkyTrain transit service. High degree of cycling connectivity and cycling network completeness. High walkability index score. Office uses. Provision of transit priority measures and other transit-supportive road infrastructure and operations.</p>	Surrey
Regional City Centre	<p>Sub-regional hub of activity.</p> <p>Accommodates significant levels of residential and employment growth.</p>	<p>Sub-region serving uses (hospital, post-secondary). Office uses. Existing frequent transit services.</p> <p>Regional-scale employment, services, business and commercial activities. Major institutional, community, cultural and entertainment uses. High and medium density forms of housing (in General Urban only), including affordable housing choices. Provision of transit priority measures and other transit-supportive road infrastructure and operations.</p> <p>Minimum density of 60-350 Jobs + People/ hectare.</p>	Any location on the Major Transit Network.
High Growth Municipal Town Centre	<p>Centre of activity for a member jurisdiction.</p> <p>Locations for significant levels of regional employment and residential growth.</p>	<p>Previously a Municipal Town Centre.</p> <p>High Regional Accessibility.</p> <p>Existing Major Transit Network service.</p> <p>Higher density commercial Uses.</p> <p>High density residential uses.</p> <p>Minimum density of 60-200 Jobs + People/ hectare.</p>	Maximum 1,200m from a Major Transit Network station. Not in an area with known and unmitigated natural hazards. Locations with high regional accessibility to jobs.

Municipal Town Centre	Centre of activity for a municipality. Accommodates municipal residential and employment growth.	<p>Municipally-serving shops, services, uses, and amenities. Medium to high density forms of residential uses.</p> <p>Employment, services, business and commercial activities, typically serving the municipal or local area. Institutional, community, cultural, and entertainment uses. High and medium density forms of housing (in General Urban only), including affordable housing choices. Services and activities oriented to the local needs of the surrounding communities. Municipal focus for community and cultural activities.</p> <p>Minimum density of 20-150 Jobs + People/ hectare.</p>	Any location on the Major Transit Network.
Frequent Transit Development Area (FTDA) – All <i>(applies to both Corridor FTDA and Station Area FTDA)</i>	<p>Location for additional medium and higher density transit-oriented development forms and mixed uses in alignment with the Major Transit Growth Corridors.</p> <p>Location for additional employment growth. Location for affordable rental housing. Location for Major Trip Generating Uses.</p>	Locations for transit-oriented employment and/or housing growth. Walkable and bike-friendly urban design. Managed parking supply. Transit priority measures. Provides appropriate noise, vibration, and air quality mitigation measures. Parks, green spaces, and public open spaces provided. Industrial uses are maintained. Supply of affordable rental housing is protected and expanded.	Located in appropriate locations within the Major Transit Growth Corridors.
Corridor Frequent Transit Development Area	Supports bus-based frequent and rapid transit. Location for medium density housing forms. Location for affordable, particularly affordable rental housing.	<p>Linear shaped.</p> <p>Minimum density of 35-80 Jobs + People/ hectare.</p>	Up to 1000m from the Major Transit Growth Corridor centreline.
Station Area Frequent Transit Development Area	Location for office employment uses. Accommodate significant residential and employment growth. Support high-capacity rapid and frequent transit.	<p>Restricted parking supply.</p> <p>Nodal shaped.</p> <p>Minimum density of 60-350 Jobs + People/hectare.</p>	Up to 1,000m from an existing Major Transit Network or RapidBus Station.

TABLE 4. URBAN CENTRE AND FREQUENT TRANSIT DEVELOPMENT AREAS TYPE RECLASSIFICATION FRAMEWORK

CENTRE TYPE RECLASSIFICATION FRAMEWORK		
Centre Type	Required Criteria for a new Urban Centre or Urban Centre reclassification	Metro 2050 Amendment Type
In order to become...	The area must meet the following criteria...	And pursue the following amendment process...
Frequent Transit Development Area (FTDA) – All <i>(applies to Corridor FTDAs and Station Area FTDAs)</i>	<i>Required for reclassification to any FTDA types:</i> Located within a Major Transit Growth Corridor. Policies supportive of, street, sidewalk and cycling network connectivity. Policies supportive of managed parking supply. Not in an area with known and unmitigated natural hazards. Official Community Plan (OCP) Land Use Map and policies supportive of infill and intensified residential and/or employment growth.	Type 3 or Regional Context Statement Update
Corridor FTDA	Meets the above criteria for FTDA, and: Located within a Major Transit Growth Corridor (on Map 5). Located up to 800m from the corridor centreline. Linear shaped	Type 3 or Regional Context Statement Update
Station Area FTDA	Meets the above criteria for FTDA, and: Located within a Major Transit Growth Corridor. Located up to 1,200m from a station on the Major Transit Network or RapidBus station. May be nodal shaped.	Type 3 or Regional Context Statement Update
Urban Centre - All <i>(applies to all Urban Centre types)</i>	<i>Required for reclassification to any Urban Centre type:</i> Located on the Major Transit Network. Not in a known unmitigated natural hazard area. OCP Land Use Map and policies supportive of infill and intensified residential and employment growth.	
Municipal Town Centre	Meets the above criteria for Urban Centre, and: Formerly a Frequent Transit Development Area. Evidence that the area is a primary hub of activity within a member jurisdiction. Minimum density of 60 Jobs + People / hectare. Minimum area of 40 hectares.	Type 3
High Growth Municipal Town Centre	Meets the above criteria for Urban Centre, and: Existing rapid rail transit service High Regional Accessibility Not in a known unmitigated natural hazard area. Minimum 100 Jobs + People / hectare. Formerly a Municipal Town Centre or FTDA. Minimum area of 40 hectares.	Type 3
Regional City Centre and Metro Centres	Reclassification from any centre type to or from the “Regional City Centre” or to “Metro Centre” types is not contemplated by the regional growth strategy.	

Strategy 1.3 Develop resilient, healthy, connected, and complete communities with a range of services and amenities

Creating complete communities, especially in the region's Urban Centres, with a mix of uses and affordable services and amenities, allows residents to meet most of their daily needs by walking, rolling, or transit without leaving their neighbourhood. This supports trip reduction, walking, healthier living, climate action, more equitable access to the key amenities that support a high quality of life, and creates resilient places with inclusion and connection.

Metro Vancouver will:

1.3.1 Support member jurisdictions and work with First Nations in developing resilient, healthy, connected, and complete communities through regional strategies, research, and best practices that:

- a) promote greater local access to affordable community services and child care, healthy food, and public spaces (including regional parks and greenways);
- b) reduce greenhouse gas emissions, bolster resilience to climate change impacts and natural hazards, and improve social equity, universal accessibility, and inclusive engagement; and
- c) encourage the provision and enhancement of urban green spaces in new and established neighbourhoods.

1.3.2 Provide technical advice, assistance, research, and data to member jurisdictions and other agencies to improve air quality, reduce greenhouse gases, increase access to community services, and to better understand the health and social equity aspects of land use and infrastructure decisions.

1.3.3 Collaborate with health authorities, academic institutions, and other researchers to share best practices, research, data, and tools that can advance land use policies to:

- a) ensure neighbourhoods are designed for walking, cycling, rolling and social activities to promote positive mental and physical health;
- b) meet community social needs and priorities;

c) reduce community exposure to climate change and air quality impacts, especially communities that are disproportionately impacted; and

d) increase equitable access and exposure to public spaces through urban green space enhancement and retention opportunities.

1.3.4 Measure and monitor access to community services and amenities, particularly in Urban Centres and Frequent Transit Development Areas.

1.3.5 Advocate to the Federal Government and the Province to ensure that growing communities are served appropriately and in a timely manner with social amenities, health, schools and educational opportunities, to avoid inequities in service levels between communities in the region.

1.3.6 Advocate to the Federal Government and the Province to ensure that community, arts, cultural, recreational, institutional, social services, health and education facilities funded or built by them are located in Urban Centres or areas with good access to transit.

Member Jurisdictions will:

1.3.7 Adopt Regional Context Statements that:

- a) support compact, mixed use, transit, walking, cycling and rolling-oriented communities;
- b) locate and support community, arts, cultural, recreational, institutional, medical/health, social service, education and child care facilities, and local serving retail uses in Urban Centres or areas with good access to transit;

c) provide and encourage public spaces and other place-making amenities and facilities (e.g. community gardens, playgrounds, gathering places, etc.) in new and established neighbourhoods, for all ages, abilities, and seasons, to support social connections and engagement.

d) respond to health and climate change-related risks by providing equitable access to:

- i) recreation facilities;
- ii) green spaces and public spaces (e.g. parks, trails, urban forests, public squares, etc.); and
- iii) safe and inviting walking, cycling, and rolling environments, including resting spaces with tree canopy coverage, for all ages and abilities;

e) support the inclusion of community gardens (at-grade, rooftop, or on balconies), grocery stores and farmers' markets to support food security, and local production, distribution and consumption of healthy food, in particular where they are easily accessible to housing and transit services;

f) consider, when preparing new neighbourhood and area plans, the mitigation of significant negative social and health impacts, such as through the use of formal health and social impact methods in neighbourhood design and major infrastructure investments; and

g) provide design guidance for existing and new neighbourhoods to promote social connections, universal accessibility, crime prevention through environmental design, and inclusivity while considering the impacts of these strategies on identified marginalized members of the community.

TransLink will:

1.3.8 Provide equitable and accessible levels of transit service to communities and employment areas.

1.3.9 Continue to improve sustainable mobility options for neighbourhoods outside the Urban Centres and Frequent Transit Development Areas within the General Urban Land Use designation as shown on Map 2.



Strategy 1.4 Protect Rural lands from urban development

Rural designated lands are located outside the Urban Containment Boundary and are not intended for urban forms of development. Containing growth within the Urban Containment Boundary ensures the protection of natural, rural, and agricultural areas, and the efficient and cost effective provision of sewerage, transit, and other community services. The inherent benefits of urban containment also support reduced greenhouse gas emissions and increases opportunities for natural carbon sinks.

Metro Vancouver will:

1.4.1 Direct the Greater Vancouver Sewerage and Drainage District (GVS&DD) to not allow connections to regional sewerage services to lands with a Rural regional land use designation as identified on Map 2. Notwithstanding this general rule, in the exceptional circumstances specified below, the Metro Vancouver Regional District (MVRD) Board will advise the GVS&DD Board that it may consider such a connection for existing development or for new development where, in the MVRD Board's opinion, that new development is consistent with the Rural regional land use designation and where the MVRD Board determines either:

- a) that the connection to regional sewerage services is the only reasonable means of preventing or alleviating a public health or environmental contamination risk; or
- b) that the connection to regional sewerage services would have no significant impact on the strategy to protect lands with a Rural regional land use designation from urban development.

1.4.2 Accept Regional Context Statements that protect lands with a Rural regional land use designation from urban development and that meet or work towards Action 1.4.3.

Member Jurisdictions will:

1.4.3 Adopt Regional Context Statements that:

- a) identify the Rural lands and their boundaries on a map generally consistent with Map 2;
- b) limit development to a scale, form, and density consistent with the intent for the Rural land use designation, and that is compatible with on-site sewer servicing;
- c) specify the allowable density and form, consistent with Action 1.4.1, for land uses within the Rural regional land use designation;
- d) support agricultural uses within the Agricultural Land Reserve, and where appropriate, outside of the Agricultural Land Reserve; and
- e) support the protection, enhancement, restoration, and expansion of ecosystems identified on Map 11 to maintain ecological integrity, enable ecosystem connectivity, increase natural carbon sinks and enable adaptation to the impacts of climate change.

GOAL
2

Support a Sustainable Economy



Goal 2: Support a Sustainable Economy

The regional growth strategy leverages the region's existing economic strengths to provide for a prosperous future by supporting diverse commercial and industrial sectors, employment growth, ensuring well designed regional places with an emphasis on public space and transit, and recognizing the region's role as a key provincial and national gateway. The regional growth strategy supports a sustainable economy through its regional land use, urban design, and transportation policies and strategies.

Urban Centres distributed throughout the region provide opportunities for commercial activities, services, and employment uses to be located close to where people live, and enable economic and transportation efficiencies. The design of these centres supports a strong sense of place, a public realm that promotes a positive civic image, and ensures a high quality of life through the provision of amenities and diversity of housing types. Policies discourage the dispersal of major employment and Major Trip-Generating uses outside of Urban Centres and Frequent Transit Development Areas, to support jobs in close proximity to homes and connected by sustainable forms of transportation.

Increasing demands for land for industrial activities as the population and economy grow, coupled with ongoing market pressure to convert Industrial lands to office, retail, residential, and other uses, has resulted in a critically diminished supply of industrial land in the region. In addition to the national, provincial, and regional serving industries in Metro Vancouver, many small to medium sized industries provide for the day-to-day needs of the region's population, such as repair and servicing activities, e-commerce, manufacturing, and renovation and construction functions. Additional lands are needed for container storage, freight forwarding, warehouses, and other distribution functions that support the regional economy to provide for a sustainable and resilient supply chain system.

Meeting the needs of both a growing regional economy and an expanding international gateway for trade requires an adequate supply of serviced industrial lands, such as those identified as 'trade-oriented' lands. Preserving the region's industrial lands supports existing businesses by allowing them to expand and supports new businesses to locate in the region, all the while avoiding long transportation distances, business inefficiencies, and higher greenhouse gas emissions. In response to the vulnerability of industrial land, policies are included to protect and intensify the use of the limited supply in the region. Efforts that encourage industrial densification and intensification provide a range of benefits such as: more efficient use of lands and resources; reduced pressures on other lands; improved capacity for businesses to grow to create employment opportunities; increased job opportunities; greater clustering of co-located operations; circular economy; and a more efficient transportation system.

There are some economic activities that are not traditional industrial uses and cannot be easily accommodated or viable in Urban Centres or Frequent Transit Development Areas. The regional growth strategy provides for these activities to be accommodated in Employment areas, which are intended to complement the planned function of Urban Centres, Frequent Transit Development Areas, and Industrial lands.

Major educational and medical institutions in this region also have a vital role in the economy, as they have key linkages with many sectors, provide and support research and innovation, and are incubators for new industries.

Agriculture is an important sector of the region's economy and a critical component of the local food system. The agricultural industry is dependent on the protection and availability of agricultural land for the production of food and other goods and services. Effective legislation and an economically viable agricultural sector are important ways to protect agricultural land for future generations.

Agricultural production is vulnerable to the impacts of climate change. Projected changes in temperature, precipitation, flooding and extreme weather events will profoundly affect agriculture production. Policies focus on increased resilience and the long-term protection of land for sustainable food production, edge planning, new drainage and irrigation infrastructure, and climate change adaptation. This strategy also seeks to protect agricultural land for local food production and supports the economic viability of the agricultural sector, while recognizing the value of ecosystem services.

Equitable growth management includes a commitment to advancing equitable and sustainable planning and land development practices that support a regional economy that is accessible and designed to benefit all people. It includes a commitment to employment growth, effective use of industrial lands, efficient transportation system, sustainable practices that work to enhance and protect natural resources, build resilience through climate-smart agricultural approaches, and mitigate the potential disproportionate impacts on ecosystems, communities, groups or individuals.

Strategies to achieve this goal are:

- 2.1 Promote land development patterns that support a diverse regional economy and employment opportunities close to where people live
- 2.2 Protect the supply, and enhance the efficient utilization, of industrial land
- 2.3 Protect the supply of agricultural land and strengthen agricultural viability



Strategy 2.1 Promote land development patterns that support a diverse regional economy and employment opportunities close to where people live

Economic and employment activities, such as post-secondary and medical institutions, shopping streets, retail centres, business parks, transportation terminals and associated infrastructure, complement employment activities in Urban Centres (Strategy 1.2) and industrial uses on Industrial lands (Strategy 2.2), which have different location requirements and attributes. These businesses support the region's economy and population, and rely on and have implications for the transportation network and the design of neighbourhoods. Locating jobs close to where people live and near the transit network supports the creation of complete communities (Strategy 1.3), reduces social inequities in the region, and helps to reduce energy consumption and greenhouse gas emissions through reduced vehicle travel and increased active transportation.

Metro Vancouver will:

2.1.1 Provide regional utility infrastructure to support the region's economic functions and to support efficient employment and settlement patterns.

2.1.2 Work with the Federal Government, the Province, member jurisdictions, First Nations, and the private sector to advance shared economic prosperity and resilience through the Regional Economic Prosperity Service to attract strategic investment to the region.

2.1.3 Work with the Federal Government, the Province, and member jurisdictions to explore:

- a) fiscal measures to reinforce the attraction of investment and employment opportunities to Urban Centres, Frequent Transit Development Areas, and lands with an Industrial or Employment regional land use designation; such employment opportunities should be consistent with the intention of the underlying regional land use designation; and
- b) fiscal reform to ensure that the property tax system supports sound land use decisions.

2.1.4 Accept Regional Context Statements that support economic activity and an urban form designed to be consistent with its context in: Urban Centres, Frequent Transit Development Areas, Industrial lands, Employment lands, ports and airports, and that meet or work towards Action 2.1.10.

2.1.5 Advocate to the Federal Government, the Province, and TransLink to develop and operate transportation infrastructure that supports and connects the region's economic activities by sustainable modes of transportation in Urban Centres, Frequent Transit Development Areas, Industrial lands, Employment lands, ports and airports.

2.1.6 Advocate that airport authorities:

- a) encourage the use of surplus airport lands for industrial activities, and where appropriate, discourage non-airport related commercial development and any expansion beyond the Industrial and Employment areas specified on Map 7;
- b) accelerate the movement of goods by energy efficient, low and zero emission modes; and
- c) develop strategies to adapt to climate change impacts and natural hazard risks.

2.1.7 Advocate that the Port of Vancouver:

- a) encourage the use of surplus port lands for industrial activities, and where appropriate, discourage non-port related commercial development and any expansion beyond the Industrial and Employment lands specified on Map 7;
- b) accelerate the movement of goods by energy efficient, low and zero emission modes; and
- c) develop strategies to adapt to climate change impacts and natural hazard risks.

2.1.8 Advocate that the Fraser Valley Regional District and the Squamish-Lillooet Regional District collaborate with the Metro Vancouver Regional District on shared initiatives related to economy, transportation, and other related matters.

2.1.9 Advocate that the Federal Government and the Province support existing and new industries in the region through such means as investment, procurement strategies, tax incentives, skill development, and small business loan programs.

Member Jurisdictions will:

2.1.10 Adopt Regional Context Statements that:

- a) include policies to support appropriate economic activities, as well as context-appropriate built form for Urban Centres, Frequent Transit Development Areas, Industrial lands, and Employment lands;
- b) support the development and expansion of large-scale office and retail uses in Urban Centres, and lower-scale uses in Frequent Transit Development Areas through policies such as: zoning that reserves land for office uses, density bonus provisions to encourage office development, variable development cost charges, and/or other incentives; and
- c) include policies that discourage the development and expansion of major commercial and institutional land uses outside of Urban Centres and Frequent Transit Development Areas.



Strategy 2.2 Protect the supply, and enhance the efficient use of, industrial land

Industrial lands are critical to supporting a diverse, resilient economy – one that supports businesses and residents by securing land for economic development and jobs within the region, and reducing costs for commuting and the transportation of goods. In response to the vulnerability of industrial land, policies are included to protect and appropriately use the region’s limited supply of Industrial and Employment lands, while also considering the future of industrial activities and work, greenhouse gas emissions, and the impacts of climate change.

Metro Vancouver will:

2.2.1 Monitor the supply, demand, and utilization of Industrial land with the objective of assessing whether there is sufficient capacity to meet the needs of the growing regional economy.

2.2.2 Work with the Province, member jurisdictions, and other agencies to investigate industrial taxation rates and policies that support industrial development, efficient use of Industrial land, and industrial densification.

2.2.3 Prepare an Implementation Guideline covering the following topics: opportunities for Industrial lands to support new growth planning initiatives, new forms of industry and technologies, urban industry and e-commerce, design of industrial forms, guidance on setting criteria for trade-oriented lands, and other policy measures.

2.2.4 Seek input from TransLink, the Port of Vancouver, the Vancouver International Airport Authority, the Ministry of Transportation and Infrastructure, and/or the Agricultural Land Commission on any proposed Regional Context Statement or regional growth strategy amendments for Industrial and Employment lands as appropriate.

2.2.5 Accept Regional Context Statements that include provisions that protect and support the ongoing economic viability of industrial activities and that meet or work towards the strategies set out in Action 2.2.9.

2.2.6 Advocate to the Federal Government and the Province to coordinate transportation infrastructure and service investments that support the efficient movement of goods and people for industrial and employment operations, and considers the Regional Goods Movement Strategy and the Regional Truck Route Network.

2.2.7 Advocate to the Federal Government and the Province to support initiatives and infrastructure investments that:

- a) introduce more energy efficient, low carbon and zero emissions equipment operations and vehicles;
- b) reduce distances travelled by commercial vehicles;
- c) accelerate the movement of goods by energy efficient, low and zero emission modes; and
- d) shift freight activity out of peak congestion periods.

2.2.8 Advocate to the Federal Government, the Province, and relevant agencies to enhance data collection and sharing related to industrial, employment, transportation, and economic matters in support of the efficient use of Industrial lands in the region.

Member jurisdictions will:**2.2.9** Adopt Regional Context Statements that:

a) identify the Industrial and Employment lands and their boundaries on a map generally consistent with Map 7.

b) identify Trade-Oriented lands, if applicable, with a defined set of permitted uses that support inter-regional, provincial, national, and international trade (e.g. logistics, warehouses, distribution centres, transportation and intermodal terminals) and location needs (e.g. large and flat sites, proximity to highway, port, or rail infrastructure) on a map consistent with the goals in the regional growth strategy. Strata and/or small lot subdivisions on these lands should not be permitted.

c) include policies for Industrial lands that:

- i) consistently define, support, and protect industrial uses in municipal plans and bylaws, and ensure that non-industrial uses are not permitted;
- ii) support appropriate and related accessory uses, such as limited-scale ancillary commercial spaces, and caretaker units;
- iii) exclude uses that are not consistent with the intent of Industrial lands and not supportive of industrial activities, such as medium and large format retail uses, residential uses, and stand-alone office uses, other than ancillary uses, where deemed necessary;
- iv) encourage improved utilization and increased intensification/densification of Industrial lands for industrial activities, including the removing of any outdated municipal policies or regulatory barriers related to development form and density;

- v) review and update parking and loading requirements to reflect changes in industrial forms and activities, ensure better integration with the surrounding character, and reflect improvements to transit service, in an effort to avoid the oversupply of parking;
- vi) explore municipal industrial strategies or initiatives that support economic growth objectives with linkages to land use planning;
- vii) provide infrastructure and services in support of existing and expanding industrial activities;
- viii) introduces land use policies through area plans for rail-oriented, waterfront, and trade-oriented areas that may contain unique industrial uses;
- ix) consider the preparation of urban design guidelines for Industrial land edge planning, such as interface designs, buffering standards, or tree planting, to minimize potential land use conflicts between industrial and sensitive land uses, and to improve resilience to the impacts of climate change; and
- x) do not permit strata and/or small lot subdivisions on identified Trade-Oriented lands.

d) include policies for Employment lands that:

- i) support a mix of industrial, small scale commercial and office, and other related employment uses, while maintaining support for the light industrial capacity of the area, including opportunities for the potential densification/intensification of industrial activities, where appropriate;
- ii) allow large and medium format retail, where appropriate, provided that such development will not undermine the broad objectives of the regional growth strategy;

- iii) support the objective of concentrating larger-scale commercial, higher density forms of employment, and other Major Trip-Generating uses in Urban Centres, and local-scale uses in Frequent Transit Development Areas;
 - iv) support higher density forms of commercial and light industrial development where Employment lands are located within Urban Centres or Frequent Transit Development Areas, and permit employment and service activities consistent with the intent of Urban Centres or Frequent Transit Development Areas, while low employment density and low transit generating uses, possibly with goods movement needs and impacts, are located elsewhere;
 - v) do not permit residential uses, except for an accessory caretaker unit;
 - vi) notwithstanding 2.2.9 (d)(v), consider limited residential uses (with an emphasis on affordable, rental units) on lands within 200 metres of a rapid transit station, and located within Urban Centres or Frequent Transit Development Areas, where appropriate. Residential uses are to be located only on the upper floors of new office and light industrial developments, and to be subject to consideration of municipal objectives, local context, and other regional growth strategy objectives.
- e) include policies to assist existing and new businesses in reducing their greenhouse gas emissions, maximizing energy efficiency, and mitigating impacts on ecosystems.
- f) include policies that assist existing and new businesses to adapt to the impacts of climate change and reduce their exposure to natural hazards risks, such as those identified within the regional growth strategy (Table 5).



Strategy 2.3 Protect the supply of agricultural land and strengthen agricultural viability

Protecting land for agricultural production is essential for the viability of the agricultural industry and a resilient region. Collaboration with the Agricultural Land Commission is necessary to address the ongoing challenges from competing residential, industrial, and commercial land use demands. Improved multi-jurisdictional collaboration that recognizes the priority to protect farm land for food production, and the importance of climate change adaptation while restricting other land uses in agricultural lands is critical. Equally important is the need to strengthen the economic viability of agriculture operations by encouraging new markets and expanding the distribution of local foods.

Metro Vancouver will:

2.3.1 Direct the Greater Vancouver Sewerage and Drainage District (GVS&DD) to not allow connections to regional sewerage services for lands with an Agricultural regional land use designation. Notwithstanding this general rule, in the exceptional circumstances specified below, the Metro Vancouver Regional District (MVRD) Board will advise the GVS&DD Board that it may consider such a connection for existing or for new development where, in the MVRD Board's discretion, the use is consistent with the underlying Agricultural regional land use designation and where the MVRD Board determines either:

- a) that the connection to regional sewerage services is the only reasonable means of preventing or alleviating a public health or environmental contamination risk; or
- b) that the connection to regional sewerage services would have no significant impact on the regional growth strategy to protect the supply of agricultural land and strengthening agricultural viability.

2.3.2 Monitor the status of agricultural land in the region including local agriculture production and other public benefits such as the provision of ecosystem services in collaboration with the Province and the Agricultural Land Commission.

2.3.3 Identify and pursue strategies and actions to increase actively farmed agricultural land, strengthen the economic viability of agriculture, and minimize conflicts between agriculture and other land uses, within or adjacent to agricultural land, in collaboration with the Province and the Agricultural Land Commission.

2.3.4 Work with the Agricultural Land Commission to protect the region's agricultural land base and not consider amending the Agricultural or Rural regional land use designation of a site if it is still part of the Agricultural Land Reserve except if the Agricultural Land Commission has:

- a) provided written confirmation that the site is not subject to the *Agricultural Land Commission Act*; or
- b) confirmed the site is subject to conditions prior to exclusion, and notifies Metro Vancouver that Metro Vancouver can consider such a proposed *Metro 2050* amendment.

2.3.5 Undertake agricultural awareness activities that promote the importance of the agricultural industry, the protection of agricultural land, and the value of local agricultural products and experiences, in partnership with other agencies and organizations.

2.3.6 Accept Regional Context Statements that protect the region's supply of Agricultural land and strengthen agricultural viability that meet or work towards the provisions set out in Action 2.3.12.

2.3.7 Advocate to all levels of government the necessity of agriculture impact assessments and mitigation requirements when transportation, utility, and recreational infrastructure is being planned, developed, or operated on agricultural lands.

2.3.8 Advocate to the Province for farm property tax reform that encourages more actively farmed land and enables secure land tenure for new and established farmers.

2.3.9 Advocate to the Province to increase agricultural producers' knowledge and adoption of innovative practices for advancing agriculture economic development, and resilience to climate change and natural hazards impacts as defined in the regional growth strategy (Table 5).

2.3.10 Advocate to the Province to provide incentives to encourage land management practices that reduce greenhouse gas emissions, improve soil health, protect natural assets, and maintain ecosystem services from agricultural land.

2.3.11 Advocate to the Province for changes to the *Local Government Act* to require that Official Community Plans prioritize the need for agricultural land, similar to how long-term needs are considered for residential, commercial, and industrial lands.

Member Jurisdictions will:

2.3.12 Adopt Regional Context Statements that:

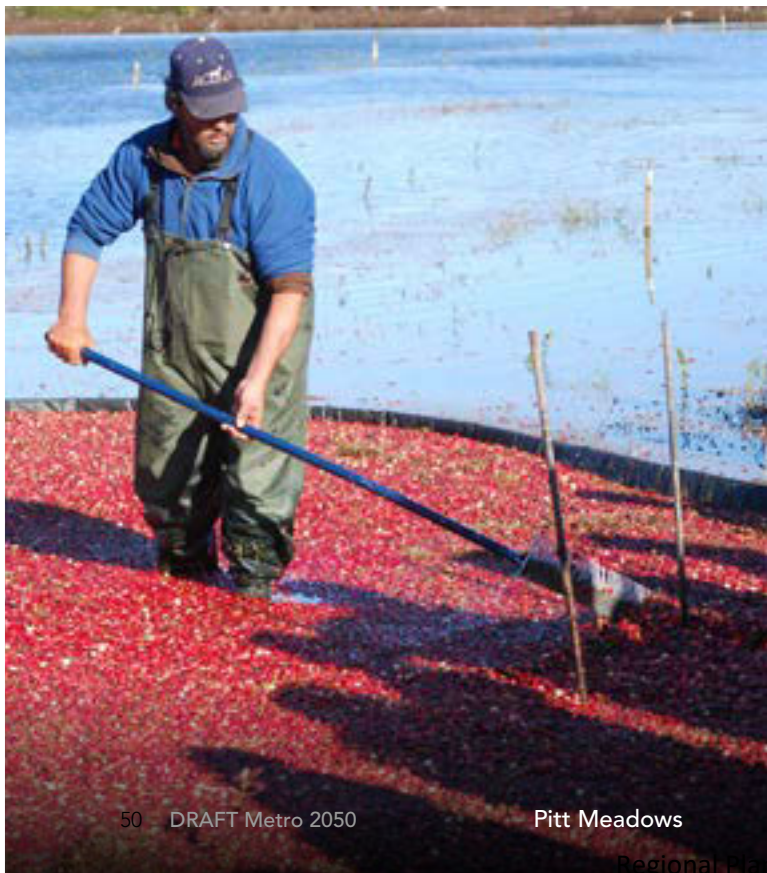
- a) specify the Agricultural lands and their boundaries within their jurisdiction on a map consistent with Map 8;
- b) consider policies and programs that increase markets and the distribution of local food in urban areas to strengthen the viability of agriculture and increase availability of local food for all residents;
- c) include policies that protect the supply of agricultural land and strengthen agriculture viability including those that:
 - i) assign appropriate land use designations to protect agricultural land for future generations and discourage land uses on Agricultural lands that do not directly support and strengthen agricultural viability;
 - ii) encourage the consolidation of small parcels and discourage the subdivision and fragmentation of agricultural land;
 - iii) support climate change adaptation including:
 - monitor storm water, flooding, and sea level rise impacts on agricultural land,
 - implement flood construction requirements for residential uses,
 - and maintain and improve drainage and irrigation infrastructure that supports agricultural production, where appropriate and in collaboration with other governments and agencies;



Delta

- iv) protect the integrity of agricultural land by requiring edge planning along the Urban Containment Boundary and adjacent to agricultural operations through activities such as screening, physical buffers, roads, or Development Permit area requirements;
- v) demonstrate support for economic development opportunities for agricultural operations that are farm related uses, benefit from close proximity to farms, and enhance primary agricultural production as defined by the *Agricultural Land Commission Act*;
- vi) align Official Community Plan policies and zoning regulations with the Minister's Bylaw Standards and Agricultural Land Commission legislation and regulations;

2.3.13 In partnership with other agencies and organizations, support agricultural awareness and promote the importance of the agricultural industry, the importance of protecting agricultural land, and the value of local agricultural products and experiences.



50 DRAFT Metro 2050

Pitt Meadows

GOAL
3

Protect the Environment and Respond to Climate Change and Natural Hazards



Goal 3: Protect the Environment and Respond to Climate Change and Natural Hazards

Metro Vancouver has a spectacular natural environment. Many of Metro Vancouver's ecosystems have global significance, providing both internationally-important fish habitat and key feeding and resting points for migratory birds along the Pacific Flyway. The region's forests, fields, coastal and intertidal areas, wetlands, and watercourses together are integral pieces of a habitat network for birds, fish, and other wildlife.

The diverse mountain, coastal, and river areas provide the region's residents with essential ecosystem services such as fresh water, clean air, pollination, traditional Indigenous food and medicines, fertile soil, flood control, cooling, carbon storage, and opportunities for tourism, recreation, cultural and spiritual enrichment, health and wellbeing. Climate change, land development, invasive species, and other human-induced pressures are causing ecosystem change and loss in many areas, which reduces nature's capacity to provide these life-sustaining services. If planned, designed, and built in harmony with nature, communities will be healthier and more resilient over the long-term.

The tenets of the regional growth strategy, such as the ongoing focus on urban containment, and land use patterns that support sustainable transportation options and carbon storage opportunities in natural areas, are critical for the region to address climate change. This section contains a strategy and associated policies that support Metro Vancouver's commitment to reaching a carbon neutral region by the year 2050. Climate change is expected to continue to cause warmer temperatures, a reduced snowpack, increasing sea levels, and more intense and frequent drought and rainfall events in the region. An additional strategy aims to improve resilience to these climate change impacts, since many of the region's natural hazards will be worsened by a changing climate.

A commitment to improving social equity includes advancing equitable climate change strategies and actions that will: intentionally consider the suite of concerns that increase community vulnerability, and acknowledge current financial, health, social disparities that are being exacerbated by low carbon solutions and the impacts of climate change. It includes developing a process that delineates resources for greenhouse gas reduction and resilience efforts equitably, prioritizing nature-based solutions and communities and support for people in the region that are disadvantaged or have been disproportionately impacted by climate change.

Strategies to achieve this goal are:

- 3.1 Protect and enhance Conservation and Recreation lands
- 3.2 Protect, enhance, restore, and connect ecosystems
- 3.3 Encourage land use, infrastructure, and human settlement patterns that reduce energy consumption and greenhouse gas emissions, create carbon storage opportunities, and improve air quality
- 3.4 Encourage land use, infrastructure, and human settlement patterns that improve resilience to climate change impacts and natural hazards

FIGURE 4. ECOSYSTEM SERVICES PROVIDED BY HEALTHY ECOSYSTEMS



Strategy 3.1 Protect and enhance Conservation and Recreation lands

The Conservation and Recreation regional land use designation is intended to help protect significant ecological and recreation assets throughout the region. Protection and management of these assets will ensure they remain productive, resilient, and adaptable, providing vital ecosystem services that support both humans and wildlife, while also safeguarding communities from climate change and natural hazard impacts.

Metro Vancouver will:

3.1.1 Direct the Greater Vancouver Sewerage and Drainage District (GVS&DD) to not allow connections to regional sewerage services to lands with a Conservation and Recreation regional land use designation. Notwithstanding this general rule, in the exceptional circumstances specified below, the Metro Vancouver Regional District (MVRD) Board will advise the GVS&DD Board that it may consider such a connection for existing development or for new development where, in the MVRD Board's opinion, that new development is consistent with the underlying Conservation and Recreation regional land use designation and where the MVRD Board determines either:

- a) that the connection to regional sewerage services is the only reasonable means of preventing or alleviating a public health or environmental contamination risk; or
- b) that the connection to regional sewerage services would have no significant impact on the strategy to protect lands with a Conservation and Recreation regional land use designation.

3.1.2 Implement the *Metro Vancouver Regional Parks Plan*, the *Regional Parks Land Acquisition 2050 Strategy*, and *Regional Greenways 2050*, and work collaboratively with member jurisdictions to identify, secure and enhance habitat and park lands, and buffer park and conservation areas from activities in adjacent areas.

3.1.3 For the Greater Vancouver Water District and the Greater Vancouver Sewerage and Drainage District, avoid ecosystem loss and fragmentation on lands with a Conservation and Recreation regional land use designation when developing and operating infrastructure, but where unavoidable, mitigate the impacts, including ecosystem restoration and striving for no net ecosystem loss.

3.1.4 Monitor ecosystem gains and losses on lands with a Conservation and Recreation regional land use designation and the Natural Resource Areas therein, as identified on Map 9.

3.1.5 Accept Regional Context Statements that protect lands with a Conservation and Recreation regional land use designation, and that meet or work towards Action 3.1.9.

3.1.6 Advocate to the Federal Government, the Province, utility companies, and TransLink to avoid ecosystem loss and fragmentation on lands within a Conservation and Recreation regional land use designation when developing and operating utility and transportation infrastructure, but where unavoidable, to mitigate the impacts, including ecosystem restoration and striving for no net ecosystem loss.

3.1.7 Advocate to the Province and its agencies to actively manage provincially-owned land within a Conservation and Recreation regional land use designation, and work with adjacent land owners to effectively buffer these lands, with the intent of minimizing negative impacts and enhancing ecosystem integrity and providing public recreational opportunities.

3.1.8 Advocate to the Federal Government and the Province to:

- a) recognize the Conservation and Recreation regional land use designation and ensure that their activities within or adjacent to these lands are consistent with the long-term intent of the land use designation; and
- b) consult and collaborate with all levels of government, including First Nations, and other stakeholders in the planning and management of lands with a Conservation and Recreation regional land use designation, including during the review of future natural resource extraction projects.

Member jurisdictions will:

3.1.9 Adopt Regional Context Statements that:

- a) identify Conservation and Recreation lands and their boundaries on a map generally consistent with Map 2;
- b) include policies that support the protection and enhancement of lands with a Conservation and Recreation land use designation, which may include the following uses:
 - i) drinking water supply areas;
 - ii) environmental conservation areas;
 - iii) wildlife management areas and ecological reserves;
 - iv) forests;
 - v) wetlands (e.g. freshwater lakes, ponds, bogs, fens, estuarine, marine, freshwater, and intertidal ecosystems);
 - vi) riparian areas (i.e. the areas and vegetation surrounding wetlands, lakes, streams, and rivers);
 - vii) ecosystems not covered above that may be vulnerable to climate change and natural hazard impacts, or that provide buffers to climate change impacts or natural hazard impacts for communities; and



viii) uses within those lands that are appropriately located, scaled, and consistent with the intent of the designation, including:

- major parks and outdoor recreation areas;
- education, research and training facilities, and associated uses that serve conservation and/or recreation users;
- commercial uses, tourism activities, and public, cultural, or community amenities;
- limited agricultural use, primarily soil-based; and
- land management activities needed to minimize vulnerability/risk to climate-related impacts.

c) include policies that:

- i) protect the integrity of lands with a Conservation and Recreation regional land use designation from activities in adjacent areas by requiring wildland interface planning, and introducing measures such as physical buffers or development permit requirements; and
- ii) encourage the consolidation of small parcels, and discourage subdivision and fragmentation of lands within a Conservation and Recreation regional land use designation.



Strategy 3.2 Protect, enhance, restore, and connect ecosystems

This Strategy establishes a collective vision for ecosystems across the region, recognizing the scientific evidence that ‘nature needs half’ of the land base to continue functioning for the benefit of all life and support human well-being. The vision can be realized in this region by working together to protect, enhance, and restore ecosystems, strategically linking green spaces into a region-wide network that sustains ecosystem services and movement of wildlife across the landscape. Actions to enhance tree canopy cover in urban areas will also improve community resilience by intercepting rainwater, moderating the urban heat island effect, and improving health outcomes.

Metro Vancouver will:

3.2.1 Implement the strategies and actions of the regional growth strategy that contribute to regional targets to:

- a) increase the area of lands protected for nature from 40% to 50% of the region’s land base by the year 2050; and
- b) increase the total tree canopy cover within the Urban Containment Boundary from 32% to 40% by the year 2050.

3.2.2 Implement the Metro Vancouver *Ecological Health Framework*, including relevant actions to:

- a) collect and maintain data, including the Sensitive Ecosystem Inventory, tree canopy cover, imperviousness, and carbon storage datasets; report on gains and losses and climate-related impacts on ecosystems; and share these datasets with member jurisdictions; and
- b) incorporate ecosystem services into Metro Vancouver’s corporate planning, asset management systems and investments, and provide regionally-appropriate guidance on methodologies, tools and decision-making frameworks.

3.2.3 Manage Metro Vancouver assets and collaborate with member jurisdictions, First Nations, and other agencies to:

- a) protect, enhance, and restore ecosystems as identified on Map 11 or more detailed local ecological and cultural datasets;
- b) identify ecosystems that may be vulnerable to climate change and natural hazard impacts as part of regional multi-hazard mapping in Action 3.4.2 a);
- c) identify a regional green infrastructure network that connects ecosystems and builds on existing local networks, while maximizing the climate adaptation, biodiversity, and human health benefits; and
- d) prepare Implementation Guidelines to support a regional green infrastructure network and to assist with the protection, enhancement, and restoration of ecosystems.

3.2.4 Work with local First Nations to:

- a) increase understanding of Indigenous ecological knowledge, and share information about environmental research, policy development, and planning best practices; and
- b) find joint stewardship and restoration opportunities on Metro Vancouver sites, and expand access to sustainably cultivate and harvest plants for cultural purposes.

3.2.5 Accept Regional Context Statements that advance the protection, enhancement, restoration, and connection of ecosystems in a regional green infrastructure network, and that meet or work towards Action 3.2.7.

3.2.6 Advocate to the Federal Government and the Province to:

- a) strengthen species-at-risk and ecosystem protection legislation to better protect critical habitat, and support restoration and biodiversity, in addition to convening a local government support network; and
- b) support the uptake of nature-based climate solutions, including those that protect or restore foreshore ecosystems.

Member jurisdictions will:**3.2.7** Adopt Regional Context Statements that:

- a) identify local ecosystem protection and tree canopy cover targets, and demonstrate how these targets will contribute to the regional targets in Action 3.2.1;
- b) refer to Map 11 or more detailed local ecological and cultural datasets and include policies that:
 - i) support the protection, enhancement, and restoration of ecosystems through measures such as land acquisition, density bonusing, development permit requirements, subdivision design, conservation covenants, land trusts, and tax exemptions;
 - ii) seek to acquire, restore, enhance, and protect lands, in collaboration with adjacent member jurisdictions and other partners, that will enable ecosystem connectivity in a regional green infrastructure network;
 - iii) discourage or minimize the fragmentation of ecosystems through low impact development practices that enable ecosystem connectivity; and
 - iv) indicate how the interface between ecosystems and other land uses will be managed to maintain ecological integrity using edge planning, and measures such as physical buffers, or development permit requirements.



c) include policies that:

- i) support the consideration of ecosystem services in land use decision-making and land management practices;
- ii) enable the retention and expansion of urban forests using various tools, such as local tree canopy cover targets, urban forest management strategies, tree regulations, development permit requirements, land acquisition, street tree planting, and reforestation or restoration policies, with consideration of climate resiliency;
- iii) reduce the spread of invasive species by employing best practices, such as the implementation of soil removal and deposit bylaws, development permit requirements, and invasive species management plans;
- v) increase green infrastructure along the Regional Greenway Network, the Major Transit Network, community greenways, and other locations, where appropriate, and in collaboration with Metro Vancouver, TransLink, and other partners; and
- iv) support watershed and ecosystem planning, the development and implementation of Integrated Stormwater Management Plans, and water conservation objectives.

Strategy 3.3 Encourage land use, infrastructure, and human settlement patterns that reduce energy consumption and greenhouse gas emissions, create carbon storage opportunities, and improve air quality

The tenets of the regional growth strategy are crucial for meeting the region's commitment to reduce greenhouse gas emissions and to reach carbon neutrality by the year 2050. As described in other strategies in the regional growth strategy, this can be achieved in three key ways: by supporting growth and development patterns that enable sustainable transportation options; by encouraging higher-density built forms and multi-unit developments which are typically more energy efficient than lower-density alternatives; and by reducing development pressures in areas that naturally store and sequester carbon (such as conservation and agricultural lands). To supplement these important policy actions from other goal areas in the regional growth strategy, Strategy 3.3 contains the region's greenhouse gas emissions reduction targets and associated policies.

Metro Vancouver will:

3.3.1 Implement the:

a) strategies and actions of the regional growth strategy that contribute to regional targets to reduce greenhouse gas emissions by 45% below 2010 levels by the year 2030 and to achieve a carbon neutral region by the year 2050; and

b) *Metro Vancouver Clean Air Plan, Climate 2050*, and other associated actions to help achieve the regional greenhouse gas emissions reduction targets in Action 3.3.1 a).

3.3.2 Work with the Federal Government, the Province, TransLink, member jurisdictions, First Nations, non-governmental organizations, energy utilities, the private sector, and other stakeholders, as appropriate, to:

a) monitor energy consumption, greenhouse gas emissions, and air quality related to land use, buildings, industry, agriculture, waste, transportation, and other emission sources, and consider lifecycle energy and emissions;

b) monitor and pursue opportunities to increase carbon storage in natural areas; and

c) promote best practices and develop guidelines to support local government actions that reduce energy consumption and greenhouse gas emissions, support a transition to clean, renewable energy (including electricity), create carbon storage opportunities, and improve air quality.

3.3.3 Work with TransLink, member jurisdictions, and health authorities to advocate that health impact assessments be conducted for major transportation projects and significant development projects with an aim to minimizing public exposure to traffic-related air contaminants.

3.3.4 Work with the Federal Government, the Province, and other stakeholders when conducting environmental assessments to reduce the environmental and health impacts related to regional air quality and greenhouse gas emissions.

3.3.5 Accept Regional Context Statements that encourage land use, infrastructure, and settlement patterns that reduce energy consumption and greenhouse gas emissions, improve air quality, create carbon storage opportunities, and that meet or work towards Action 3.3.7.

3.3.6 Advocate to the Federal Government and the Province to establish and support legislative and fiscal actions, that help the public and private sector maximize reductions in energy consumption and greenhouse gas emissions, and improve air quality, such as:

a) in the building sector,

- i) accelerating the transition of energy efficiency requirements in the BC Building Code to net-zero energy ready levels by 2032;
- ii) setting greenhouse gas and energy performance requirements for new and existing buildings;
- iii) increasing incentives and financing tools for new low-carbon, zero-emissions, and resilient buildings;
- iv) supporting large-scale building electrification;
- v) requiring benchmarking and energy labels for new and existing buildings;
- vi) supporting reductions in embodied emissions of buildings, and the increased use of low-carbon building products;
- vii) supporting programs, services and incentives for low-carbon upgrade options in rental buildings that benefit building owners and tenants;
- viii) incenting equitable transit-oriented development through policy and funding programs; and
- ix) supporting, where feasible and appropriate, energy recovery, renewable energy generation and zero-carbon district energy systems, and related transmission needs.

b) in the transportation sector,

- i) revising enabling legislation to allow regional road usage charging for the purposes of managing congestion and greenhouse gasses;
- ii) supporting electric vehicle charging in new and existing buildings through requirements and programs;
- iii) continuing to increase the amount of reliable and sustainable funding available for sustainable transportation infrastructure and low emission travel modes, such as active transportation and public transit; and
- iv) continuing to advance stringent standards for on-road vehicle emissions and fuel carbon content.

Member jurisdictions will:

3.3.7 Adopt Regional Context Statements that:

- a) identify how local land use and transportation policies will contribute to meeting the regional greenhouse gas reduction target of 45% below 2010 levels by the year 2030 and achieving a carbon neutral region by the year 2050;
- b) identify policies, actions and/or strategies that reduce energy consumption and greenhouse gas emissions, create carbon storage opportunities, and improve air quality from land use, infrastructure, and settlement patterns, such as:
 - i) existing building retrofits and construction of new buildings to meet energy and greenhouse gas performance guidelines or standards (e.g. BC Energy Step Code, passive design), the electrification of building heating systems, green demolition requirements, embodied emissions policies, zero-carbon district energy systems, and energy recovery and renewable energy generation technologies, such as solar panels and geoechange systems, and zero emission vehicle charging infrastructure;

- ii) community design, infrastructure, and programs that encourage transit, cycling, rolling and walking; and
- c) focus infrastructure and amenity investments in Urban Centres and Frequent Transit Development Areas, and at appropriate locations along Major Transit Growth Corridors.

TransLink will:

3.3.8 Support regional air quality objectives and greenhouse gas emission reduction targets by advancing policy and infrastructure to support the aggressive transition of the ground-based vehicle fleet to zero-emissions, and by transitioning the entire transit fleet to one that utilizes low-carbon fuels.

3.3.9 In collaboration with Metro Vancouver and member jurisdictions, establish a definition of major development proposals, which are referenced in the *South Coast British Columbia Transportation Authority Act*, to support the objective of concentrating Major Trip-Generating uses in areas well served by transit.



Strategy 3.4 Encourage land use, infrastructure, and human settlement patterns that improve resilience to climate change impacts and natural hazards

Climate change is expected to impact Metro Vancouver through warmer temperatures, decreased snowpack, sea level rise, longer summer drought periods, and increased precipitation in the fall, winter, and spring. The region is also exposed to multiple natural hazards, many of which are worsened by climate change. Where and how the region accommodates growth determines the degree to which communities and infrastructure are exposed to these risks. While efforts need to be made to ensure that all populations are well-equipped to address these challenges, proactive and collaborative planning can minimize risks by encouraging growth and development in more resilient areas, where feasible, and taking measures to ensure existing communities and infrastructure are resilient to current and future risks.

TABLE 5. MAJOR NATURAL HAZARDS AND CLIMATE CHANGE IMPACTS AFFECTING METRO VANCOUVER

NATURAL HAZARDS	RELATED CLIMATE CHANGE IMPACTS
Earthquakes	
Tsunamis	Sea level rise
Landslides	More precipitation (fall, winter, and spring)
Floods (pluvial, coastal, riverine)	More precipitation (fall, winter, and spring) Sea level rise Decrease in snowpack
Wildfires	Longer drought periods (summer) Warmer temperatures and extreme heat events Reduced air quality
Erosion	Sea level rise More precipitation (fall, winter, and spring)
Subsidence	Sea level rise
Windstorms and other extreme weather events	Sea level rise More precipitation (fall, winter, and spring)

Metro Vancouver will:

3.4.1 Incorporate climate change and natural hazard risk assessments into the planning and location of Metro Vancouver utilities, assets, operations, and other critical infrastructure.

3.4.2 Work with the Integrated Partnership for Regional Emergency Management, the Federal Government, the Province, First Nations, TransLink, member jurisdictions, adjacent regional districts, and other stakeholders, as appropriate, to:

- a) collaboratively develop and share information and data related to hazards, risks, and vulnerabilities in the Metro Vancouver region, which may include preparing a regional multi-hazard map, and identifying and coordinating priority actions, implementation strategies, and funding mechanisms;
- b) plan for climate change impacts and natural hazard risks when extending utilities and transportation infrastructure that support development;
- c) support the integration of emergency management, utility planning, and climate change adaptation principles in land use plans, transportation plans, and growth management policies;
- d) research and promote best practices and develop guidelines to support resilience to the impacts of climate change and natural hazards as it relates to planning and development;
- e) support regional flood management approaches, such as the implementation of the Lower Mainland Flood Management Strategy; and
- f) research and share information related to the impacts of climate change and natural hazards on vulnerable populations, and focus resilience actions on equitable outcomes.

3.4.3 Accept Regional Context Statements that encourage land use, settlement patterns, transportation and utility infrastructure which improve the ability to withstand climate change impacts and minimize natural hazard risks, and that meet or work towards Actions 3.4.5, 3.4.6, 3.4.7, and 3.4.8.

3.4.4 Advocate to the Federal Government and the Province that they:

- a) review and improve existing provincial legislation and guidelines regarding flood hazard management at the local level, encourage the adoption of local flood hazard policies and bylaws, and implement appropriate preparatory actions to address the long-term implications of sea level rise on infrastructure planning, construction, and operations;
- b) incorporate resilience considerations into building codes and standards;
- c) modernize the provincial *Emergency Program Act* and associated regulations with requirements for land use planning, and consider land use implications in the development of climate change adaptation strategies; and
- d) provide guidelines, programs, funding, and timely data and information to support regional and local planning for climate change impacts and natural hazards.

Member jurisdictions will:

3.4.5 Adopt Regional Context Statements that include policies that:

- a) minimize risks associated with climate change and natural hazards in existing communities through tools such as heat and air quality response plans, seismic retrofit policies, and flood-proofing policies; and
- b) discourage new development in current and future hazardous areas to the extent possible through tools such as land use plans, hazard-specific Development Permit Areas, and managed retreat policies, and where development in hazardous areas is unavoidable, mitigate risks.

3.4.6 Incorporate climate change and natural hazard risk assessments into planning and location decisions for new municipal utilities, assets, operations, and community services.

3.4.7 Integrate emergency management, utility planning, and climate change adaptation principles when preparing land use plans, transportation plans, and growth management policies.

3.4.8 Adopt appropriate planning standards, guidelines, and best practices related to climate change and natural hazards, such as flood hazard management guidelines and wildland urban interface fire risk reduction principles.



GOAL
4

Provide Diverse and Affordable Housing Choices

Maple Ridge

Goal 4: Provide Diverse and Affordable Housing Choices

A diverse and affordable housing stock is critical to accommodating growth and supporting the region's population. Communities across Metro Vancouver are experiencing significant housing pressures paired with accelerating housing costs in the rental and ownership markets. Strong demand for rental housing is causing low rental vacancy rates and rising rental costs, and at the same time, existing affordable rental housing stock is aging and in need of maintenance and renewal.

High land and construction costs make the delivery of new rental units that are affordable to low and moderate income households challenging, particularly in proximity to transit. Lower income households earning less than 80% of the Regional Median Household Income, who make up the majority of renters in the region, are being forced to look further afield for housing that is affordable and meets their needs. Additionally, there is a shortage of permanent, affordable, and supportive housing units to meet the acute housing needs of vulnerable populations including those experiencing or at risk of homelessness.

In response to these challenges, a diverse mix of housing types and tenures that respond to an aging population, changing family and household characteristics, and a range of household incomes across the region is needed. Having housing choices means that all residents can find adequate and suitable housing that is affordable based on their household income, and that meets their unique needs and preferences. For the purpose of implementing *Metro 2050's* policies, "affordable housing" is defined as housing that is affordable to households earning up to 120% of the Regional Median Household

Income. Goal 4 encourages diverse and affordable housing choices as a means to provide opportunities for residents to live in their desired community or neighbourhood, close to employment, transit, schools, parks, amenities and important social connections.

The first strategy identifies actions to promote an adequate supply of housing to meet existing and future housing needs across the housing continuum. Supporting housing policy efforts across the region through housing strategies or action plans that work towards achieving the number and type of housing units required to meet the needs identified in local housing needs reports or assessments is critical to this strategy.

The second strategy encourages policies and actions that expand rental housing supply, mitigate or limit the net loss of existing purpose-built rental and non-market housing stock, and protect renter households. The strategy also advocates for measures and incentives to stimulate the supply of below-market and market rental housing, particularly in proximity to transit.

The third strategy advocates for capital and operating funding to support the non-profit housing sector and the overall provision of permanent, affordable, and supportive housing. The strategy also requests ongoing housing and income benefits to supplement the high cost of rent in the private market. It recognizes that housing strategies and action plans must be aligned with plans to address homelessness. All levels of government have a role to play in creating opportunities for diverse housing options, and senior government funding is essential to meeting the housing needs of these populations.

A commitment to social equity prioritizes planning and decision-making processes that ensure the housing needs of the region's residents and populations that are housing insecure are met, so that everyone can access safe, quality, affordable, and climate resilient housing. Furthermore, it means intentionally seeking to prevent economic, health or access disparities in the housing market that are primarily experienced by lower income populations, renter households, and individuals experiencing or at risk of homelessness. Essential to this commitment is examining and modifying any systemic and institutional practices and policies that may limit the quality, affordability, accessibility, and equitable distribution of housing that is essential to creating a livable and resilient region for current and future generations.

Strategies to achieve this goal are:

- 4.1 Expand the supply and diversity of housing to meet a variety of needs
- 4.2 Expand, retain, and renew rental housing supply and protect tenants
- 4.3 Meet the housing needs of lower income households and populations experiencing or at risk of homelessness



Strategy 4.1 Expand the supply and diversity of housing to meet a variety of needs

Housing diversity refers to the range of housing types and tenures required to meet the needs of households of all sizes, incomes, ages, and abilities. Expanding the supply and diversity of housing that meets a variety of needs across the housing continuum increases affordability, social equity, and resilience in the region.

Metro Vancouver will:

4.1.1 Assist member jurisdictions in developing housing strategies or action plans by providing analysis on regional demographics, household characteristics, and market conditions, and work with member jurisdictions to review and refine local housing priorities, policies, and housing needs reports or assessments in the context of this analysis.

4.1.2 Monitor and report on the progress of member jurisdiction housing strategies or action plans in achieving the number and type of housing units required to meet current and anticipated housing needs, as determined in the member jurisdiction's housing needs report or assessment.

4.1.3 Support member jurisdictions in the development and delivery of housing policies and actions by compiling, analyzing, and communicating data, preparing implementation guidelines and best practices research, and convening discussions on issues of common interest.

4.1.4 Accept Regional Context Statements that describe how local plans, strategies, and policies will achieve diverse and affordable housing options, expand the supply and diversity of housing to meet a variety of needs along the housing continuum, and meet or work towards Actions 4.1.8 and 4.1.9.

4.1.5 Advocate to the Province to create new enabling legislation that provides the ability for local governments to mandate affordable housing through inclusionary zoning powers.

4.1.6 Advocate to the Province to provide funding to support member jurisdictions in the development and update of housing strategies or action plans that are aligned with housing needs reports or assessments.

4.1.7 Advocate to the Province for expanded funding maximums and eligibility that support Treaty and Non-Treaty First Nations in developing housing needs reports or assessments to ensure a complete regional and provincial understanding of housing needs, and to help inform local plans, policies, and development decisions.



Member jurisdictions will:**4.1.8** Adopt Regional Context Statements that:

- a) indicate how they will work towards meeting estimated future housing needs and demand, as determined in their housing needs report or assessment;
- b) articulate how local plans and policies will meet the need for diverse (in tenure, size, and type) and affordable housing options;
- c) identify policies and actions that contribute to the following outcomes:
 - i) increased supply of adequate, suitable, and affordable housing to meet a variety of needs along the housing continuum;
 - ii) increased supply of family-friendly, age-friendly, and accessible housing;
 - iii) increased diversity of housing tenure options, such as attainable homeownership, rental, co-op housing, rent-to-own models, and cohousing;
 - iv) increased density and supply of diverse ground-oriented and infill housing forms in low-density neighbourhoods, such as duplex, four-plex, townhouse, laneway/coach houses, and apartments, particularly in proximity to transit;
 - v) integration of land use and transportation planning such that households can reduce their combined housing and transportation costs;

- vi) increased social connectedness in multi-unit housing;
- vii) integrated housing within neighbourhood contexts and high quality urban design; and
- viii) existing and future housing stock that is low carbon and resilient to climate change impacts and natural hazards.

4.1.9 Prepare and implement housing strategies or action plans that:

- a) are aligned with housing needs reports or assessments, and reviewed or updated every 5-10 years to ensure that housing strategies or action plans are based on recent evidence and responsive to current and future housing needs;
- b) are based on an assessment of local housing market conditions, by tenure, including assessing housing supply, demand, and affordability;
- c) identify housing priorities, based on the assessment of local housing market conditions, household incomes, changing population and household demographics, and key categories of local housing need, including specific statements about special needs housing and the housing needs of equity-seeking groups; and
- d) identify implementation measures within their jurisdiction and financial capabilities, including actions set out in Action 4.1.8.

Strategy 4.2 Expand, retain, and renew rental housing supply and protect tenants

Purpose-built rental housing is a critical component of the housing continuum, offering security of tenure to the many residents who cannot or choose not to purchase a home. The private rental market also forms a large part of the region's overall rental housing stock, and provides additional rental housing options such as secondary suites, laneway/coach houses, and rented condominiums. Increasing the rental housing supply, retaining existing rental housing, and renewing aging rental housing while minimizing the impacts of redevelopment and renovation on existing tenants preserves affordability and increases opportunities for everyone in the region to access an energy efficient home they can afford.

Metro Vancouver will:

4.2.1 Monitor the purpose-built rental housing stock in the region, and report on rental housing supply gaps by income level and number of bedrooms.

4.2.2 Implement the *Metro Vancouver Housing 10-Year Plan* (2019) and seek opportunities for Metro Vancouver Housing to partner with member jurisdictions and others to expand affordable rental housing across the region.

4.2.3 Set a regional target of 15% affordable rental housing in new and redeveloped housing development within Urban Centres and Frequent Transit Development Areas, and monitor progress towards the target every 5 years.

4.2.4 Accept Regional Context Statements that describe how local plans, strategies, and policies will increase rental housing supply while protecting tenants, and that meet or work towards Actions 4.2.7 and 4.2.8.

4.2.5 Advocate to the Federal Government and the Province to provide measures and incentives to stimulate private sector investment in rental housing to help achieve the current and anticipated need for rental housing units, as determined by housing needs reports or assessments.

4.2.6 Advocate to the Province for expanded measures to address housing speculation and vacant homes as a means of increasing long-term rental options, and bringing unoccupied housing into the secondary rental market.

Member jurisdictions will:**4.2.7** Adopt Regional Context Statements that:

- a) indicate how they will, within their local context, work towards the regional target of 15% affordable rental housing in redeveloped and new housing development within Urban Centres and Frequent Transit Development Areas;
- b) articulate how local plans and policies will mitigate impacts on renter households, particularly during redevelopment or densification of Urban Centres and Frequent Transit Development Areas;
- c) identify the use of regulatory tools that protect and preserve rental housing;
- d) identify policies and actions that contribute to the following outcomes:
 - i) increased supply of affordable rental housing in proximity to transit and on publicly-owned land;
 - ii) increased supply of market and below-market rental housing through the renewal of aging purpose-built rental housing and prevention of net rental unit loss;

- iii) protection and renewal of existing non-market rental housing;
- iv) mitigated impacts on renter households due to renovation or redevelopment, and strengthened protections for tenants; and
- v) reduced energy use and greenhouse gas emissions from existing and future rental housing stock, while considering impacts on tenants and affordability.

4.2.8 Prepare and implement housing strategies or action plans that:

- a) encourage the supply of new rental housing and mitigate or limit the loss of existing rental housing stock;
- b) encourage tenant protections and assistance for renter households impacted by renovation or redevelopment of existing purpose-built rental housing; and
- c) cooperate with and facilitate the activities of Metro Vancouver Housing under Action 4.2.2.



Strategy 4.3 Meet the housing needs of lower income households and populations experiencing or at risk of homelessness

Lower income households and populations experiencing or at risk of homelessness have the most acute housing needs in the region. Through collaboration with the Federal Government and the Province, efforts to support the provision of non-market housing can ensure equitable access to housing for all. Meeting the housing needs of the most vulnerable in our communities also provides a number of co-benefits including positive health outcomes and improved social cohesion.

Metro Vancouver will:

4.3.1 Accept Regional Context Statements that describe how local plans, strategies, and policies will meet the specific housing needs of lower income households, including the existing housing needs of populations experiencing or at risk of homelessness, and that meet or work towards Actions 4.3.7 and 4.3.8.

4.3.2 Collaborate with member jurisdictions, non-profit housing and homelessness services providers, and the Federal Government and the Province on coordinated actions to address regional homelessness.

4.3.3 Advocate to the Federal Government and the Province for measures and incentives to stimulate non-market rental supply and capital and operating funding to support the construction of permanent, affordable, and supportive housing across the region.

4.3.4 Advocate to the Federal Government and the Province to provide capital and operating funding to meet the current and anticipated housing needs of lower income households and populations experiencing or at risk of homelessness, as determined by housing needs reports or assessments.

4.3.5 Advocate to the Federal Government and the Province for portfolio-based, long-term funding sources for non-profit housing providers that shift away from short-term, project-based funding models as a means of ensuring the sustainability of the non-profit housing sector.

4.3.6 Advocate to the Federal Government and the Province to provide and expand ongoing rent supplements and housing benefits, and to increase

the shelter portion of income assistance to ensure that lower income households and populations experiencing or at risk of homelessness can afford suitable and adequate housing.

Member jurisdictions will:

4.3.7 Adopt Regional Context Statements that:

- a) indicate how they will collaborate with the Federal Government, the Province, and other partners, to assist in increasing the supply of permanent, affordable, and supportive housing units; and
- b) identify policies and actions that partner with other levels of government and non-profit organizations to create pathways out of homelessness and contribute to meeting the housing and support needs of populations experiencing or at risk of homelessness.

4.3.8 Prepare and implement housing strategies or action plans that:

- a) identify opportunities to participate in programs with other levels of government to secure additional housing units to meet the housing needs of lower income households;
- b) identify strategies to increase community acceptance and communicate the benefits of affordable and supportive housing development; and
- c) are aligned with or integrate plans to address homelessness, and identify strategies to reduce the total number of households that are in core housing need and populations experiencing or at risk of homelessness.

GOAL
5

Support Sustainable Transportation Choices



North Vancouver City

Goal 5: Support Sustainable Transportation Choices

Land uses influence travel patterns and transportation systems, in turn, affect land use and development. Achieving the goals of *Metro 2050* requires the alignment of land use and transportation strategies. Accessible and sustainable transportation choices are supported by strategies for a compact urban area, with transit-oriented development patterns that focus growth in Urban Centres, Major Transit Growth Corridors and Frequent Transit Development Areas. This transit-oriented pattern of growth helps reduce vehicle use, traffic congestion, energy consumption and greenhouse gas emissions from on-road sources while fostering transit ridership and active transportation. It provides the region's residents with resilient mobility options, a cleaner environment, and opportunities to reduce household transportation costs.

The first strategy identifies actions to increase the proportion of trips by transit, cycling, walking, and other alternatives to single occupancy vehicles. *Transport 2050's* Major Transit Network will be critical in reinforcing *Metro 2050's* network of Urban Centres and Frequent Transit Development Areas. *Metro 2050* aligns these locations for growth with planned transit connections to provide clearer expectations about future growth and investment. Aligning land use and transportation in this way enables a diversity of transit-oriented affordable housing, shorter trips and greater access to opportunity.

The second strategy recognizes the fundamental role that the Major Road Network, Regional Truck Route Network, provincial highways, and federal transportation facilities play in shaping regional growth, moving people and goods within the region, and connecting the region with intra-provincial, national and international destinations. The strategy advocates for active management of the existing and planned capacity of the road network and the demands put upon it to minimize the need for capital-intensive roadway expansion in the future. Further, rail and marine transportation have the potential to play a larger role in the future for goods movement, so protecting rail rights-of-way and access points to waterways today is critical to preserving transportation options in the future. This strategy also anticipates the changing nature of industry and digitalization of commerce.

Metro Vancouver works in partnership with member jurisdictions, TransLink, Port of Vancouver, airport authorities, the Federal Government, and the Province to coordinate decision-making in support of the regional growth strategy. TransLink prepares and implements strategic transportation plans for roads, transit, active transportation, and goods movement, among other regional transportation programs. TransLink is also responsible for the region's long-term transportation strategy, *Transport 2050*. *Metro 2050* and *Transport 2050* comprise the region's long-term vision for the land use and transportation system. The Province prepares provincial highway and transit plans which help to guide the development of regional transportation plans. Both the Federal Government and the Province play significant roles in funding regional transit and goods movement infrastructure. Metro Vancouver advocates for reductions in transportation-related greenhouse gas emissions and common air contaminants.



A commitment to equity includes creating a more equitable land use and transportation system across the region that will enhance social cohesions and connectedness to benefit all communities; mitigate the environmental, economic, and social risks associated with goods and service movement; and ultimately, provide affordable and accessible transportation that creates quality jobs, promotes safe and inclusive communities, and focuses on results that benefit all.

Strategies to achieve this goal are:

- 5.1 Coordinate land use and transportation to encourage transit, multiple-occupancy vehicles, cycling and walking
- 5.2 Coordinate land use and transportation to support the safe and efficient movement of vehicles for passengers, goods, and services

Strategy 5.1 Coordinate land use and transportation to encourage transit, multiple-occupancy vehicles, cycling and walking

The coordination of land use and transportation supports positive region building by ensuring communities are connected to sustainable transportation networks while investing in transportation improvements for existing neighbourhoods. Over time, this creates a regional growth pattern where destinations are closer together and more accessible for all, with less need to drive. The benefits of this transit-oriented growth pattern include: reduced greenhouse gas emissions; formation of complete, compact communities; more physical activity and improved health; lower transportation costs; and a more resilient economy with better access to job opportunities, diverse and affordable housing, and community amenities.

Metro Vancouver will:

5.1.1 Provide advice and input into TransLink's regional transportation system, planning, and demand management strategies through the provision of land use, growth management and air quality information and forecasts, and the evaluation of land use and vehicle emissions impacts.

5.1.2 Establish the following objectives for the regional transportation system:

- a) support the regional land use framework and strategy, as set out in Strategy 1.2;
- b) reduce energy consumption and greenhouse gas emissions while improving air quality, as set out in Strategy 3.3; and
- c) ensure the safe and efficient movement of vehicles for passengers, goods, and services, as set out in Strategy 5.2.

5.1.3 Encourage TransLink and member jurisdictions, in support of Action 5.1.2 (a), to prioritize the expansion of transit services between Urban Centres, according to the following priorities:

- Priority 1: Major Transit Network
- Priority 2: Frequent Transit Network
- Priority 3: Local Transit Networks

5.1.4 Collaborate with TransLink, in support of Action 5.1.2 (b), on the achievement of regional priorities to increase the share of trips made by transit, shared mobility options, cycling, and walking, and reduce energy consumption and air emissions from on-road transportation sources. Metro Vancouver will support the development of strategic transportation plans to achieve this objective, within TransLink's mandate to plan and manage the regional transportation system.

5.1.5 In collaboration with other levels of government, implement the Regional Greenway Network, as shown in Map 10.

5.1.6 Collaborate with member jurisdictions and TransLink to jointly develop a regional parking strategy that:

- a) provides guidance to inform municipal parking requirements;
- b) considers local needs through customized guidance for different land use and transportation contexts; and
- c) seeks to right-size the supply of parking in the region, make more efficient use of the limited land supply, and improve housing and transportation affordability.

5.1.7 Accept Regional Context Statements that identify policies and actions that coordinate land use and transportation planning to support transit, shared mobility options, cycling, and walking, that support the transition to zero-emission vehicles, and that meet or work towards Action 5.1.14.

5.1.8 Advocate to the Federal Government and the Province, in collaboration with TransLink and member jurisdictions, to evaluate and develop measures to mitigate the potential negative impacts on the region's Industrial, Agricultural, and Conservation and Recreation lands when planning transportation infrastructure, including roadways, railways and rapid transit systems.

5.1.9 Advocate for the Province to work with TransLink, adjacent regional districts, and Metro Vancouver in coordinating transportation planning and infrastructure projects in the Lower Mainland.

5.1.10 Advocate to the Federal Government and the Province to provide increased reliable and sustainable funding for expanding, and operating:

- a) the regional transit system;
- b) the Regional Cycling Network (i.e. the Major Bikeway Network for utility cycling trips and Regional Greenway Network for recreational travel); and
- c) municipal pedestrian infrastructure.

5.1.11 Advocate to railway companies, when developing their plans and strategies for rail corridors and facilities in the region, that they coordinate and consult with member jurisdictions, TransLink, Port of Vancouver, and Metro Vancouver to ensure that they are compatible with and support the regional transportation and land use planning goals of the regional growth strategy.

5.1.12 Advocate to member jurisdictions to engage with impacted municipalities and First Nations when developing plans, policies, and programs related to new mobility, shared mobility, and inter-jurisdictional connectivity.

5.1.13 Advocate to the Province and TransLink to co-locate active transportation facilities with rapid transit infrastructure and include delivery of such facilities within the scope of rapid transit projects.

Member jurisdictions will:

5.1.14 Adopt Regional Context Statements that identify land use and transportation policies and actions that:

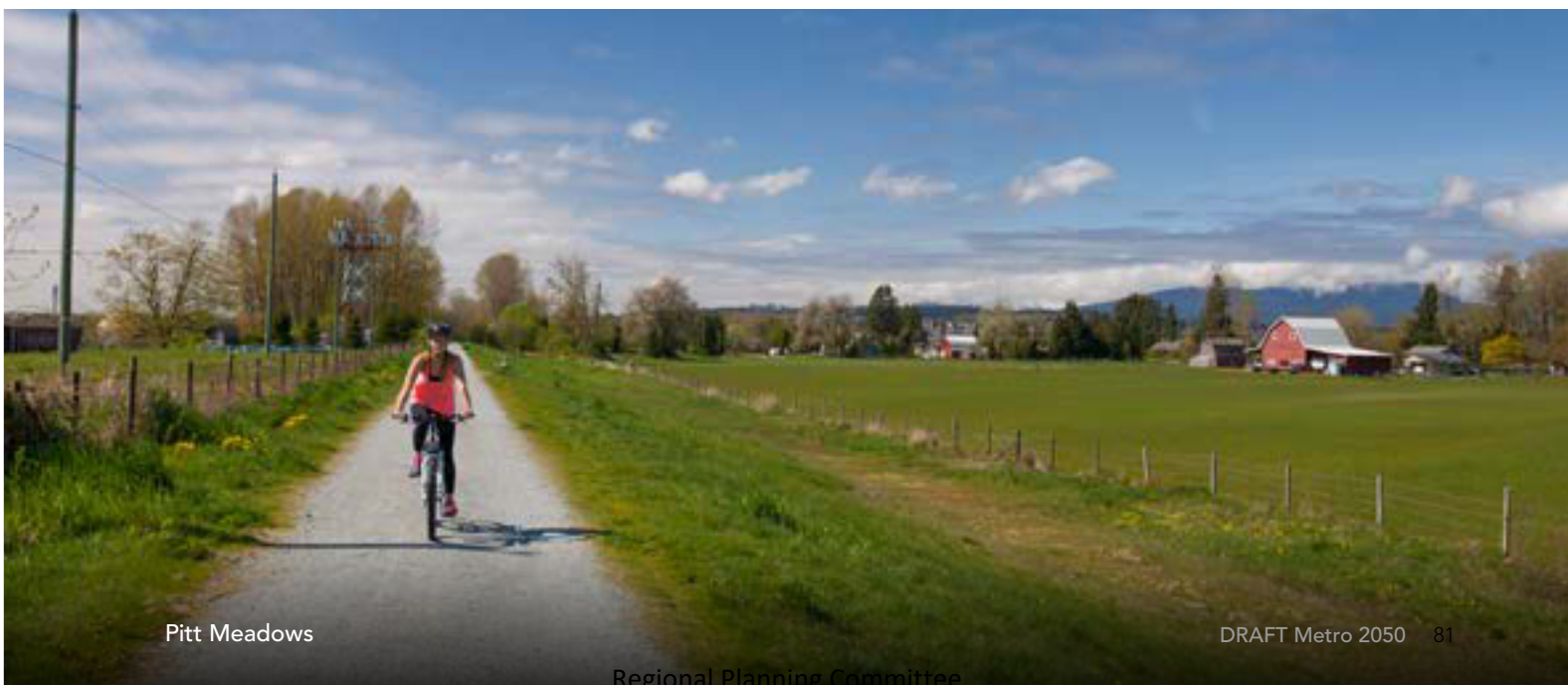
- a) coordinate to encourage a greater share of trips made by transit, shared mobility options, cycling, and walking;
- b) support the development and implementation of transportation demand management strategies, such as: parking pricing and supply measures, transit priority measures, end-of-trip facilities for active transportation, and shared mobility services;
- c) manage and enhance municipal infrastructure in support of transit, multiple-occupancy vehicles, cycling, and walking;
- d) support the transition to zero-emission vehicles;
- e) support implementation of the Regional Greenway Network and Major Bikeway Network, as identified in Map 10; and
- f) support implementation of local active transportation facilities that connect to the Regional Greenway Network or Major Bikeway Network.

TransLink will:

5.1.15 In support of coordinated land use and transportation to encourage transit, multiple-occupancy vehicles, cycling and walking:

- a) prepare and implement strategic transportation plans that support focused growth in Urban Centres and Frequent Transit Development Areas, while avoiding known unmitigated flood and other natural hazard risk areas;

- b) provide Metro Vancouver with adequate opportunity to provide input into TransLink's strategic planning and decision-making processes that would affect the achievement of the objectives and priorities as set out in Action 5.1.2;
- c) establish performance measures and/or targets that support an increased share of trips made by transit, shared mobility, zero-emission vehicles, cycling and walking, and the associated reductions in air emissions from on-road transportation sources, and monitor progress towards achieving these targets;
- d) prepare and implement regional transportation system and demand management strategies, such as: ridesharing programs, transportation user-based pricing, and regulation for ride-hailing services and other emerging mobility technologies;
- e) support the development of safe and comfortable regional cycling networks serving Urban Centres, Frequent Transit Development Areas, and other areas of high potential for utility and/or recreational cycling;
- f) work with the Province, the Integrated Partnership for Regional Emergency Management, and member jurisdictions to evaluate the potential impacts of climate change and known unmitigated natural hazards on rapid transit alignments, station locations, and associated transportation infrastructure;
- g) explore methods to support affordable housing through existing and future revenue sources, such as: continuing the reduction or waiver of the TransLink Development Cost Charge on certain types of not-for-profit rental housing; seeking partnership opportunities with the Province and others to support delivering affordable housing; seeking commitments on the development of affordable housing policies and targets in partnership agreements required for major transportation projects; and considering the impacts of proposed projects on affordable housing when evaluating future rapid transit investments;
- h) continue developing active transportation and transit networks as a means to create redundancy in low-cost, low-emission travel options;
- i) work with the Province, member jurisdictions, and others, to implement both the Regional Greenway Network and the Major Bikeway Network, as identified in Map 10; and
- j) continue to identify viable new opportunities to create and improve transit and active transportation linkages to and within First Nations communities.



Strategy 5.2 Coordinate land use and transportation to support the safe and efficient movement of vehicles for passengers, goods, and services

Roadways, truck routes, provincial and federal highways, port terminals, rail corridors, navigable waterways, airports, transit routes and active transportation facilities play a vital role in supporting the regional economy, shaping regional growth, and connecting Metro Vancouver to other regions. Making the most of the goods movement system requires protecting industrial lands and transportation rights-of-way, minimizing community impacts, reducing greenhouse gas emissions, and seeking demand-management alternatives to infrastructure expansion, particularly for roadway expansion.

Metro Vancouver will:

5.2.1 Support implementation of the Regional Goods Movement Strategy and continue to participate in the Greater Vancouver Urban Freight Council.

5.2.2 Accept Regional Context Statements that identify coordinated land use and transportation policies and actions in support of the safe and efficient movement of vehicles for passengers, goods and services and that meet or work towards Action 5.2.6.

5.2.3 Support the ongoing efforts of the Federal Government, the Province, and the Port of Vancouver to reduce truck traffic on local roads by exploring: the more effective use of the existing multi-modal transportation network on a 24-hour basis; expanding short-sea shipping; moving more containers by rail directly from marine container terminals to transload facilities; and enhancing co-location of import and export transload facilities.

5.2.4 Advocate to the Province, TransLink, and neighbouring regional districts to request that the following elements are considered when contemplating future expansion of private vehicle capacity on major roads, highways, and crossings:

- a) transportation demand management and active transportation strategies as alternatives to, or as integral with, such capacity expansion;
- b) the negative impacts on the achievement of regional greenhouse gas emission reduction targets and air quality objectives;
- c) the negative impacts on the implementation of the regional land use framework and strategy as set out in Strategy 1.2;
- d) the long-term effects of induced demand, ongoing maintenance requirements, life-cycle costs, and opportunity costs;
- e) the negative impacts on ecosystems, as identified in Map 11; and
- f) the ability of the transportation system to withstand known unmitigated climate change impacts and natural hazards.

5.2.5 Advocate to the Federal Government and the Province to support the safe, reliable, and efficient movement of vehicles for passengers, goods, and services through:

- a) policies and regulations to protect rail rights-of-way, truck routes, transit routes, and access points to navigable waterways;
- b) policies and regulations to protect communities and habitats by mitigating air quality impacts;
- c) local government funding programs for applied research into transportation system and demand management-related technologies, policies, and regulations to optimize the low-carbon movement of vehicles for passengers, goods, and services, in particular to and from airports, ports, intermodal goods handling facilities, last mile delivery, and distribution centres for e-commerce;
- d) local government funding programs for survey instruments to obtain timely and comprehensive data on the travel patterns of residents, workers, and goods and service vehicles travelling inter- and intra-regionally; and
- e) local government funding programs and regulations to encourage the transition to zero-emissions options for medium- and heavy-duty vehicles.

Member jurisdictions will:

5.2.6 Adopt Regional Context Statements that:

- a) identify routes on a map for the safe and efficient movement of goods and service vehicles to, from, and within Urban Centres, Frequent Transit Development Areas, Major Transit Growth Corridors, Industrial, Employment and Agricultural lands, ports, airports, and international border crossings;
- b) identify land use and related policies and actions that support the optimization and safety of goods movement via roads, highways, railways, aviation, and short sea shipping;
- c) support the development of local and regional transportation system management strategies, such as the provision of information to operators of goods and service vehicles for efficient travel decisions, management of traffic flow using transit priority measures, coordinated traffic signalization, and lane management;
- d) identify policies and actions that support the protection of rail rights-of-way, truck routes, and access points to navigable waterways in order to reserve the potential for goods movement;
- e) identify policies and actions to mitigate public exposure to unhealthy levels of noise, vibration, and air pollution associated with the Major Road Network, Major Transit Network, railways, truck routes, and Federal / Provincial Highways; and





f) identify policies and actions that anticipate the land and infrastructure requirements for goods movement and drayage, such as truck parking, zero-emission vehicle charging infrastructure, and e-commerce distribution centres, and mitigate any negative impacts of these uses on neighbourhoods.

TransLink will:

5.2.7 Support the safe and efficient movement of vehicles for passengers, goods and services in consideration of the regional land use framework and strategy, as set out in Strategy 1.2, by:

a) managing and maintaining the Major Road Network and Regional Truck Route Network;

b) implementing the Regional Goods Movement Strategy;

c) preparing and implementing regional transportation system and demand management strategies; and

d) continuing to identify viable new opportunities to create and improve active transportation and transit linkages between the region's Industrial and Employment lands and the regional labour force.

5.2.8 Support the protection of rail rights-of-way, truck routes, and access points to navigable waterways to preserve the potential for goods movement, in consideration of the potential impacts on air quality, habitat, and communities.

5.2.9 Seek to minimize negative impacts from within-and-through passenger, goods, and service vehicle movement on the environment and public health within the Lower Fraser Valley Airshed.

F. Implementation

6.1 Regional Growth Strategy Implementation Framework

6.1.1 Metro Vancouver and affected local governments will implement the regional growth strategy within a collaborative decision-making framework. This framework is based on provisions set out in the *Local Government Act* and in recognition by Metro Vancouver and affected local governments that collaborative decision-making is necessary in order to achieve the vision and goals laid out in the regional growth strategy.

The regional growth strategy has been designed so that the more regionally significant an issue, the higher the degree of regional federation involvement in decision-making, and conversely, the less regionally significant an issue, the less Metro Vancouver involvement there is. This approach is intended to provide appropriate consideration of land use planning decisions made within Metro Vancouver and member jurisdictions.

This collaborative decision-making process applies to:

- acceptance by affected local governments of the initial regional growth strategy and subsequent amendments;
- acceptance by Metro Vancouver of municipal Regional Context Statements and subsequent amendments;
- ongoing regional growth strategy and Regional Context Statement administration and procedures;
- implementation guidelines.



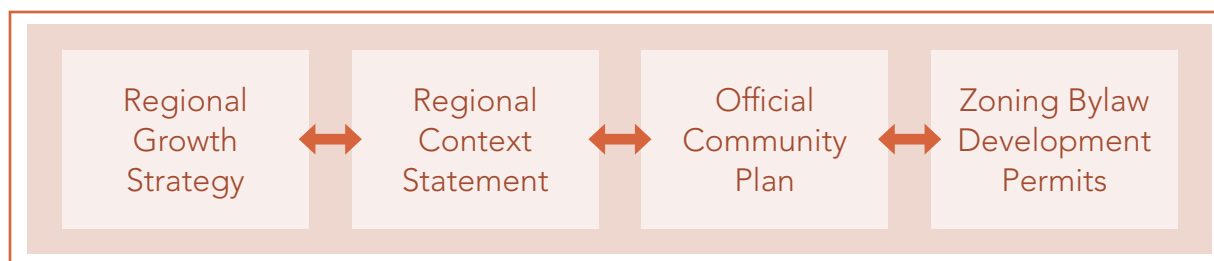
TABLE 6: REGIONAL GROWTH STRATEGY IMPLEMENTATION FRAMEWORK*

PRINCIPLES	EXAMPLES	PROCEDURES
Fundamental change to core goals or strategies	Amend the goals or strategies; delete an entire goal; change the amendment process	Type 1: 50% + 1 Board vote and acceptance by all affected local governments
Region-wide significance for non-urban designations	Change Urban Containment Boundary or Agricultural designation	Type 2: 2/3 Board vote
Region-wide significance for urban designations	Large scale Industrial area designation change	Type 3: 50% + 1 Board vote
Small scale urban designation changes	Small scale Industrial area designation change, changes to Urban Centre boundaries	Official Community Plan change only, no requirement to amend Regional Context Statement
Local planning matter with no regional significance	Rezoning consistent with Official Community Plan	Official Community Plan matters, no Regional Context Statement reference required

*Table 6 for reference only

6.2 Regional Context Statements

6.2.1 Within two years of the Metro Vancouver Regional District (MVRD) Board's adoption of a regional growth strategy or of a Type 1 amendment, each member jurisdiction must include, or update, in its Official Community Plan, and submit to the MVRD Board for acceptance, a Regional Context Statement. A member jurisdiction will submit its Regional Context Statement to the MVRD Board for acceptance after the member jurisdiction holds its public hearing and subsequent reading relating to its Official Community Plan bylaw amendment.

FIGURE 5: RELATIONSHIP BETWEEN THE REGIONAL GROWTH STRATEGY AND OFFICIAL COMMUNITY PLANS

Each member jurisdiction prepares an updated Official Community Plan (OCP) and Regional Context Statement (RCS) within two years of the adoption of a new regional growth strategy or a Type 1 Amendment. The RCS sets out the relationship between the regional growth strategy and the member jurisdiction's OCP, and identifies how local actions will contribute to achieving regional growth strategy goals. Member jurisdictions must submit their RCS to the Metro Vancouver Board for acceptance.

Contents of Regional Context Statement

6.2.2 The Regional Context Statement must identify the relationship between an Official Community Plan and the goals, strategies, and actions identified in the regional growth strategy. If applicable, the Regional Context Statement will identify how the Official Community Plan will be made consistent with the regional growth strategy over time. Regional Context Statements that propose to add or delete Frequent Transit Development Areas must be accompanied by written comments from TransLink.

Regional Context Statement Process

6.2.3 If a member jurisdiction proposes an amendment to a Regional Context Statement, it must submit to Metro Vancouver a council resolution, including an accompanying report, that sets out the member jurisdiction's proposed amendment(s).

6.2.4 If a member jurisdiction anticipates that its proposed Regional Context Statement, or amendment to its Regional Context Statement, will not be accepted by the Metro Vancouver Regional District Board because it is not generally consistent with the regional growth strategy, the member jurisdiction should submit a proposed amendment to the regional growth strategy. The procedure for amendments to the regional growth strategy is set out in section 6.4.

6.2.5 The Metro Vancouver Regional District (MVRD) Board will respond within 120 days of receiving a Regional Context Statement from a member jurisdiction by council resolution, indicating whether it accepts the Regional Context Statement. If the MVRD Board does not accept a Regional Context Statement, the Board will indicate the provisions to which it objects and the reasons for its objections.

Consistency with Regional Growth Strategy

6.2.6 In considering acceptance of Regional Context Statements, the Metro Vancouver Regional District Board's expectation is that acceptable Regional Context Statements are generally consistent with the regional growth strategy's goals, strategies, actions and the regional land use designations depicted on Map 2. Regional Context Statements should respond to all applicable policies in the regional growth strategy, and indicate how the Official Community Plan is generally consistent (including projections, maps, and specific policy language) or how it will be made consistent over time.

Providing for Appropriate Municipal Flexibility

6.2.7 A member jurisdiction may include language in its Regional Context Statement that permits amendments to the municipality's Official Community Plan to adjust the boundaries of regional land use designations within the Urban Containment Boundary, as follows:

- a) the member jurisdiction may re-designate land from one regional land use designation to another regional land use designation, only if the aggregate area of all proximate sites so re-designated does not exceed one hectare;
- b) notwithstanding section 6.2.7 (a), for sites that are greater than one hectare and less than three (3) hectares in area, the member jurisdiction may re-designate land:
 - from Industrial to General Urban regional land use designation, if the site is contiguous with an Industrial site and the developable portion of the site will be predominantly within 150 metres of an existing or approved rail rapid transit station; or

- from Industrial to Employment regional land use designation if the developable portion of the site will be predominantly within 250 metres of an existing or approved rail rapid transit station,

provided that:

- the re-designation does not impede rail, waterway, road, or highway access for industrial uses; and
- the aggregate area of all proximate sites so re-designated does not exceed three (3) hectares;

c) the aggregate area of land affected by all re-designations under section 6.2.7 (a) and (b) together cannot exceed two (2) percent of the member jurisdiction's total lands within each applicable regional land use designation as of July 29, 2011.

6.2.8 A member jurisdiction may include language in its Regional Context Statement that permits amendments to its Official Community Plan to adjust the boundaries of Urban Centres and Frequent Transit Development Areas, provided such boundary adjustments meet the guidelines set out in Table 3 (Guidelines for Urban Centres and Frequent Transit Development Areas) of the regional growth strategy.

6.2.9 Member jurisdictions will notify Metro Vancouver, in writing, of any and all adjustments, as permitted by sections 6.2.7 and 6.2.8, within thirty (30) days after the member jurisdiction has adopted its Official Community Plan amendment bylaw.

6.2.10 If a member jurisdiction includes language in its Regional Context Statement that permits amendments to its Official Community Plan to adjust the boundaries of regional land use designations within the Urban Containment Boundary or the boundaries of Urban Centres and Frequent Transit Development Areas, as permitted by sections 6.2.7 and 6.2.8 respectively, the prescribed adjustments do not require a new Regional Context Statement or consideration by the Metro Vancouver Regional District (MVRD) Board. All other adjustments to regional land use designation boundaries require an amendment to the member jurisdiction's Regional Context Statement, which must be submitted to the MVRD Board for acceptance in accordance with the requirements of the *Local Government Act*.

6.3 Categories of Regional Growth Strategy Amendments

Type 1 Amendments to the Regional Growth Strategy

6.3.1 The following Type 1 amendments to the regional growth strategy require an affirmative 50%+1 weighted vote of the Metro Vancouver Regional District Board and acceptance by all affected local governments in accordance with section 436 of the *Local Government Act*:

- a) the addition or deletion of regional growth strategy goals or strategies;
- b) an amendment to the process for making minor amendments to the regional growth strategy, which is specified in sections 6.3.3 and 6.3.4; and

c) the matters specified in section 437 (4) of the *Local Government Act*.

6.3.2 All amendments to the regional growth strategy other than the amendments specified in section 6.3.1 are minor amendments (Type 2 and Type 3) for the purposes of section 437 (2) of the *Local Government Act*.

Type 2 Amendments to the Regional Growth Strategy

6.3.3 The following Type 2 amendments require an affirmative two-thirds weighted vote of the Metro Vancouver Regional District Board:

- a) amendment to the Urban Containment Boundary;
- b) amendment of Agricultural or Conservation and Recreation regional land use designations, except as set out in section 6.3.4 (e), (f) and (g);
- c) amendment from Rural to Industrial, Employment, or General Urban regional land use designations;

d) amendment of sites located outside the Urban Containment Boundary from Employment to a General Urban regional land use designation;

e) the addition or deletion of an Urban Centre; and

f) the addition or deletion of, or amendment to, the descriptions of the regional land use designations or actions listed under each strategy.

Type 3 Amendments to the Regional Growth Strategy

6.3.4 The following Type 3 amendments require an affirmative 50% + 1 weighted vote of the Metro Vancouver Regional District Board:

- a) the addition or deletion of a Frequent Transit Development Area;
- b) for sites within the Urban Containment Boundary, amendments from Industrial, Employment, or General Urban to any other such regional land use designation(s);
- c) amendment from Industrial, Employment, or General Urban to Rural, Agricultural, or Conservation and Recreation regional land use designations;
- d) amendment from Rural to Agricultural or Conservation and Recreation regional land use designation;
- e) amendment from Conservation and Recreation to Agricultural regional land use designation;
- f) for sites that are contiguous with, or within, the Urban Containment Boundary, and are not within the Agricultural Land Reserve and subject to the *Agricultural Land Commission Act*, amendment from Agricultural or Rural to Industrial regional land use designation, and associated Urban Containment Boundary adjustments;
- g) for sites that are identified as Special Study Areas on Map 12, an amendment to another regional land use designation and associated Urban Containment Boundary adjustments;
- h) removal of the Trade-Oriented Lands overlay from parcels with an Industrial regional land use designation;
- i) housekeeping amendments to figures, tables or maps, performance measures or other items related to document structure that do not alter the intent of the regional growth strategy;
- j) amendments to mapping to incorporate maps included in accepted Regional Context Statements;
- k) the reclassification of a Frequent Transit Development Area to an Urban Centre, or reclassification of an Urban Centre type to another Urban Centre type;
- l) an amendment to the Major Transit Growth Corridors; and
- m) all other amendments not identified in sections 6.3.1 or 6.3.3.



6.4 Procedures for Regional Growth Strategy Amendments

Who Can Apply for an Amendment

6.4.1 The process to initiate amendments to the regional growth strategy is by resolution of the Metro Vancouver Regional District (MVRD) Board. Member jurisdictions may, by resolution, request amendments. The MVRD Board will not give first reading to an amendment bylaw which proposes to change a regional land use designation or Urban Containment Boundary unless or until the member jurisdiction or jurisdictions in which the subject site is located have requested that amendment or have been given the opportunity to formally comment on the proposed amendment.

Notification and Request for Comments

6.4.2 For all proposed amendments to the regional growth strategy the Metro Vancouver Regional District (MVRD) Board will:

- a) provide written notice of the proposed amendment to all affected local governments;
- b) provide a minimum of forty-five (45) days from the date of the notice for affected local governments, and the appropriate agencies, to respond to the proposed amendment;
- c) post notification of the proposed amendment on the MVRD website, for a minimum of forty-five (45) days from the date of the notice;

d) if the proposed amendment is to change a site from Industrial or Employment to General Urban regional land use designation, provide written notice and a minimum of forty-five (45) days from the date of the notice for the Port of Vancouver, the Vancouver International Airport Authority, the Ministry of Transportation and Infrastructure and/or the Agricultural Land Commission, as appropriate, to respond to the proposed amendment.

Procedures for Type 1 Amendments

6.4.3 For Type 1 amendments to the regional growth strategy set out in section 6.3.1, the procedures set out in section 436 of the *Local Government Act* apply.

Procedures for Type 2 Amendments

6.4.4 For Type 2 amendments to the regional growth strategy set out in section 6.3.3, the Metro Vancouver Regional District (MVRD) Board will:

- a) consider first, second, and third reading of the amendment bylaw;
- b) provided the amendment bylaw receives an affirmative two-thirds weighted vote of the MVRD Board at first, second, and third readings, refer for comment the proposed amendment to the regional growth strategy to all affected local governments, in accordance with the requirements set out in section 6.4.2;

c) provide public engagement opportunities that may include:

- notification of the proposed amendments on the Metro Vancouver website;
- requesting written comments by way of a comment form on the Metro Vancouver website;
- opportunities for the public to appear as a delegation to the Regional Planning Committee or the MVRD Board when the amendment is being considered;
- conveyance of comments submitted from the respective local public hearing to the MVRD Board, and
- hosting a public information meeting (digitally or in person).

d) receive the comments from the notification and referral for comments process set out in section 6.4.2, and consider final reading and adoption of the amendment bylaw, which must receive at least a two-thirds weighted vote of the MVRD Board.

6.5 Coordination with First Nations

6.5.1 Metro Vancouver will work with First Nations to facilitate the compatibility of the regional growth strategy and First Nations' planning and development initiatives.

Procedures for Type 3 Amendments

6.4.5 For Type 3 amendments to the regional growth strategy set out in section 6.3.4, the Metro Vancouver Regional District (MVRD) Board will:

- a) consider first, second, and third reading of the amendment bylaw;
- b) provided the amendment bylaw receives an affirmative majority weighted vote of the MVRD Board at each of the first, second, and third readings, notify and refer for comment the proposed amendment to the regional growth strategy to all affected local governments, in accordance with the requirements set out in section 6.4.2;
- c) consider final adoption of the amendment bylaw and, provided the amendment bylaw receives an affirmative simple majority weighted vote of the MVRD Board, adopt the amendment bylaw.

6.5.2 A land use plan prepared by Tsawwassen First Nation will include a statement equivalent to a Regional Context Statement as defined in the *Local Government Act*, identifying how the Nation's land use plan is consistent with the regional growth strategy.

6.6 Coordination with TransLink

6.6.1 Metro Vancouver will work with TransLink with the objective that the regional growth strategy and TransLink's regional transportation plans are compatible and complementary. Metro Vancouver will refer to TransLink for written comments on proposed Regional Context Statements that would impact the regional transportation system or significantly affect the demand for regional transportation services.

6.6.2 As an affected local government, TransLink is required to consider acceptance of the regional growth strategy and any proposed Type 1 amendments, as set out in section 6.3.1.

6.6.3 TransLink is mandated to provide a regional transportation system that is consistent and supportive of the regional growth strategy, and its associated goals, objectives, land use designations, overlays, and policies. *The South Coast British Columbia Transportation Authority Act* also requires TransLink to: review the regional growth strategy and any amendments to it and advise Metro Vancouver of the implications for the Regional Transportation Strategy, and prepare regional transportation investment plans that set out the relationships between major actions and the regional growth strategy.

6.7 Coordination with Other Governments and Agencies

6.7.1 Metro Vancouver will work with the Fraser Valley Regional District, the Squamish-Lillooet Regional District, and the Islands Trust (regarding Bowen, Bowyer, and Passage Islands) to facilitate the compatibility of regional planning and growth management initiatives in Metro Vancouver and these neighbouring jurisdictions.

6.7.2 Metro Vancouver will collaborate with the Federal Government and the Province on major investments in the regional transportation system, expansion of diverse and affordable housing options, and the location of public facilities that support the goals and strategies specified in the regional growth strategy. Metro Vancouver will seek formal Implementation Agreements with these agencies to give effect to that intent.



6.8 Coordination with Metro Vancouver / Greater Vancouver Boards

6.8.1 All bylaws adopted and all works and services undertaken by Metro Vancouver Regional District, the Greater Vancouver Water District, or the Greater Vancouver Sewerage and Drainage District must be consistent with the regional growth strategy.

The Greater Vancouver Sewerage and Drainage District and the Greater Vancouver Water District will not directly or indirectly supply, agree to supply, or authorize connections that enable the supply of services to a site that is developed or proposed to be developed after the date of adoption of the regional growth strategy where the nature of that development is, in the sole judgment of the Metro Vancouver Regional District Board, inconsistent with the provisions of the regional growth strategy.

6.8.2 For further clarity, sites within the Urban Containment Boundary that are designated General Urban, Industrial, or Employment, would be eligible for sewerage services, subject to normal Greater Vancouver Sewerage and Drainage District technical considerations, provided that the proposed development complies with the applicable policies under those designations and any such Urban Centre and Frequent Transit Development Area overlays that might apply.

6.8.3 For lands with a Rural, Agricultural, or Conservation and Recreation regional land use designation, sections 1.1.1, 1.4.1, 2.3.1, and 3.1.1 apply regardless of whether the area is within one of the Greater Vancouver Sewerage and Drainage District's sewerage areas.

With reference to sections 1.1.1, 1.4.1, 2.3.1, and 3.1.1, in determining whether, in the circumstances, connection to regional sewerage services is the only reasonable means of preventing or alleviating a public health or environmental contamination risk, the Metro Vancouver Regional District (MVRD) Board will consider the opinion of a professional, as such term is defined in the Sewerage System Regulation pursuant to the *Public Health Act* (British Columbia), or if appropriate a qualified professional, as such term is defined in Municipal Wastewater Regulation 87/2012 pursuant to the *Environmental Management Act* (British Columbia), submitted by the member jurisdiction as to the technical and economic feasibility of installing and maintaining a private on-site sewage treatment system in accordance with all laws and regulations applicable in British Columbia. The MVRD Board may also obtain its own opinion from a professional and consider such opinion.

6.9 Sewerage Area Extensions

6.9.1 Notwithstanding any other provision in the regional growth strategy, within the areas identified on Map 12 in the Township of Langley as "Rural within the Sewerage Area", which includes part of the Salmon River Uplands that is contained within the Greater Vancouver Sewerage and Drainage District's Fraser Sewerage Area, and within the area identified as "Sewerage Extension Areas", regional sewer servicing will be permitted subject only to the land uses being consistent with the applicable regional land use designation and normal Greater Vancouver Sewerage and Drainage District technical considerations.

6.9.2 All connections to regional sewerage services approved by the Greater Vancouver Sewerage and Drainage District (GVS&DD) Board as per sections 1.1.1, 1.4.1, 2.3.1, and 3.1.1 will be contained within a sewerage area footprint boundary as determined by the Metro Vancouver Regional District (MVRD) and GVS&DD Boards. Any sewerage service connection outside of that boundary will require MVRD Board and GVS&DD Board approval.

6.10 Special Study Areas

6.10.1 Special Study Areas as depicted on Map 12 identify locations where, prior to the adoption of *Regional Growth Strategy Bylaw No. 1136*, on July 29, 2011, a member jurisdiction had expressed an intention to alter the existing land use, and is anticipating a future regional land use designation amendment. Pending Metro Vancouver Regional District Board approval of a regional land use designation amendment, the current regional land use designation(s) applies within the Special Study Area. Amending a regional land use designation within a Special Study Area is considered a Type 3 amendment under section 6.3.4 of the regional growth strategy.

This includes any associated adjustment(s) to the Urban Containment Boundary for a Special Study Area. As part of any amendment establishing a change in regional land use designation, the Special Study Area boundaries for those amended lands will be removed from the regional growth strategy.

6.10.2 If the Special Study Area involves lands within the Agricultural Land Reserve, the member jurisdiction is required to consult with the Agricultural Land Commission during the preparation of the planning studies prior to initiating an application to exclude the lands from the Agricultural Land Reserve.

6.11 Jurisdiction

6.11.1 The regional growth strategy applies to all lands within the boundaries and jurisdiction of the Metro Vancouver Regional District.

6.11.2 In accordance with the *Agricultural Land Commission Act*, in the event that there is an inconsistency between the regional land use designations or policies set out in the regional growth strategy and the requirements of the *Agricultural Land Commission Act* or regulations and orders made pursuant thereto, the Agricultural Land Commission requirements will prevail.



6.12 Regional Growth Strategy Maps

6.12.1 The maps contained in the regional growth strategy are small scale depictions of the official regional land use designation maps and have been included for convenience purposes only. The official regional land use designation maps, the Sensitive Ecosystems Inventory map, and the Major Transit Growth Corridor map are maintained by Metro Vancouver and available for viewing on the Metro Vancouver website, and will be updated to incorporate changes to designation boundaries that result from adopted regional growth strategy amendment bylaws. TransLink owns and maintains the official Major Transit Network map on its website.

6.12.2 Where a regional land use designation boundary does not align with a property or parcel legal boundary, the Agricultural Land Reserve boundary, a member jurisdiction Official Community Plan or zoning boundary, or a distinct geographic or natural feature, the regional land use designation boundary will be considered approximate, and the boundary depicted in the respective accepted Regional Context Statement will prevail.

6.12.3 The boundaries of Urban Centres, Frequent Transit Development Areas, and Trade-Oriented Lands are to be defined by member jurisdictions in Official Community Plans, Neighbourhood or Area Plans, or equivalent, and shown in Regional Context Statements. Where member jurisdictions amend the boundaries of Urban Centres, Frequent Transit Development Areas, or Trade-Oriented Lands, and, in accordance with section 6.2.8, have not changed their Regional Context Statement, member jurisdictions will notify Metro Vancouver, in writing, within thirty (30) days.

6.12.4 The boundaries for Special Study Areas depicted on Map 12 are not to be expanded nor are new areas to be created. A Type 3 amendment to Map 12 is only permitted to delete Special Study Areas and may occur after the regional growth strategy has been amended to change the regional land use designation of the Special Study Area or when a member jurisdiction decides to eliminate a Special Study Area.

6.13 Tables, Figures and Performance Measures

6.13.1 Tables 1 and 2 showing growth projections and dwelling unit and employment growth targets for Metro Vancouver and member jurisdictions are included in the strategy as guidelines only. These tables are included in the regional growth strategy as a reference for use when preparing Regional Context Statements and regional planning initiatives. Metro Vancouver, in collaboration with member jurisdictions, will maintain projections to monitor growth and will propose updates to tables in accordance with the amendment process set out in section 6.3.4 following Metro Vancouver Regional District Board acceptance of Regional Context Statements or a significant change in the growth projections assumptions.

6.13.2 The following figures and maps in the regional growth strategy are included as reference only: Table 6; Figures 1, 2, 3, 4, 5; Maps 1, 10, and 11.

6.13.3 Pursuant to the *Local Government Act*, Metro Vancouver will prepare an annual report on progress in meeting the goals of the regional growth strategy through the monitoring of the performance measures identified in the Performance Measures section and in meeting other targets set out in the regional growth strategy.

6.14 Interpretation

6.14.1 All terms used in the regional growth strategy that are defined in the *Local Government Act* have the meanings given to such terms in the *Local Government Act*.

6.14.2 For terms not addressed in 6.14.1, a Glossary of Terms is provided and will be used to define terms used in *Metro 2050*.

6.14.3 In the case of the Electoral Area A, a Regional Context Statement is not required, but the policy actions listed for member jurisdictions should be addressed in the Electoral Area A Official Community Plan, as applicable.

6.15 Implementation Guidelines

6.15.1 Metro Vancouver may periodically prepare Implementation Guidelines to assist in the implementation of the regional growth strategy, to be prepared in collaboration with member jurisdictions. These guidelines should be read in conjunction with the regional growth strategy, and do not replace or supersede the content and requirements of the regional growth strategy.



G. Performance Monitoring

Performance monitoring allows for the informed review and update of the regional growth strategy as required. Metro Vancouver will produce annual reports on implementation of the regional growth strategy and progress towards its goals using the following performance measures.

Regional land use designations

- Total and cumulative change in hectares of land in each of the six regional land use designations

Goal 1: Create a Compact Urban Area

Urban Containment

- Total and cumulative change in hectares of land in the Urban Containment Boundary
- Percent of regional dwelling unit growth located within the Urban Containment Boundary
- Number and status of new regional sewerage service connection applications made for areas outside of the Urban Containment Boundary (UCB) to lands with an Agricultural, Rural, or Conservation and Recreation regional designation
- Change in hectares of greenfield lands within the Urban Containment Boundary that have a General Urban regional land use designation.

Growth in Priority Areas

- Percent of regional dwelling unit growth located in Urban Centres, Frequent Transit Development Areas, and Major Transit Growth Corridors
- Change in people plus jobs per hectare in Urban Centres, Frequent Transit Development Areas, and Major Transit Growth Corridors

Complete Communities and Health

- A walkability index composed of, land use mix, commercial floor area ratio, intersection density, residential density, and sidewalk completeness
- Total and change in number of community services and amenities in Urban Centres and Frequent Transit Development Areas, including, but not limited to, child care, green space and land use mix

Goal 2: Support a Sustainable Economy

Employment in Priority Areas

- Percent of regional employment growth located in Urban Centres, Frequent Transit Development Areas, and Major Transit Growth Corridors
- Total and change in employment by sector in Urban Centres, Frequent Transit Development Areas, and Major Transit Growth Corridors
- Change in office floor area within Urban Centres, Frequent Transit Development Areas, and Major Transit Growth Corridors

Agricultural Lands

- Percent of land in the Agricultural Land Reserve that is actively farmed

Employment Accessibility

- Average number of kilometres travelled for commute (region-wide)
- Average number of minutes travelled for commute (region-wide)
- Average trip length by transportation mode (region-wide)

Industrial and Employment Lands

- Total and cumulative change in hectares of land designated Industrial and Employment that is developed and vacant

Goal 3: Protect the Environment and Respond to Climate Change and Natural Hazards

Ecosystem Health

- Change in hectares of land protected for nature across the region
- Change in the percentage of regional total tree canopy cover within the Urban Containment Boundary
- Change in hectares of land identified as a Sensitive or Modified Ecosystem
- Change in hectares of identified Sensitive and Modified Ecosystems rated high quality

Greenhouse Gas Emission Reduction

- Total and change in tonnes of regional greenhouse gas emissions related to land use, buildings, industry, agriculture, waste, transportation, and other emission sources in support of the regional target to reduce greenhouse gas emissions by 45% below 2010 levels by the year 2030 and to achieve a carbon neutral region by the year 2050
- Tonnes of carbon storage in natural areas including lands with Rural, Conservation and Recreation, and Agricultural regional land use designations

Goal 4: Provide Diverse and Affordable Housing Choices

- Percentage of affordable rental housing in new and redeveloped units in Urban Centres and Frequent Transit Development Areas
- Percentage of household income spent on housing and transportation expenses across the region and by tenure and income level

Goal 5: Support Sustainable Transportation Choices

Travel Mode Choices

- Total and change in trips by transportation mode
- Percent of residents within walking distance of the Major Transit Network
- Total and per-capita change in the number of actively insured vehicles

Road and Vehicle Use and Safety

- Total and per-capita change in annual vehicle kilometres travelled by transportation mode



H. Glossary of Terms

METRO 2050 GLOSSARY

The following terms used in the regional growth strategy are defined as follows:

Affected Local Governments - Metro Vancouver Regional District member jurisdictions (excluding Bowen Island Municipality), Squamish-Lillooet Regional District, Fraser Valley Regional District, and the South Coast British Columbia Transportation Authority (also known as TransLink).

Affordable Housing - For the purpose of *Metro 2050*, “Affordable Housing” is housing that is affordable to households earning up to 120% of the Regional Median Household Income. In Canada, a general measure of housing affordability is the shelter-cost-to-income ratio, where no more than 30% of a household’s gross income is spent on housing (including all housing-related costs like utilities).

Air Contaminant - Any substance that is introduced into the air that: injures or is capable of injuring the health or safety of a person; injures or is capable of injuring property or any life form; interferes or is capable of interfering with visibility; interferes or is capable of interfering with the normal conduct of business; causes or is capable of causing material physical discomfort to a person; or damages or is capable of damaging the environment.

Carbon Neutral Region - A region that generates no net greenhouse gas emissions. This is achieved by any greenhouse gas emissions across all economic sectors being balanced out by the removal of carbon dioxide from the atmosphere by the plants, trees, and soil of the region, or through technological means.

Carbon Storage - The total amount of carbon stored in ecosystems such as forests, wetlands and intertidal areas, which often takes thousands of years to accumulate. A conservative estimate of the total carbon stored in the vegetation and soils of the region’s ecosystems is 65 million tonnes. This estimate is derived from Metro Vancouver’s regional carbon storage dataset and applies to the full extents of the watersheds that supply the Metro Vancouver region’s drinking water, along with estuarine and intertidal areas.

Climate Change Impacts - The consequences of realized climate change risks on ecosystems, economies, infrastructure, and communities.

Dwelling Unit - For the purposes of *Metro 2050*, the term “Dwelling Unit” is used as a short-form for “private dwelling that is occupied by usual residents” and is measured using Census household data.

Ecosystem Connectivity - The physical and functional links between ecosystems that support biodiversity by allowing the movement of species within and between ecosystems. Ecosystem connectivity is achieved by conserving and maintaining a connected network of natural and urban ecosystems.

Ecosystem Fragmentation - The process of ecosystems being divided into smaller and isolated patches of land thereby reducing ecosystem integrity.

Ecosystem Integrity - The ability of an ecosystem to support diverse communities of organisms and maintain ecological processes (e.g. water, carbon, and nutrient cycling).

Ecosystem Services - The benefits people obtain from ecosystems. These services can be grouped into four main types: supporting, provisioning, cultural, and regulating.

Embodied Emissions - The greenhouse gas emissions associated with the construction of goods and products, including the raw materials, manufacture, and the transport of the good or product to where it is sold.

Green Infrastructure - The natural, enhanced, and engineered assets that collectively provide society with ecosystem services. Natural assets (e.g. forests, wetlands, and soil), enhanced assets (e.g. urban trees, and bioswales), and engineered systems (e.g. green roofs and permeable pavement) improve resilience and mitigate negative environmental impacts from urban development, benefiting both people and ecosystems.

Low Impact Development - Development that works with nature to: manage stormwater quantity and quality by preserving trees and other natural features where possible; support ecosystem connectivity; minimizes impervious surfaces; and create dispersed multi-functional landscapes that minimize pollutant runoff, the need for stormwater infrastructure, and extreme flooding and heat events.

Lower Income Households - Households earning less than 80% of the Regional Median Household Income.

Member Jurisdictions - Metro Vancouver Regional District member municipalities, Tsawwassen First Nation, and Electoral Area A.

Natural Hazards - Naturally occurring phenomena that may cause loss of life, injury or other health impacts, property damage, social, and economic disruption or environmental degradation. Examples of natural hazards affecting the Metro Vancouver region include earthquakes, landslides, floods, and wildfires. Many natural hazards are worsened by climate change.

Official Community Plan - As defined by the British Columbia *Local Government Act*, or land use plan equivalent in the case of the City of Vancouver, Tsawwassen First Nation, and Electoral Area A.

Province - The Government of British Columbia, including its ministries and agencies.

Regional Context Statement - As described by the British Columbia *Local Government Act*, the linking document that demonstrates the relationship between an Official Community Plan and the regional growth strategy and, if applicable, how the Official Community Plan is to be made consistent with the regional growth strategy over time. A Regional Context Statement and the rest of the Official Community Plan must be consistent.

Regional Median Household Income - The median total household income of all households living in the Metro Vancouver region based on Census data. As defined by Statistics Canada, the median divides the region's households into two equal groups: half having an income above that amount, and half having an income below that amount. It differs from the mean (or average) income.

Resilience - The capacity to prepare for, avoid, absorb, recover, and adapt to the effects of shocks and stresses in an efficient manner through the preservation, restoration, and adaptation of essential services and functions.

Risk - A combined function of the probability of a hazard occurring and the magnitude or severity of its potential consequences (i.e. injury, damage, loss of habitat etc.).

Sensitive Ecosystem Inventory - An inventory of the region's most ecologically important areas mapped using provincial methodology. It does not include small, young, significantly disturbed, farmed or landscaped vegetation (e.g. young forests <5 hectares, crop or fallow land, enhanced or engineered assets, backyards and street trees). The inventory includes sensitive ecosystems and modified ecosystems, as follows:

- **Sensitive Ecosystems** - are ecologically fragile, rare or at-risk ecosystems such as wetlands, forests, and riparian areas.
- **Modified Ecosystems** - include young forests (30-80 years old) and freshwater reservoirs, that have experienced some human alteration, but still provide ecosystem services and remain important for biodiversity. In many cases, modified ecosystems are essential to maintaining ecosystem connectivity in highly fragmented landscapes where sensitive ecosystems have been lost.

Social Equity - The promotion of fairness and the removal of systemic barriers that may cause or aggravate disparities experienced by different groups of people. This can include the many dimensions of identity, such as socioeconomic status, ethnicity, race, sex, age, disability, gender, sexuality, religion, indigeneity, class, and other equity related issues.

Transit-Oriented - Areas located in close proximity to transit (generally within 800 m). Distances over 800 m from rapid transit stations may also be considered within the context of the area.

Transportation Demand Management - Measures that seek to reduce the overall amount of driving, particularly for single-occupant vehicle trips, through strategies aimed at deterring driving (e.g. priced parking) or promoting alternative modes of transportation (e.g. providing free bike parking).

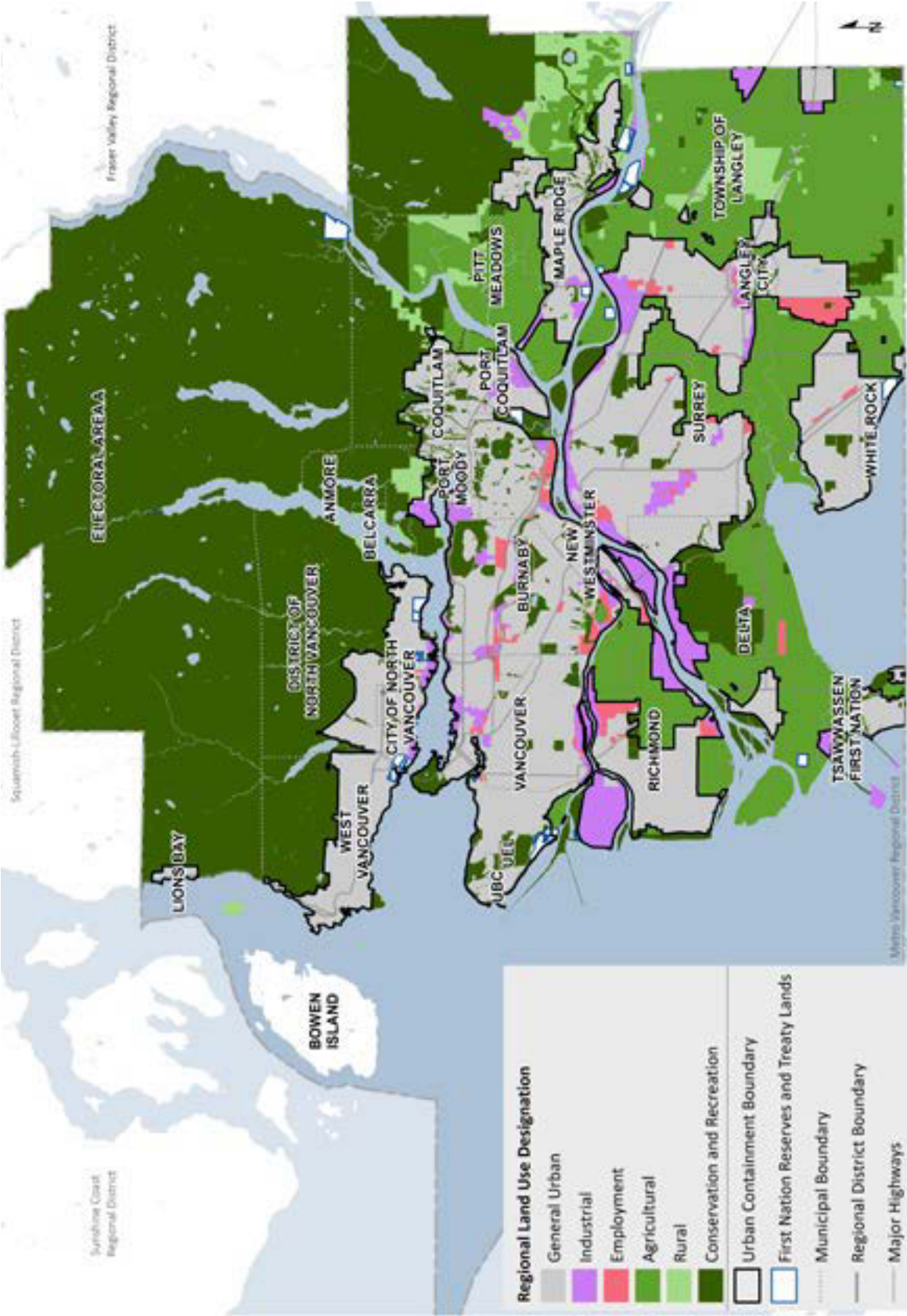
I. Maps

Map 1: Metro Vancouver Region



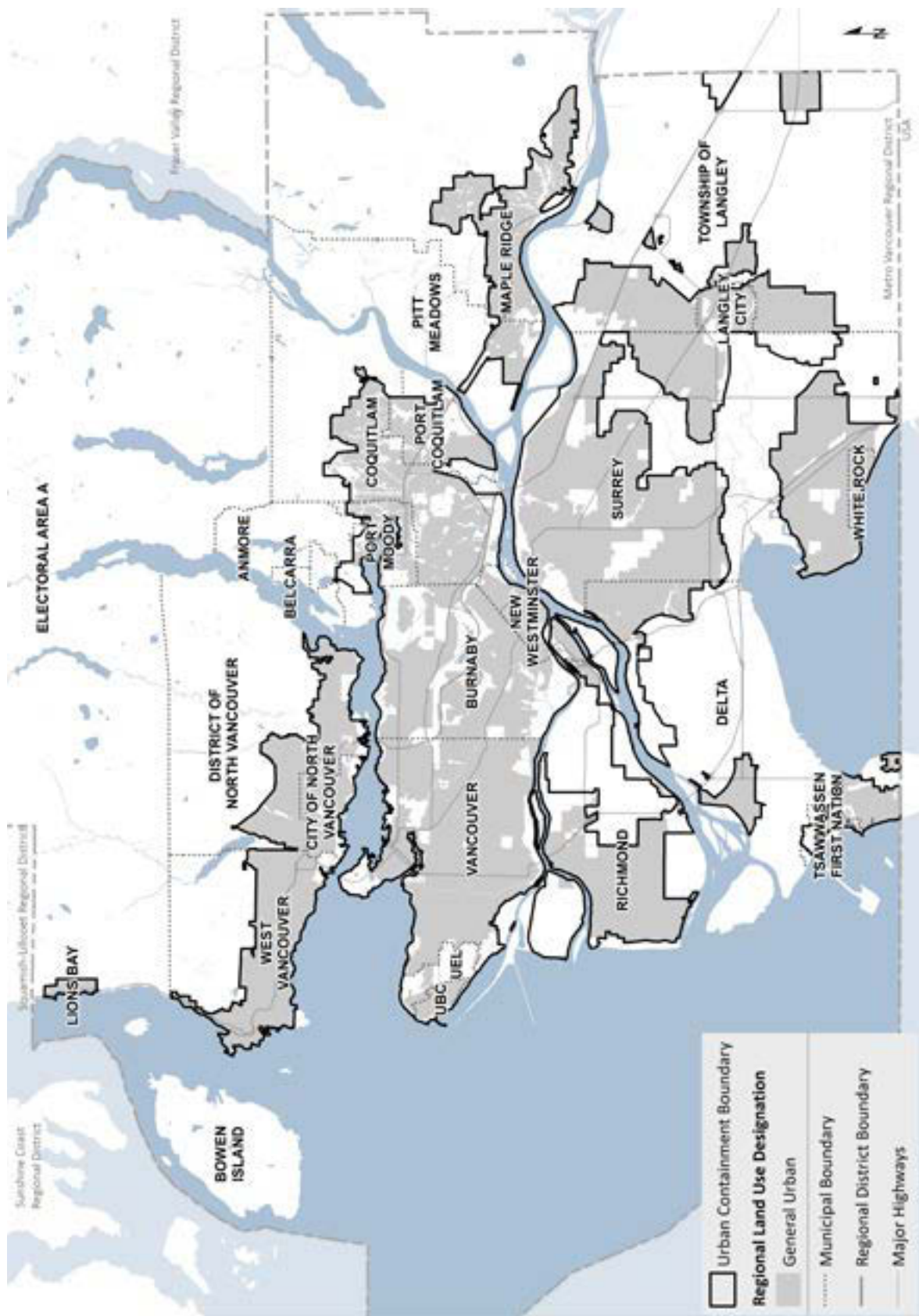
Map for reference only.

Map 2: Regional Land Use Designations

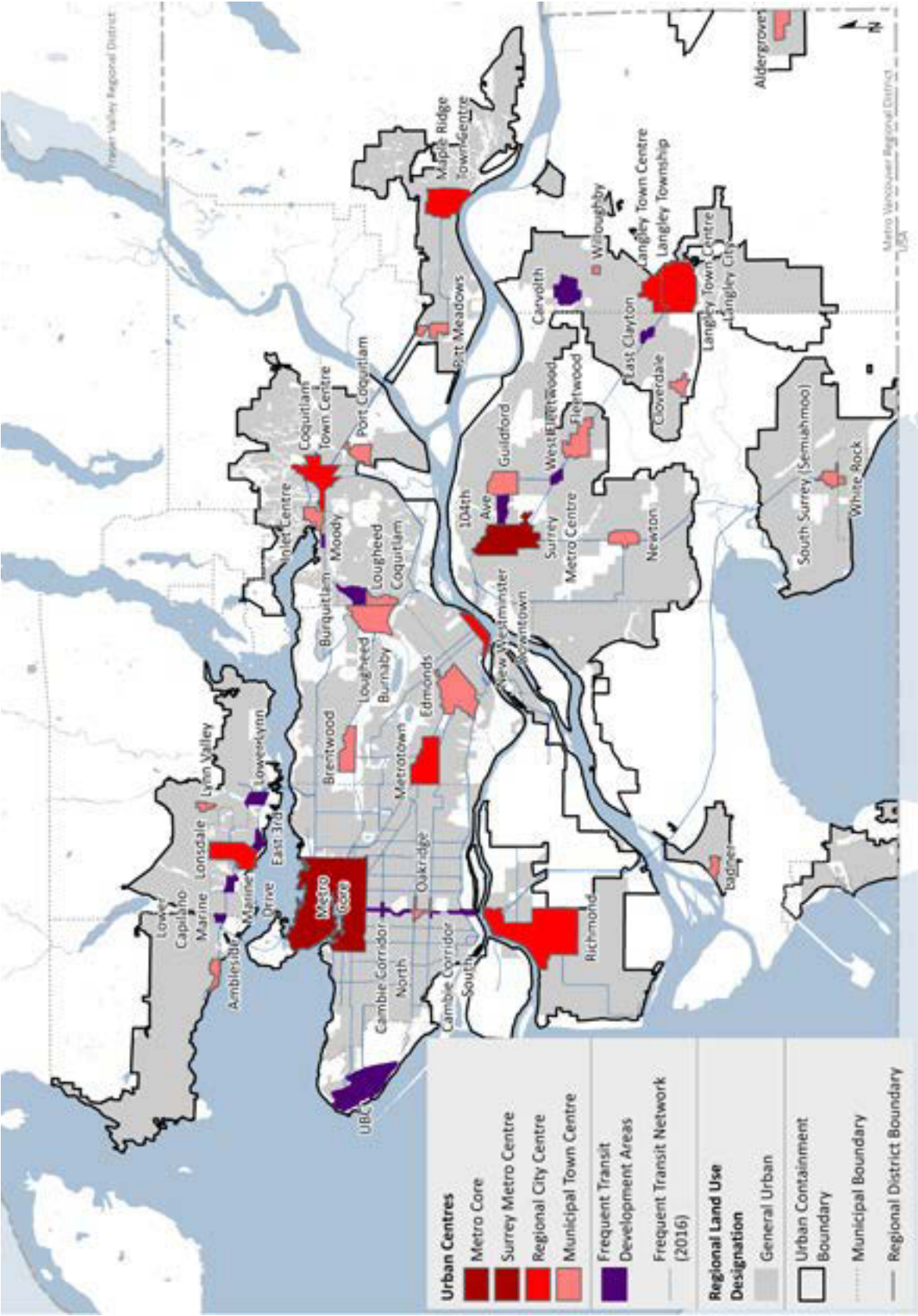


This map is a small scale depiction of the Regional Land Use Designation Map that Metro Vancouver maintains as the basis for defining land use designation boundaries. The official Regional Land Use Designation Map can be viewed on the Metro Vancouver website.

Map 3: Urban Containment Boundary and General Urban Lands

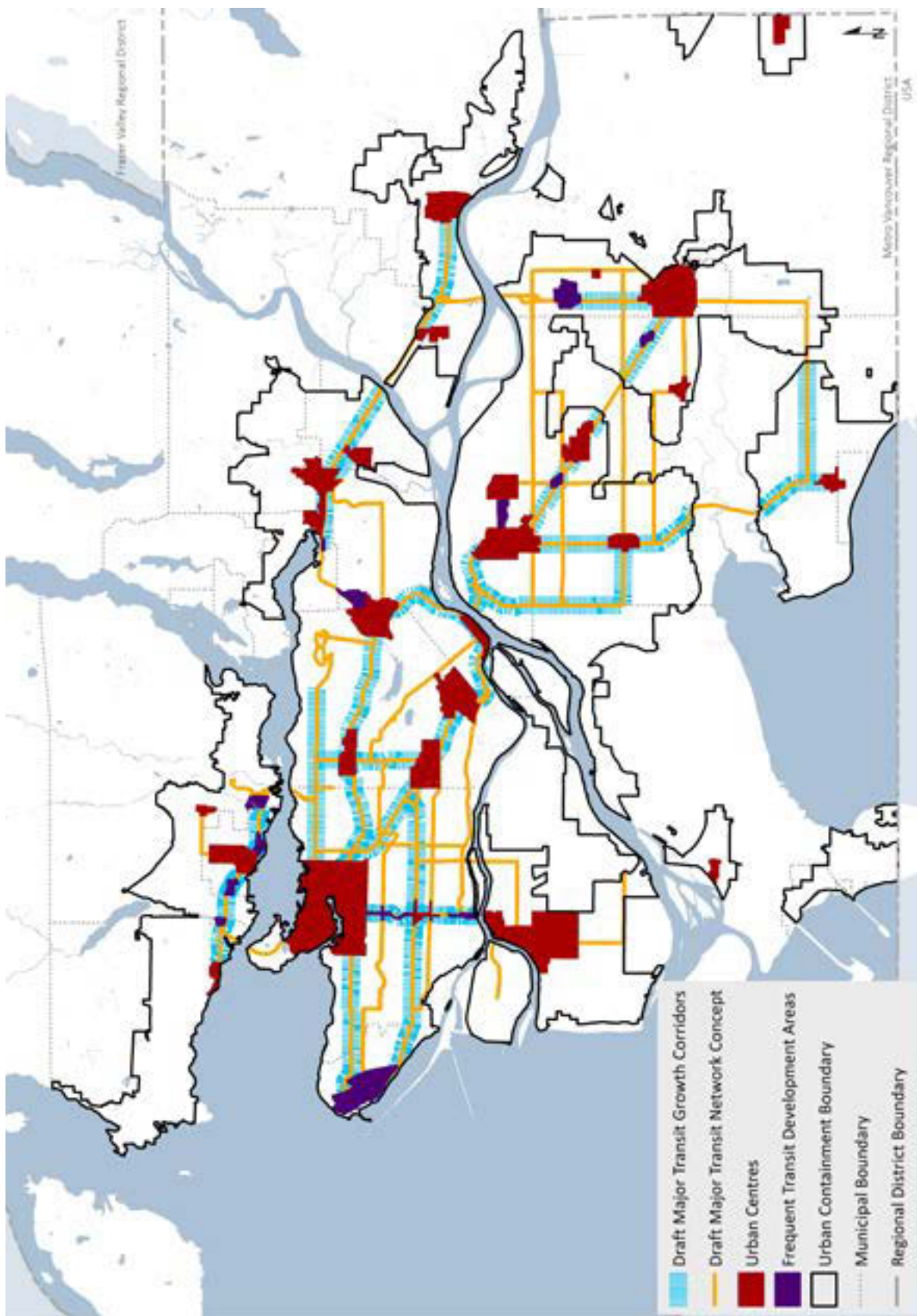


Map 4: Urban Centres and Frequent Transit Development Areas



Urban Centres and FTDA are overlays for structuring residential and employment growth. The boundaries are identified by member jurisdictions. Where overlays cover areas other than General Urban or Mixed Employment, the intent and policies of the underlying regional land use designations still apply.

Map 5: Major Transit Growth Corridors and Major Transit Network

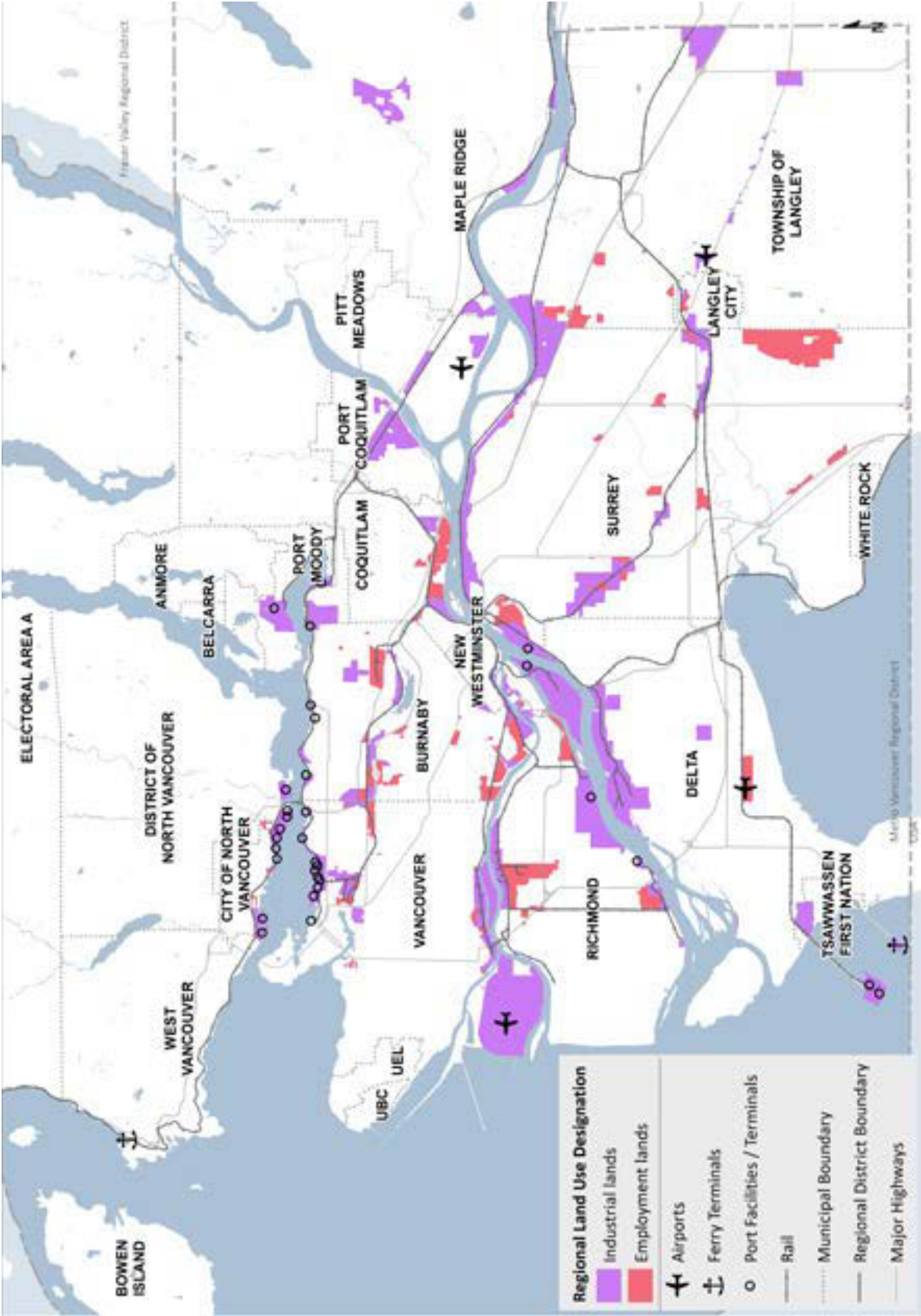


The Major Transit Growth Corridors are preliminary and subject to review and confirmation. The Draft Major Transit Network comprises both Transport 2050 Concepts A and B, which are also to be confirmed and are shown on this map for illustrative purposes only.

Map 6: Rural Lands



Map 7: Industrial and Employment Lands



The depicted highway network, rail lines, and port / airport transportation facilities are shown for reference only.

Map 8: Agricultural Lands



Map 9: Conservation and Recreation Lands



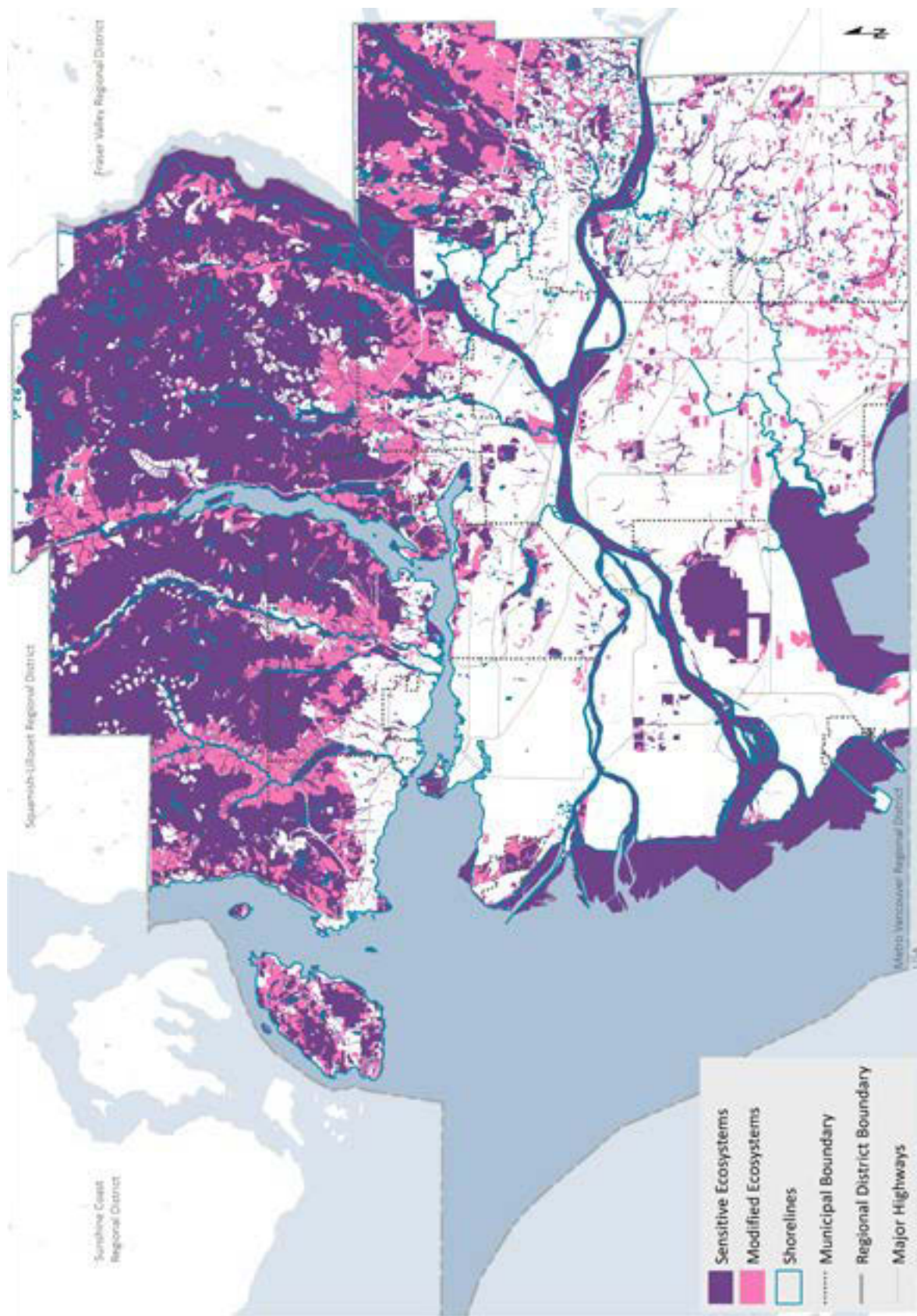
The Natural Resource Areas Overlay was collated by Metro Vancouver from several data sources including: Active managed forest tenure licenses, relevant OCPs, GVS&DD, and GVWD

Map 10: Regional Greenway Network and Major Bikeway Network



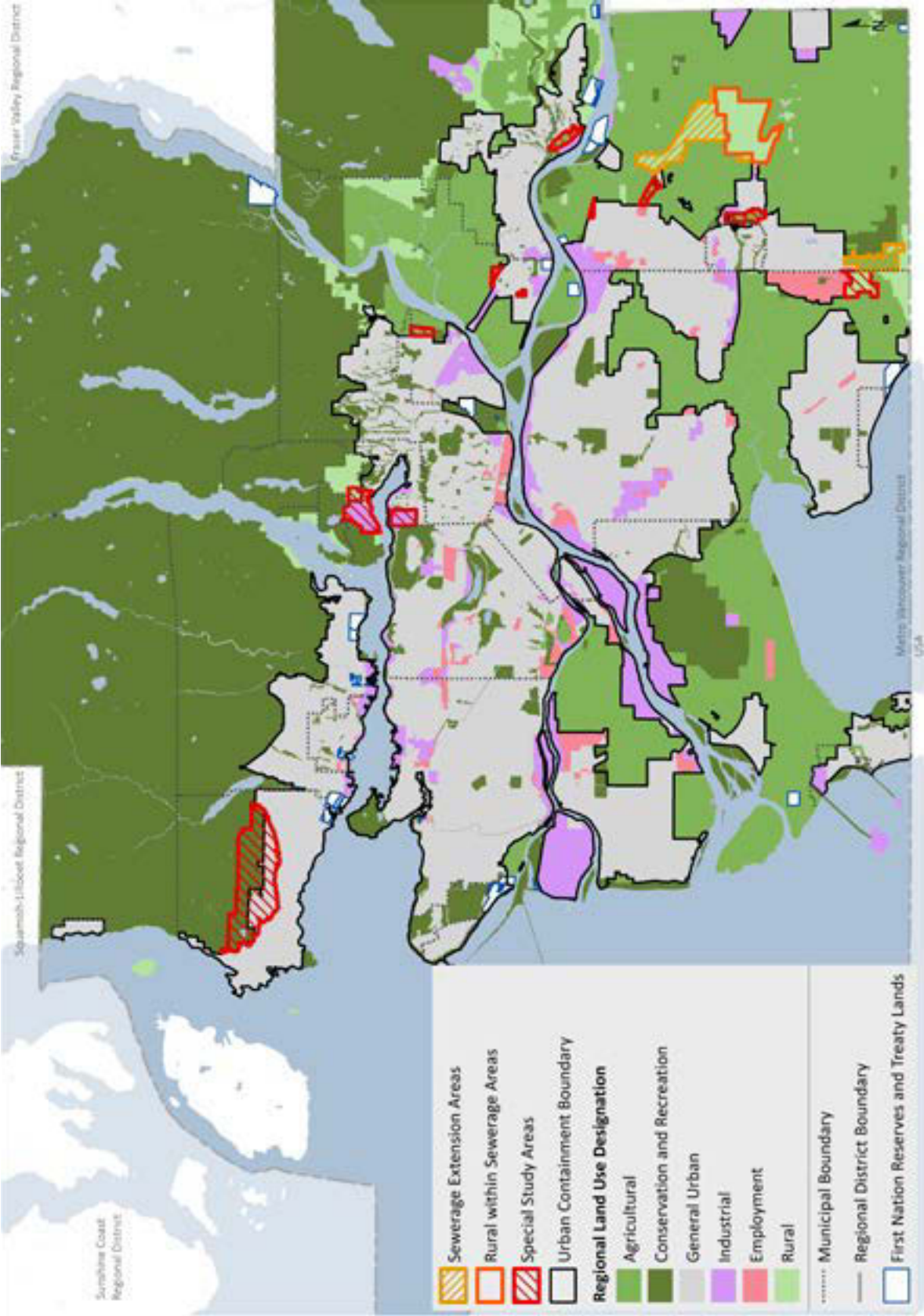
The Regional Greenway Network and Major Bikeway Network (MBN) are concepts illustrating existing and planned active transportation corridors of regional significance. The MBN is being developed through TransLink's Transport 2050 process and will be updated following the identification of a preferred MBN concept.

Map 11: Sensitive Ecosystem Inventory



Map for reference only. An online SEI Tool is available at <https://gis.metrovancouver.org/mvmaps/SEI> and downloadable from <http://www.metrovancouver.org/data>. The SEI dataset is from 2014. Local ecological datasets may be more current and detailed.

Map 12: Special Study Areas and Sewerage Extension Area



Bylaw No 1136, 2010 and List of Amendments

This will be the same as current Metro 2040

List of Affected Local Governments and Dates of Acceptance

This will be the same as current Metro 2040

DRAFT



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SERVICES AND SOLUTIONS FOR A LIVABLE REGION

SUMMARY OF PROPOSED CHANGES MADE TO *METRO 2050* POLICY ACTIONS BY GOAL AREA

These proposed changes to *Metro 2050* content stem from input and feedback from members of the *Metro 2050* Intergovernmental Advisory Committee (i.e. member jurisdiction staff as well as representation from federal and provincial governments and agencies, First Nations, post-secondary institutions and other regional stakeholders) as well as from the Regional Planning Committee and MVRD Board between January and May 2021.

Goal Preambles and Social Equity

- A short passage has been added to each of the preambles explaining the linkage between the policy area and social equity. This has been provided to begin introducing the concept of social equity as it relates to each of the *Metro 2050* topic areas with a view to enhancing the policies and policy actions from the perspective of social equity over time.

Goal 1

- Action 1.1.6 was added as an action for Metro Vancouver to: “work with First Nations to incorporate development plans and population, employment, and housing projections into the regional growth strategy to support potential infrastructure and utilities investments”.
- Action 1.1.9 d) was added at the request of an IAC submission, requiring member jurisdictions to, “integrate land use planning policies with local and regional economic development strategies, particularly in the vicinity of the port and airports, to minimize potential exposure of residents to environmental noise and other harmful impacts”.
- At the request of an IAC submission, Action 1.2.7 was revised to remove the words, “acquire and develop”, and now states that Metro Vancouver will, “work with TransLink, the Province, First Nations, and member jurisdictions to expand the supply of secure and affordable market and non-market rental housing within Major Transit Growth Corridors”.
- Action 1.2.12 was shortened and now reads: “develop an Implementation Guideline, in collaboration with member jurisdictions and TransLink, to be used as a resource to support transit-oriented planning throughout the region”.
- Action 1.2.13 was added to ensure that the Urban Centre and Frequent Transit Development Area growth targets are integrated as policy actions and to complement Table 2.
- Action 1.2.14 was added as an action for Metro Vancouver to: “monitor the region’s total household and employment growth that occurs in Major Transit Growth Corridors”.
- Action 1.2.15 was added as an action for Metro Vancouver to: “work with First Nations and other appropriate agencies to ensure that new development and infrastructure investment is directed to areas that are transit oriented and resilient to climate change impacts and natural hazards”.
- Specific mention of YVR Airport Authority was removed from Action 1.2.22 at the request of an IAC submission in recognition that there are multiple airports in the region.
- Action 1.2.24 b) ix) was added at the request of an IAC submission, requiring Regional

Context Statements to include policies for Urban Centres and Frequent Transit Development Areas that “support the provision of community services and spaces for non-profit organizations”.

- Action 1.2.24 c) iv) was added, requiring Regional Context Statements to include policies for General Urban lands that: “encourage neighbourhood-serving commercial uses”.
- Action 1.2.24 d) was revised at the request of IAC submissions, to remove, “large format retail,” and, “public-serving health authority facilities,” from the list of non-residential Major Trip Generating Uses.

Goal 2

- Action 2.2.9 d) vi) was revised to remove the word “rail” from the provision allowing limited residential uses in Employment lands within 200m of rapid transit stations;
- Policy 2.3.4 was revised to allow consideration of re-designating a parcel in the Agricultural Land Reserve with an Agricultural or Rural regional land use designation if the Agricultural Land Commission confirms that the site is not subject to the *ALC Act* without requiring exclusion from the ALR.

Goal 3

- Action 3.3.4 was added pertaining to Metro Vancouver’s role in environmental assessments, specifically to reduce the environmental and health impacts related to regional air quality and greenhouse gas emissions.
- Under Action 3.3.6 a) “energy benchmarking” was added to the list of advocacy actions to the Federal Government and the Province based on feedback from multiple IAC submissions.
- Action 3.3.9 was moved from a Metro Vancouver-led action to a TransLink-led action based on TransLink’s legal authority.
- Action 3.4.4. a), an advocacy action to the Federal Government and the Province was changed from: “mandate the adoption of flood hazard bylaws” to: “encourage the adoption of local flood hazard policies and bylaws”.
- The Natural Resource Areas Overlay has been identified on Map 9 (Conservation and Recreation Lands).

Goal 4

- Action 4.1.6 was added as an action for Metro Vancouver to: “Advocate to the Province to provide funding to support member jurisdictions in the development and update of housing strategies or action plans that are aligned with housing needs reports or assessments”.
- Action 4.3.2 was added as an action for Metro Vancouver to: “collaborate with member jurisdictions, non-profit housing and homelessness services providers, and the Federal Government and the Province on coordinated actions to address regional homelessness”.

Goal 5

- Under Action 5.1.3 there was IAC support for Option B (general corridor priorities); the new draft emphasizes transit priorities.
- Action 5.1.6 was updated to clarify the scope of the parking strategy.

Implementation

- The amendment process for re-designating Industrial lands was first presented to IAC as a Type 2 amendment (6.3.3) but in the final drafts was revised to be a Type 3 amendment (6.3.4) based on direction from the MVRD Board.
- Amendments to the Major Transit Growth Corridors was added to the list of Type 3 amendments (6.3.4).

To: Regional Planning Committee

From: Carla Stewart, Senior Planner, Regional Planning and Housing Services

Date: May 11, 2021

Meeting Date: June 9, 2021

Subject: **2021 Agriculture Awareness Grant Recommendations**

RECOMMENDATION

That the MVRD Board award the annual Agriculture Awareness Grants to the following eleven non-profit organizations as described in the report dated May 11, 2021, titled “2021 Agriculture Awareness Grant Recommendations”:

- i. BC Agriculture in the Classroom Foundation, for the “Take a Bite of BC” project in the amount of \$6,000;
 - ii. BC Chicken Growers’ Association, for the “Poultry in Motion Educational Mini Barn” project in the amount of \$6,000;
 - iii. Delta Farmland and Wildlife Trust, for the “Agriculture and Conservation in the Fraser River Estuary Videos” in the amount of \$6,000;
 - iv. FarmFolk CityFolk, for “BC Seed Gathering” in the amount of \$6,000;
 - v. Growing Chefs Society, for “Metro Vancouver Edible Education” in the amount of \$3,500;
 - vi. Grow Local Society, for the “Power of Produce Club”, in the amount of \$3,600;
 - vii. Langley Environmental Partners Society, for the “Langley Eats Local” project in the amount of \$4,400;
 - viii. Maple Ridge Pitt Meadows Agricultural Association, for the “Maple Ridge Pitt Meadows Country Fest” in the amount of \$1,500;
 - ix. Open Science Network Society, for the “Digital Agriculture in Metro Vancouver” project in the amount of 3,000;
 - x. Pacific Immigrant Resources Society, for the “Needs Assessment & Educational Campaign on Food Literacy and Metro” project in the amount of \$6,000; and
 - xi. The Sharing Farm, for the “Interpretive Signage at the Sharing Farm” in the amount of \$4,000.
-

EXECUTIVE SUMMARY

This report provides recommendations to the Regional Planning Committee and MVRD Board to award a total of \$50,000 in Agriculture Awareness Grants to eleven non-profit organizations in 2021. Metro Vancouver has awarded grants for agriculture awareness since 2008, as recommended by the Agriculture Advisory Committee (AAC). The funding is particularly valuable now for community organizations doing public outreach on the value of producing or buying food close to home.

PURPOSE

The purpose of this report is to recommend that the MVRD Board award funding grants to non-profit organizations from around the region that are leading public awareness activities about the importance of local agriculture and food and about educating residents on how to grow and cook food produced in the region.

BACKGROUND

Metro Vancouver Regional District has supported agriculture awareness since 1994 to raise public understanding about the importance of local food and agriculture production in the region. The grant program started in 2008 and continues to provide annual funding to non-profit organizations that host events, workshops and educational programs in schools and communities.

In 2020, a total of \$45,000 in Agriculture Awareness Grants was awarded to twelve non-profit organizations. At that time, staff recognized there was some uncertainty as to whether the groups could deliver their awareness activities in 2020 due to COVID-19. In some cases, projects were postponed until 2021, which was supported by Metro Vancouver. The public event restrictions that emerged due to the pandemic have also changed the type of agriculture awareness activities being proposed around the region.

The number of applications and grants awarded over the past twelve years is listed by year in Table 1. A description of previous grant recipients is available on the Metro Vancouver [website](#).

Table 1: Metro Vancouver Agriculture Awareness Grant Program 2008 – 2020

Year	Number of Applications	Number of Grants Awarded	Funding Awarded
2008	11	3	\$25,000
2009	14	5	\$25,000
2010	14	7	\$30,000
2011	12	9	\$35,000
2012	27	8	\$35,000
2013	13	9	\$40,000
2014	15	11	\$40,000
2015	14	11	\$40,000
2016	12	11	\$40,000
2017	21	13	\$40,000
2018	24	12	\$40,000
2019	15	13	\$45,000
2020	21	12	\$45,000
TOTAL	189	112	\$480,000

GRANT APPLICATION EVALUATION CRITERIA

The mandatory requirements for agriculture awareness projects receiving a grant are:

- a) have a regional scope (impacting more than one municipality);
- b) be located in Metro Vancouver;
- c) be administered by a non-profit organization in good standing; and
- d) have matching funding (dollars or in-kind) from another organization.

The six evaluation criteria and basis for scoring are the following:

1. The agriculture awareness activity is unique. A high score will be given to awareness activities that are one of a kind in the region and are currently not being done by another organization in Metro Vancouver.
2. The geographic scope of the grants awarded reaches out to municipalities across the region. A high score will be awarded to projects that provide a broad reach in Metro Vancouver or are targeting areas that are currently not well served by agriculture awareness activities.
3. The activity reaches out to culturally diverse audiences, urban residents, youth or K-12 school aged children. A high score will be awarded when these audiences are targeted in the awareness activity.
4. The activity contributes to the following desirable outcomes that support regional policy objectives, where a high score is awarded when the agriculture awareness activity aligns with two or more of the regional policy objectives:
 - Educates residents about local food production;
 - Enhances food literacy and skills in schools;
 - Communicates how food choices support the local economy;
 - Supports the next generation of food producers; and
 - Involves community gatherings that educate residents about local food.
5. The grant request is in the range of \$500 to \$6,000. A higher score will be awarded if the Metro Vancouver cash contribution is greater than 20% of the total cash budget, so that projects that may have a greater financial need are prioritized.
6. The extent grant applications previously completed the Agriculture Awareness Grant required conditions listed on the application form. Groups that have not previously received a grant would automatically score high, while the previous grant recipients would be scored based on past compliance with the five conditions.

2021 AGRICULTURE AWARENESS GRANTS

On January 25, 2021, over 50 agricultural-related organizations, community groups and municipal staff liaisons were notified about Metro Vancouver's Agriculture Awareness grants with an invitation to submit an application available on the Metro Vancouver website. Fourteen applications were received by the March 1, 2021 deadline. The grant applications were evaluated by three AAC members and staff using the mandatory requirements and evaluation criteria listed above. Table 2, shown below, highlights the Agriculture Awareness grant applications submitted, the recommended non-profit organizations to receive a grant and the amount.

A summary description of all the applications is provided in Attachment 1 and a list of all the recommended Agriculture Awareness grants is provided in Table 2.

Table 2: List of 2021 Agriculture Awareness Applications and Recommended Grants

#	NON-PROFIT GROUP	PROJECT TITLE	GRANT REQUEST	RECOMMENDED GRANT
1	BC Agriculture in the Classroom Found	Take a Bite of BC	\$6,000	\$6,000
2	BC Chicken Growers' Association	Poultry in Motion™ Educational Mini Barn Program	\$6,000	\$6,000
3	Delta Farmland and Wildlife Trust	Agriculture and Conservation in the Fraser River Estuary Videos	\$6,000	\$6,000
4	FarmFolk CityFolk	BC Seed Gathering	\$6,000	\$6,000
5	Grow Local Society	Power of Produce Club	\$3,600	\$3,600
6	Growing Chefs Society	Metro Vancouver Edible Education	\$6,000	\$3,500
7	Langley Environmental Partners Soc.	Langley Eats Local	\$6,000	\$4,400
8	Maple Ridge Pitt Meadows Agricultural Association	Maple Ridge Pitt Meadows Country Fest	\$1,500	\$1,500
9	Open Science Network Society (OSN)	Digital Agriculture in Metro Vancouver	\$5,000	\$3,000
10	Pacific Immigrant Resources Society	Needs Assessment & Educational Campaign on Food Literacy and Metro	\$6,000	\$6,000
11	The Sharing Farm	Interpretive Signage at The Sharing Farm	\$6,000	\$4,000
			TOTAL	\$50,000

ALTERNATIVES

1. That the MVRD Board award the annual Agriculture Awareness Grants to the following eleven non-profit organizations as described in the report dated May 11, 2021, titled “2021 Agriculture Awareness Grant Recommendations”:
 - i. BC Agriculture in the Classroom Foundation, for the “Take a Bite of BC” project in the amount of \$6,000;
 - ii. BC Chicken Growers’ Association, for the “Poultry in Motion Educational Mini Barn” project in the amount of \$6,000;
 - iii. Delta Farmland and Wildlife Trust, for the “Agriculture and Conservation in the Fraser River Estuary Videos” in the amount of \$6,000;
 - iv. FarmFolk CityFolk, for “BC Seed Gathering” in the amount of \$6,000;
 - v. Growing Chefs Society, for “Metro Vancouver Edible Education” in the amount of \$3,500;
 - vi. Grow Local Society, for the “Power of Produce Club”, in the amount of \$3,600;
 - vii. Langley Environmental Partners Society, for the “Langley Eats Local” project in the amount of \$4,400;
 - viii. Maple Ridge Pitt Meadows Agricultural Association, for the “Maple Ridge Pitt Meadows Country Fest” in the amount of \$1,500;
 - ix. Open Science Network Society, for the “Digital Agriculture in Metro Vancouver” project in the amount of 3,000;

- x. Pacific Immigrant Resources Society, for the “Needs Assessment & Educational Campaign on Food Literacy and Metro” project in the amount of \$6,000; and
 - xi. The Sharing Farm, for the “Interpretive Signage at the Sharing Farm” in the amount of \$4,000.
2. That the Regional Planning Committee receive for information the report dated May 11, 2021 titled “2021 Agriculture Awareness Grant Recommendations” and provide alternate direction to staff.

FINANCIAL IMPLICATIONS

The total amount of dollars available for the Agriculture Awareness grants in 2021 is \$50,000. This amount was approved as part of the annual MVRD Board budget process. If the Board chooses Alternative 1, successful grant recipients will be notified.

CONCLUSION

Based on the evaluation conducted by AAC members and staff, eleven non-profit organizations are recommended to receive grants, for a total amount of \$50,000. The recommendations enable the continuation of successful educational programs and community agriculture-related events in 2021. Staff recommend Alternative 1.

Attachment:

Description of the 2020 Agriculture Awareness Grant Applications

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Description of the 2021 Agriculture Awareness Grant Applications

#	NON-PROFIT GROUP	PROJECT TITLE	BRIEF PROJECT DESCRIPTION	GRANT REQUEST	TOTAL BUDGET
1	BC Agriculture in the Classroom Found	Take a Bite of BC	Provides fresh BC grown products to BC Culinary Arts Secondary schools.	\$6,000	\$170,570
2	BC Chicken Growers' Association	Poultry in Motion™ Educational Mini Barn Program	Upgrade of the Poultry in Motion website with separate pages for schools and teachers.	\$6,000	\$40,000
3	Delta Farmland and Wildlife Trust	Agriculture and Conservation in the Fraser River Estuary Videos	To showcase local agriculture (crops grown, distribution, direct farm marketing and conservation).	\$6,000	\$14,500
4	Don't Go Hungry Food Program	Growing to Sustain	To develop a community garden and food forest (200m ²) for food production.	\$6,000	\$24,359
5	Downtown Eastside Neighbourhood House	Seeds of Connection Family Urban Farm Project	To support the 1/2 acres urban farm and drop-in programs.	\$3,000	\$8,450
6	Ecole Larson Elementary	Larson's Garden Project	Build a community garden on school grounds in North Vancouver.	\$1,000	\$5,000
7	FarmFolk CityFolk	BC Seed Gathering	Support the growth of BC's seed sector including a biennial BC Seed Gathering.	\$6,000	\$30,000
8	Grow Local Society	Power of Produce Club	A farmers market-based children program that teaches children (4-12) about fruits & vegetables.	\$3,600	\$10,500
9	Growing Chefs Society	Metro Vancouver Edible Education	Children grow their own food, connect to local farmers and chefs, and learn where/how food is grown.	\$6,000	\$45,175
10	Langley Environmental Partners Soc.	Langley Eats Local	Delivers interactive learning experiences to school children and the general public about the source of food.	\$6,000	\$57,200
11	Maple Ridge Pitt Meadows Agricultural Association	Maple Ridge Pitt Meadows Country Fest	Live streamed fair with agricultural videos, home produce competitions and week-long 4-H club program.	\$1,500	\$20,000
12	Open Science Network Society (OSN)	Digital Agriculture in Metro Vancouver	Introduces students to 'The Internet of Things', how it can be used to help farmers sustainably grow produce.	\$5,000	\$11,346
13	Pacific Immigrant Resources Society	Needs Assessment & Educational Campaign on Food Literacy and Metro	To identify gaps in local food knowledge among vulnerable populations and create an educational campaign.	\$6,000	\$12,260
14	The Sharing Farm	Interpretive Signage at The Sharing Farm	Create interpretive signage for our sustainable community farm in a public park.	\$6,000	\$27,000
			TOTALS	\$68,100	\$476,360

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To: Regional Planning Committee

From: Marcin Pachcinski, Division Manager, Electoral Area and Environment
Regional Planning and Housing Services

Date: May 19, 2021 Meeting Date: June 9, 2021

Subject: **Evaluation of Regional Ecosystem Connectivity Study**

RECOMMENDATION

That the MVRD Board receive for information the report dated May 19, 2021, titled "Evaluation of Regional Ecosystem Connectivity Study".

EXECUTIVE SUMMARY

Connectivity of habitats is a critical issue for conservation and is particularly important in urban areas where remaining greenspace is often fragmented. The recently completed Evaluation of Regional Ecosystem Connectivity Study evaluates the connectivity of greenspaces in the region by studying the habitat requirements of eight representative species: red-backed vole, red-back salamander, long-toed salamander, muskrat, great blue heron ssp. *fannini*, brown creeper, rufous hummingbird, and pileated woodpecker. The study found that:

- there are more important habitat areas for connectivity for the four bird species compared to the other four mammals and amphibian species;
- the largely protected areas of the north shore mountains provide high levels of connectivity;
- forest patches in-between farmland are the highest ranked stepping stone patches;
- there is a current lack of high value habitat along the shorelines of many of the reaches of the Fraser River; and
- connectivity across agricultural areas is relatively uniform.

The study is intended to be used as a high-level planning tool to help guide development and land acquisition by member jurisdictions throughout the region.

PURPOSE

To present to the Regional Planning Committee and MVRD Board the recently completed Evaluation of Regional Ecosystem Connectivity Study for information.

BACKGROUND

In June 2018, the MVRD Board received a report on the use of land cover data to assess regional ecosystem services. As part of that work, habitat connectivity networks were mapped for three different species, and methods were tested and calibrated to confirm the ability to apply them to other species across the region. Once confirmed, a broader spatial analysis study of regional ecosystem connectivity was included in the 2020 Regional Planning budget. This study, titled Evaluation of Regional Ecosystem Connectivity (Reference 1), has recently been completed and is presented for information in this report.

STUDY OVERVIEW

Connectivity of habitats is a critical issue for conservation and is particularly important in urban areas where remaining greenspace is often fragmented. Reduced connectivity can negatively impact ecosystem services flows, reduce the dispersal ability of plants and animals in the short term, and the viability of populations over longer time frames.

As described in the executive summary of the Evaluation of Regional Ecosystem Connectivity Study (Reference 1), this spatial analysis used land cover and sensitive ecosystem inventory data to evaluate the connectivity of greenspaces in the region by studying the habitat requirements of eight representative species: red-backed vole, red-back salamander, long-toed salamander, muskrat, great blue heron ssp. *fannini*, brown creeper, rufous hummingbird, and pileated woodpecker. These species represent amphibians, mammals, and birds with a variety of home range sizes, dispersal patterns and tolerances to human impacts. The habitat patches in the evaluation should be considered as representations of the most favourable habitat for a guild of species that is represented by each of the eight representative species, rather than focusing on the species itself.

The study identifies where important “key-hub” patches are located for each of the eight representative species, and overall regionally significant patches for connectivity were identified. The model shows that there are more important habitat areas for connectivity for the four bird species compared to the other four mammals and amphibian species. This indicates that Metro Vancouver provides habitat that is better connected for birds compared to terrestrial species.

The North Shore mountains provide a variety of habitat and contain many of the most significant habitat patches in the region for the representative species and also when findings for the species were combined and analyzed. This is unsurprising given that these areas are continuous and well connected and are largely protected as watersheds, parks, or include rugged and inaccessible terrain.

The highest ranked stepping stone patches are forest patches in between farmland in the south-east of Metro Vancouver or adjacent to the already protected natural areas across the region. There is a current lack of high value habitat along the shorelines of many of the reaches of the Fraser River. Connectivity across agricultural areas was found to be relatively uniform, which suggests that vegetated fields allow wildlife to move across the landscape without major barriers, providing a moderate level of connectivity throughout.

The study includes regional scale maps, as well as maps for each member jurisdiction. This information is intended to be used as a high-level planning tool to help guide development and land acquisition by member jurisdictions throughout the region.

ALIGNMENT WITH METRO VANCOUVER PLANS

The Evaluation of Regional Ecosystem Connectivity Study supports *Metro 2040* Strategy 3.2: Protect and enhance natural features and their connectivity, as well as the *Ecological Health Framework* guiding principle of promoting space for nature, which commits Metro Vancouver to working with member jurisdictions to prevent habitat fragmentation and to understand ecosystem connectivity across the region, recognizing that nature needs room to thrive in our rapidly developing region.

NEXT STEPS

Staff will use this spatial analysis to continue to support important work of member jurisdictions in assessing and protecting ecosystem connectivity in their communities. This work also enables the identification and consideration of connectivity across municipal boundaries, which will be promoted to reduce fragmentation of habitats based on jurisdictional boundaries.

ALTERNATIVES

This is an information report. No alternatives are presented.

FINANCIAL IMPLICATIONS

Costs associated with this project were included in the Board-approved Regional Planning program budget.

CONCLUSION

Metro Vancouver is committed to supporting regional ecosystem connectivity through *Metro 2040*, regional growth strategy, and the *Ecological Health Framework*. The Evaluation of Regional Ecosystem Connectivity Study provides data, analysis, and maps that provide an understanding of the region's current ecological connectivity and that can be used to support the work of member jurisdictions in assessing and protecting ecosystem connectivity in their communities.

Attachment (45149349)

Evaluation of Regional Ecosystem Connectivity Study

45750256

Metro Vancouver

Evaluation of Regional Ecosystem Connectivity



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Photo Credit: Mike Hagen ViaAdventures.com



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Executive Summary

Understanding the connectivity of green spaces is critical for conserving biodiversity in our region. This spatial analysis evaluates the connectivity of greenspaces in Metro Vancouver by studying the habitat requirements of eight representative species: red-backed vole, red-back salamander, long-toed salamander, muskrat, great blue heron *ssp. fannini*, brown creeper, rufous hummingbird, and pileated woodpecker. These eight species were selected as, collectively, they require a broad range of life history strategies and traits. These species represent amphibians, mammals, and birds with a variety of home range sizes, dispersal patterns and tolerances to human impacts. The habitat patches should be considered as representations of the most favorable habitat for a guild of species that is represented by each focal species, rather than focusing on the focal species itself.

This study used a spatial prioritization model to evaluate the value of natural areas for supporting and connecting wildlife habitat across Metro Vancouver. The results identified where important “key-hub” patches are located for each of the eight representative species. Regionally significant patches for connectivity were identified. The value of these patches was adjusted to highlight unprotected areas.

This analysis found that the pileated woodpecker has the most connected network followed by rufous hummingbird. The blue heron, red salamander, brown creeper, and muskrat showed lower levels of overall connectivity. The two species with very low levels of connectivity include the long-toed salamander and red-backed vole. The model showed that there are more important habitat areas for connectivity for the four birds species compared to the other four mammals and amphibian species. This indicates that Metro Vancouver provides habitat that is better connected for birds compared to terrestrial species. In general, the birds can take better advantage of the smaller, more urban, less connected features throughout the landscape.

The north shore mountains provide a variety of habitat and contain many of the most significant habitat patches in the region. These mountains are critical for the red-backed salamander and brown creeper, as most of their key-hub patches are on the north shore mountains. The muskrat, long-toed salamander and the great blue heron are all dependent on specific aquatic habitats. The muskrat and great blue heron require access to foreshore habitat, with most key and key-hub patches found along large, connected shorelines throughout Metro Vancouver. The muskrat and long-toed salamander have less habitat than many species, requiring access to riparian habitat.

The software program Zonation was used to combine and analyse the findings for all eight species. At a regional scale, the largest and most highly connected natural areas identified include the extensive forests that interface with the north side of Metro Vancouver. This area represents the interface of natural ecosystems that have been largely protected for our water supply and as parks or include rugged and inaccessible terrain. These areas are continuous and well connected with the extensive natural areas that continue to the north.

Metro Vancouver – Regional Connectivity Report

The highest ranked stepping stone patches are forest patches in between farmland in Langley, in the south-east of Metro Vancouver, or adjacent to the already protected natural areas in the north of Metro Vancouver in North Vancouver, West Vancouver, Coquitlam, Maple Ridge, and Bowen Island.

The southwest marine foreshore is highly valued and provides protected, connected estuaries, intertidal wetlands, and mud flats that are dynamic and rich in food sources for both terrestrial and aquatic species. Inland from the ocean, the arms of the Fraser River extend through Metro Vancouver. The results of this analysis highlighted the lack of high value habitat along the shorelines of many of the reaches of the Fraser River.

The outputs of this analysis show that connectivity across agricultural areas are relatively uniform. The results suggest these vegetated fields allow wildlife to move across the landscape without major barriers, providing a moderate level of connectivity throughout.

The findings from this analysis are illustrated on maps that are scaled to the region as well as each local government. This information is intended to be used as a high-level planning tool to help guide development and land acquisition throughout the region. There are many key-hub patches that have been identified by this modeling exercise that are not currently protected and are vulnerable to the impacts of urban development. This analysis should be considered again in the future as our understanding of species home range sizes, dispersal patterns and tolerances to human impacts is further refined and additional input habitat data is made available for a wider range of species. Future studies could look to include species which better represent the intertidal foreshore areas or focus on understanding the connectivity of freshwater habitats in Metro Vancouver.

1.0 Introduction

The connectivity of ecosystems is a key component of ecosystem function, adaptability and resiliency. As urban areas densify, it becomes increasingly important to understand where valuable habitat patches exist and how they are connected together. Urban greenspace most commonly exist as a fragmented patchwork created by development, roads, utilities, and other land uses (Cen et al., 2015; Irwin & Bockstael, 2007). Habitat fragmentation can negatively impact ecosystem services and reduce the dispersal ability of plants and animals, as well as the long-term flow of genes and viability of metapopulations (Hanski and Gilpin, 1991; Clergeau and Burel, 1997; Ferreras, 2001; Angelone and Holderegger, 2009; Dixo et al., 2009). Quantifying the connectivity of urban greenspaces improves our understanding of the landscape's ability to meet the habitat requirements of a variety of species.

Metro Vancouver provides resources and services to the region to support decision making processes. This spatial analysis evaluates the connectivity of greenspaces in Metro Vancouver by studying the habitat requirements of eight species; red-backed vole, red-back salamander, long-toed salamander, muskrat, great blue heron ssp. *fannini*, brown creeper, rufous hummingbird, and pileated woodpecker. These eight species were selected as, collectively, they require a broad range of life history strategies and traits. These species represent amphibians, mammals, and birds with a variety of home range sizes, dispersal patterns and tolerances to human impacts. The habitat patches should be considered as representations of the most favorable habitat for a guild of species that is represented by each focal species.

This study used a spatial prioritization model to evaluate the value of natural areas for supporting and connecting wildlife across the region. This analysis involved two phases. The first phase included identifying the 8 focal species, determining their critical life requirements, and completing a spatial analysis to identify their critical habitat. The second phase of this project involved a spatial connectivity analysis that considers all of the identified habitat areas for these eight focal species and prioritizes their importance. These findings have been illustrated on maps that have been scaled to the region as well as each City.

This analysis was completed using prioritization software which minimizes bias and provides a consistent output for all of Metro Vancouver. It has been developed to help understand and prioritize which areas are most valuable for connectivity and should be protected to best preserve biodiversity in the Region as it continues to grow. The results, however, are limited by the accuracy of the input habitat mapping as well as the selection of focal species and the understanding of their life requirements.

The goals of this analysis are to:

- Identify important habitat patches for each of the 8 focal species;
- Understand how these habitat patches overlap;
- Identify regionally significant patches that best support all of the focal species;
- Identify patches that are critical for regional connectivity; and
- Identify important patches that are unprotected as parkland.

This report provides a summary of the process used to carry out this analysis as well as preliminary results. This information is intended to be used as a high-level planning tool to help guide development and land acquisition throughout the region.

2.0 Methodology for Phase 1 – Identifying focal species and their critical habitat in Metro Vancouver¹

The first step for this analysis was to identify a number of focal species for connectivity modelling. As freshwater species and the connectivity of freshwater habitat were not included in this analysis, all identified candidate species were terrestrial. 45 candidate regional indicator species were selected with a diversity of life history characteristics. This included 29 birds, 10 mammals and 6 amphibians/reptiles.

A variety of primary and secondary sources were reviewed to determine habitat types, maximum and minimum dispersal distances, minimum patch size, life history parameters, and dispersal limitations. Habitat was typed based on land cover type, forest composition & age, core/edge, and by proximity to marine/freshwater features. Modelling parameters required for this analysis included the median and maximum dispersal and minimum patch size required for survival. Factors that limit dispersal were also identified such as roads and major rivers.

Focal species were then removed based on:

- **Availability of modeling parameter data** (those species for which, after a sustained research effort, we could not reasonably attribute modelling parameters)
- **Length of dispersal distances** (tens to hundreds of km were deemed too long and unsuitable for modelling at the scale of the Metro Vancouver region)
- **Habitat types** (very generalist use of habitat types were removed because their landscapes would be hyper-connected)

A short list of potential focal species was identified consisting of 5 birds, 5 mammals, and 6 amphibians. Modelling and life history parameters for these shortlisted species were summarized into seven criteria. Eight final focal species were selected in collaboration with Metro Vancouver staff to ensure a range of species, habitat types, modelling and life history parameters. The final species chosen, and their life requirements, are summarised in Table 1. They are meant to represent a diversity of habitat requirements and life history characteristics. Species patches should be considered as representations of the most favorable habitat for a guild of species that is represented by each focal species.

¹ Additional details are provided in Appendix 2.

Table 1. Eight focal species selected for this connectivity study, their life history traits and patch habitat requirements.

Species Common Name	Patch Habitat Requirements			Life History Parameters			
	Median Dispersal (m)	Max Distance (m)	Minimum Patch Size (ha)	Average Lifespan (yrs)	# of Offspring per Year or Clutch Size	Maximum Body Length (m)	Average Body Mass (g)
Red-Backed Vole	220	500	0.1	0.5	4.5	0.11	25
Red-Backed Salamander	1.0	36	1.0	<10	5	0.115	-
Long-toed Salamander	200	3,200	30	6	110	0.17	7.5
Muskrat	57	4,000	3.0	3.5	15	0.7	1,200
Great Blue Heron <i>ssp. fannini</i>	2,000	10,000	1.0	23	2.9	1.4	2100 (female)
Brown Creeper	88	2,110	2.3	-	6	0.13	8
Rufous Hummingbird	31	2,000	0.3	1-8	2	0.1	3.4
Pileated Woodpecker	1,650	18,700	1.0	4	3 to 5	0.5	290

The MV 2014 Landcover and Sensitive Ecosystem Inventory (SEI) was the primary geospatial data input used to create habitat patches. A network of high value habitat areas was identified for each species using the parameters listed in the table. Buffers of habitat were erased along roads for species that are sensitive to urban barriers. Rivers and other watercourses were also accounted for as a form of barrier, preventing dispersal for the species that cannot fly and without a water component of their life history strategy. Some other modifications were made for species with specific habitat requirements. A literature review indicated that the great blue heron was unlikely to use forest habitat above 500m and that the red-backed salamander was highly averse to all human disturbances. Further masks were created to modify the habitat patches for these species.

A network of high value habitat areas was identified for each species using the parameters listed in the table. Buffers of habitat were erased along roads for species that are sensitive to urban barriers. Rivers and other watercourses were also accounted for as a form of barrier, preventing dispersal for the species that cannot fly and without a water component of their life history strategy. using the SEI condition assessment. Quality rasters were created for each species based on the size of patches, core and edge condition modifiers, water features and riparian habitat.

Some shallow marine areas and intertidal foreshore/mudflats were included in the analysis, as they are used by two of the eight species. They were included to account for the importance of the connections between the marine foreshore and upland forests. They do not reflect marine species as none were included in this analysis.

Metro Vancouver – Regional Connectivity Report

The Conefor Sensinode software package was used to run a network analysis for each of the eight focal species. Habitat mapping, life requirements and a quality rating were used as inputs to model connectivity importance. Conefor quantified the importance of habitat areas and links for the maintenance or improvement of connectivity. Outputs from this model include Probability of Connectivity (PC) and Integral Index of Connectivity (IIC) metrics. The following terms are key outputs of the first phase of the study (see Appendix 1 for a glossary of terms and acronyms).

Probability of Connectivity (PC): This can be interpreted as the probability that “...two animals randomly placed within the landscape fall into areas that are reachable from each other” (Saura & Pascual-Hortal, 2007a p.93). The PC metric describes the amount of reachable habitat within a landscape both among and within patches.

dPC: This is a metric that measures the effect of node removal on overall network connectivity. dPC combines within-patch and between-patch connectivity to determine overall patch importance.

dPCconnect: This is the measure of a patch’s importance for connecting *other* patches together.

Key Patches: These are the habitat areas that the model has identified as being most important for each species.

Hub Patches (stepping stones): Hub patches are areas that are most important for each species as stepping stones for maintaining connectivity across a landscape. The removal of these patches have a disproportionately large negative effect on connectivity with nearby patches.

Key-Hub Patches: Key-hub patches are patches that meet the requirements of both key patches and hub patches, and are the most important patches to protect from a connectivity perspective.

3.0 Methodology for Phase 2 – Evaluating collective habitat value and connectivity importance²

The first phase of the study identified key-hub patches throughout Metro Vancouver for each of the eight focal species. The second step of this study was to use a spatial analysis software to analyse all of the species' habitat collectively and to prioritize their value towards regional connectivity. The prioritization software Zonation was used to complete this analysis. The inputs for this model included the habitat analysis completed in Phase 1, as well as a Protected Areas layer.

The Protected Areas layer was developed by DHC and contains all areas in Metro Vancouver that are already protected as parkland. This layer was derived from a 2013 Parks Protected Areas layer, which was updated with the most recent municipal open data sources. Protected Areas include those being protected through a land use designation as municipal, regional, or provincial park along with any other areas municipalities included in their parks/protected area GIS layers. Additionally, all parks were considered protected, even if they may not protect natural areas within them (i.e. urban recreational parks were not differentiated from natural areas parks).

There were three tasks associated with this connectivity analysis (illustrated in Figure 1):

1. **Analyze Conefor results** to identify important patches for the 8 focal species.
2. **Process Zonation rasters to identify regionally important areas for connectivity** for the greatest number of species. Rerun with the Protected Areas layer to identify priority areas outside of already protected land.
3. **Identify major connectivity routes** by digitizing key pathways over the Zonation results.

² Additional details are provided in Appendix 3.

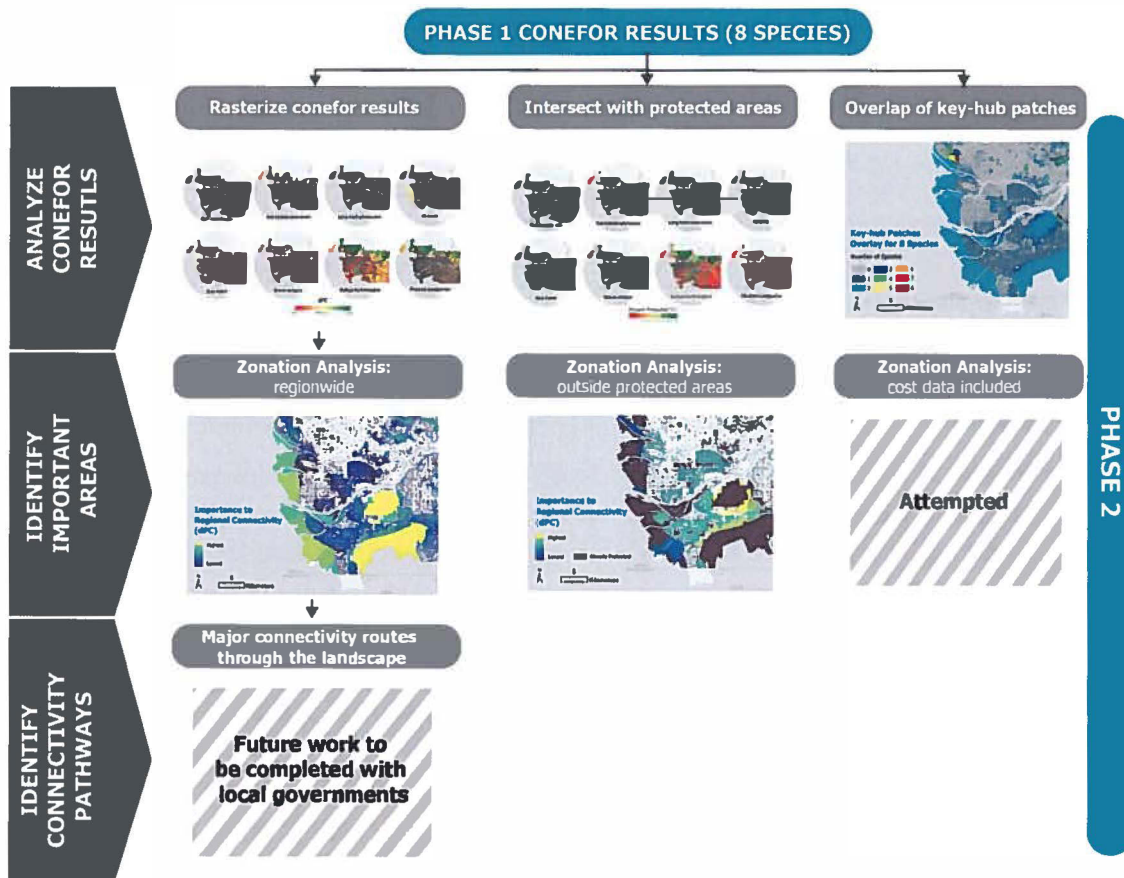


Figure 1. Methodology workflow for Phase 2 of the Metro Vancouver Connectivity study.

Task 1 – Analyze Conefor results to identify important patches for the 8 focal species

Conefor results from Phase 1 were analyzed to characterize patches, species networks, and identify sites of high connectivity value for each of the eight focal species. The most important patches (key patches) for each species were overlayed to determine which areas provide the greatest collective value. Areas that are protected as parks were overlaid with these findings to understand which areas are most at risk.

Key patches were determined by the output metric dPC, which combines within-patch and between-patch connectivity to determine overall patch importance. Hub patches are the most important patches for each species for maintaining the connectivity of their respective networks. Key patches and hub patches for each species were identified based on frequency distribution of dPC and dPCconnect. Typically, the top 5% of patches were selected; however, this was adjusted to up to 20% for species with fewer patches.

Key-hub patches for all 8 focal species were combined. This produced a combined habitat map with a simple overlay to show which patches were important for the greatest number of species. These patches were then overlaid with the protected areas layer to determine which ones are currently not at risk of development.

Task 2 – Process Zonation rasters to identify regionally important areas for connectivity

The outputs from Conefor were rasterized for input into Zonation, with a 5m spatial resolution. Zonation takes raster inputs and ranks each cell based on a given cell removal rule, weights for species that use different habitats, and other indicators such as removal masks (i.e., weighted protected areas, land values). In this project, we used equal weights for all species. We considered each of the 8 species to be equally important for conservation purposes, as they represent 8 unique life history parameters and the multiple species that use similar life history strategies. Protected areas were negatively weighted in the model so that the prioritization outputs would highlight the high value habitat areas that are not currently protected as parkland.

Zonation identified areas that have a high proportion of connectivity distribution (dPC or dPCconnect values) of each species across the landscape. The software removed cells that had the smallest connectivity distribution for each species first. The last site to remain in the landscape were the cells with the highest connectivity distribution for the greatest number of species. Zonation assigned ranking values, ranging from 0 – 1, to cells across the landscape based on the order that the cells were removed. The cells removed first received lower values and are considered less important. The cells removed last received higher values and are considered more important in terms of connectivity.

Zonation raster processing included multiple iterations in consultation with Metro Vancouver's staff and subject experts. The following combinations of inputs were explored in this phase:

- 1 Combination of dPC and dPCconnect. This identifies the important areas in terms of connectivity values regionwide.

- 2 Combination of dPCconnect and protected areas. This identifies the important areas located outside protected areas that contribute the greatest to regional connectivity.
- 3 Incorporate land cost to identify “low-hanging fruit” for parkland acquisition.

Two final maps were produced based on the first two inputs. The incorporation of land cost was attempted, however, the results were not considered helpful for identifying priority areas for connectivity conservation. More details are provided in Section 4.2.

Task 3 – Identify major connectivity routes by digitizing key pathways over the Zonation results

Using the results of the zonation analysis, an attempt was made to identify important regional connectivity corridors throughout Metro Vancouver. In some cases, clear, high value routes were evident. In other areas including many agricultural fields, they were not clear enough to definitively identify a preferred route. Providing a region-wide connectivity network is not possible based solely on the output data. When identifying critical corridors, other values in addition to wildlife movement should be considered. For example, riparian areas of streams should be prioritized over non riparian forests of equal connectivity value as they provide aquatic habitat. Due to the complexities of this analysis, this report provides the output of the model but does not include delineation of a region-wide connectivity network. This work needs to be done at a finer scale and in conjunction with individual municipalities and experienced biologists that are familiar with the natural areas in Metro Vancouver.

4.0 Results and Discussion

Results from both phases of the connectivity study are presented and discussed under the three tasks described in the methodology.

Task 1 – Analyse Conefor results to identify important patches for the 8 focal species

The probability of connectivity (PC) was calculated for the 8 focal species. This value indicates how connected the landscape is for that species, quantifying the amount of reachable habitat per species. The results indicate that the pileated woodpecker has the most connected network, with PC values ranging from 0.04 to 0.25 depending on the subset area (Figure 2). The rufous hummingbird followed with second highest overall connectivity values, with PC ranging from 0.002 to 0.12. The blue heron, red salamander, brown creeper, and muskrat showed lower levels of overall connectivity with values of 0.002, 0.001, 0.0009 and 0.0008 respectively. The long-toed salamander and red-backed vole showed the lowest connectivity values of 0.0001 and 0.0000004.

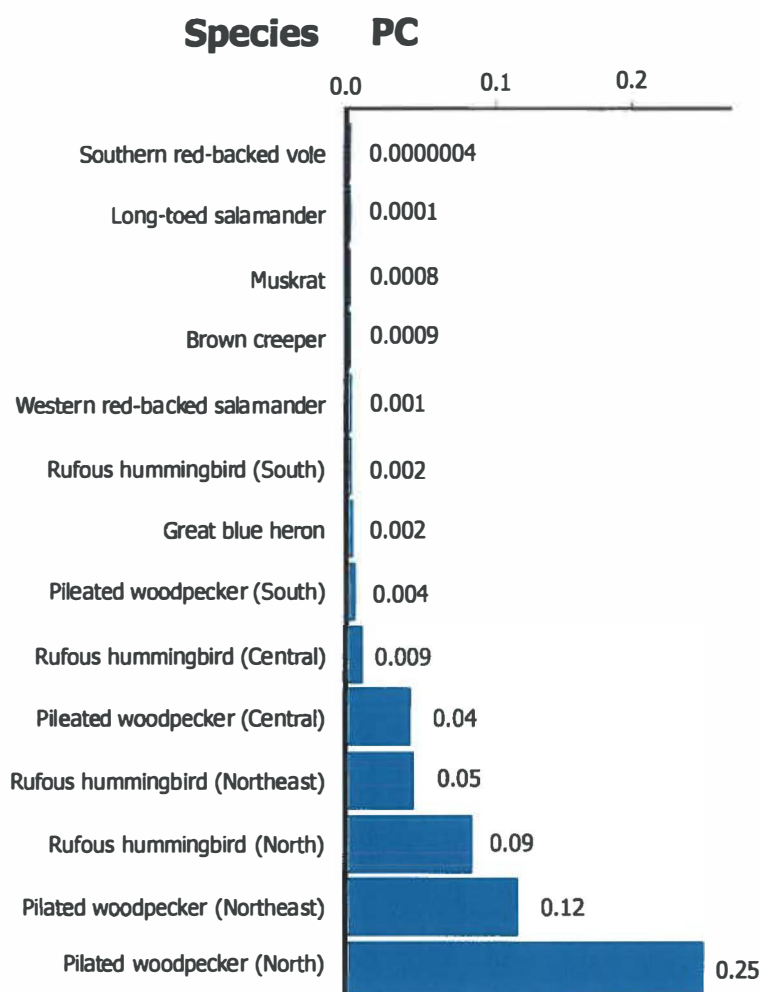


Figure 2. PC values, representing how well the landscape is connected for the eight focal species in Metro Vancouver.

A related metric of PC is dPC. While PC quantifies the overall level of landscape connectivity of a given species network, dPC measures the effect of node removal on overall network connectivity and identifies key patches in the network. Figure 3 highlights the components that dPC consists of: *dPCintra*, a measure of intrapatch connectivity, *dPCconnect*, the importance of a patch for connecting other patches together, and *dPCflux*, a measure of how connected a patch is to the network.

All four bird species have higher sum dPC values compared to non-bird species (Figure 3). This indicates the presence of more critical habitat areas for connectivity compared to the other four species. The four bird species are characterized by a large portion of dPCconnect making up the sum dPC value. This indicates the important role stepping stones play in the four bird species network compared to the other species. This indicates that Metro Vancouver provides habitat that is better connected for birds compared to terrestrial species.

Conversely, the remaining four species are largely comprised of dPCintra and have overall lower sum dPC value. These two factors indicate low network connectedness, a reliance on intrapatch connectivity, and the presence of more isolated patches.

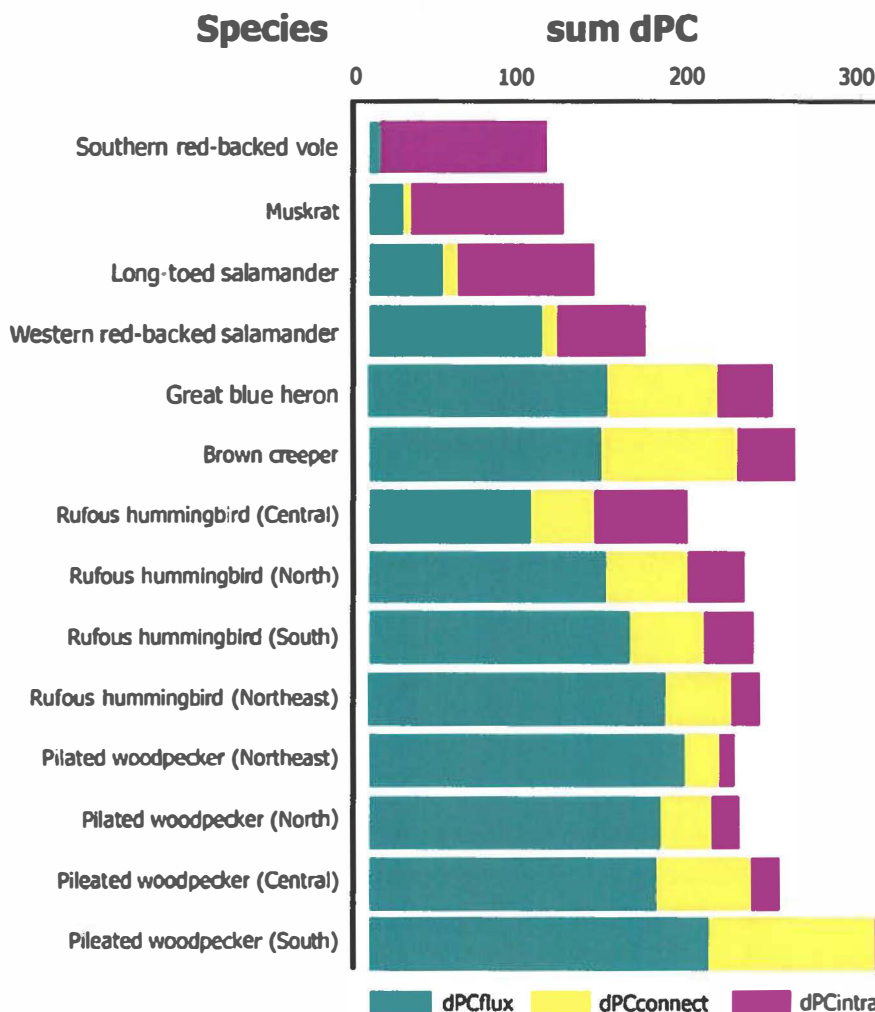


Figure 3. Sum of node importance for 8 species in Metro Vancouver. The length of each bar represents sum dPC which is comprised of patch connectedness (dPCflux), stepping stones (dPCconnect), and intra patch connectivity (dPCintra).

Every species patch has been ranked by dPC to examine the spatial distribution of both between and within-patch connectivity (Figure 4). The northern areas of Metro Vancouver are characterized by a higher proportion of large, high dPC value patches. The main exceptions are the long-toed salamander, muskrat, and the great blue heron, whose high importance patches lie within estuaries, wetlands, and mudflats to the south (Figure 4). Numerous small patches important to connectivity are found throughout urban areas, namely for the rufous hummingbird and the pileated woodpecker, as well as the southern red-backed vole.

The distribution of patches classified as key, hub, or key-hub, as well as any remaining patches, are illustrated in Figure 5. Key patches represent all elements of connectivity. The distribution of key patches (shown in pink and blue in Figure 5) mirrors the distribution of dPC values. The key-hub patches are the most important patches in the network, as they provide critical habitat on their own, while also linking the network as a whole. These key-hub patches are likely to be sources of species emigrants to other patches.

Many patches for each species are both key and hub patches (i.e., key-hub patches). Species with a high abundance of large key-hub patches include the rufous hummingbird, red salamander, pileated woodpecker, and blue heron. The long-toed salamander, brown creeper, muskrat and pileated woodpecker have large key patches that are not considered hubs (figure 5). The patches that are uniquely hubs are relatively rare and mostly concentrated in the southeast or northeast of Metro Vancouver.

In general, the birds can take better advantage of the smaller, more urban, less connected features throughout the landscape. The rufous hummingbird and pileated woodpecker have the most abundant habitat types throughout Metro Vancouver and are highly connected.

The north shore mountains provide a variety of habitat and contain many of the most significant habitat patches in the region. These mountains are critical for the red-backed salamander and brown creeper, as most of their key-hub patches are on the north shore mountains. The red-backed vole has minimal habitat in Metro Vancouver, and the patches that do exist are relatively disconnected and concentrated in the north shore mountains, with additional patches in Vancouver and Bowen Island.

The muskrat, long-toed salamander and the great blue heron are all dependent on specific aquatic habitats. The muskrat and great blue heron require access to foreshore habitat, with most key and key-hub patches found along large, connected shorelines throughout Metro Vancouver. The muskrat and long-toed salamander have less habitat than many species, requiring access to riparian habitat. There are numerous hubs along the north shore and eastern Lower Mainland that connect their key patches, allowing them to take advantage of habitats further apart. Overall, the long-toed salamander has several long, disconnected key patches, and may have more isolated populations.

When comparing the extent of key-hub patches with areas that are protected, it was found that many large key-hub patches fall within protected (park)land for all 8 species (Figure 6). The key-hub patches in the northern region of Metro Vancouver are especially well protected. These areas represent largely intact forests protected for water supply purposes, as well as regional and provincial parks.

While many key-hub patches are protected as parkland, there are some important patches that are not. Patches of habitat which are protected as parkland to a lesser degree include the western portion of Bowen Island, which represents key-hub patches for the red salamander and rufous hummingbird, and the area to the east of Golden Ears Provincial Park, which contains key-hub patches for the red salamander, rufous hummingbird, and the pileated woodpecker (Figure 5).

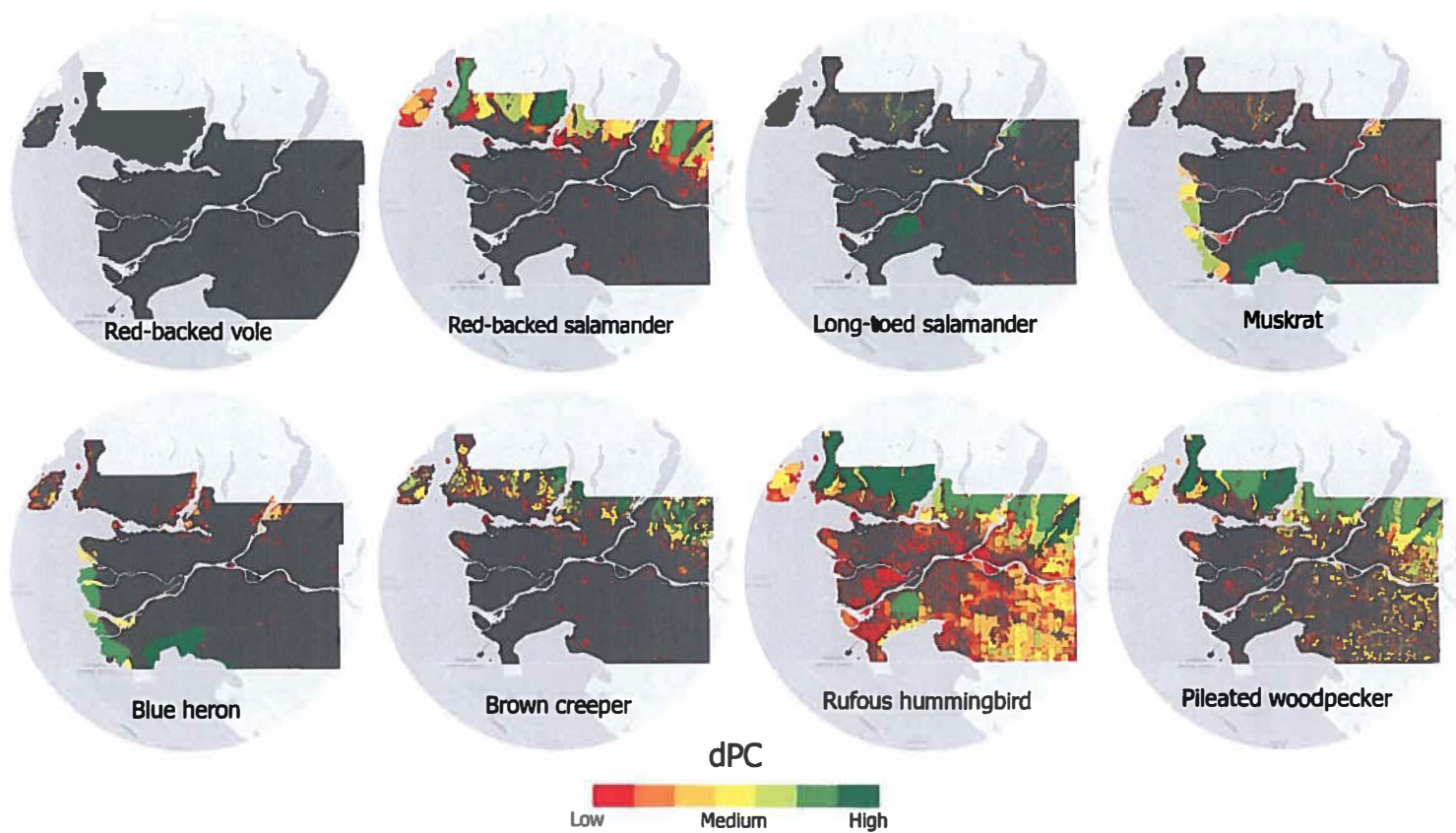


Figure 4 dPC values mapped for all 8 species. A geometric interval was used to classify values due to the large number of small DPC values. Low dPC values are shown in red, while high dPC values are green.

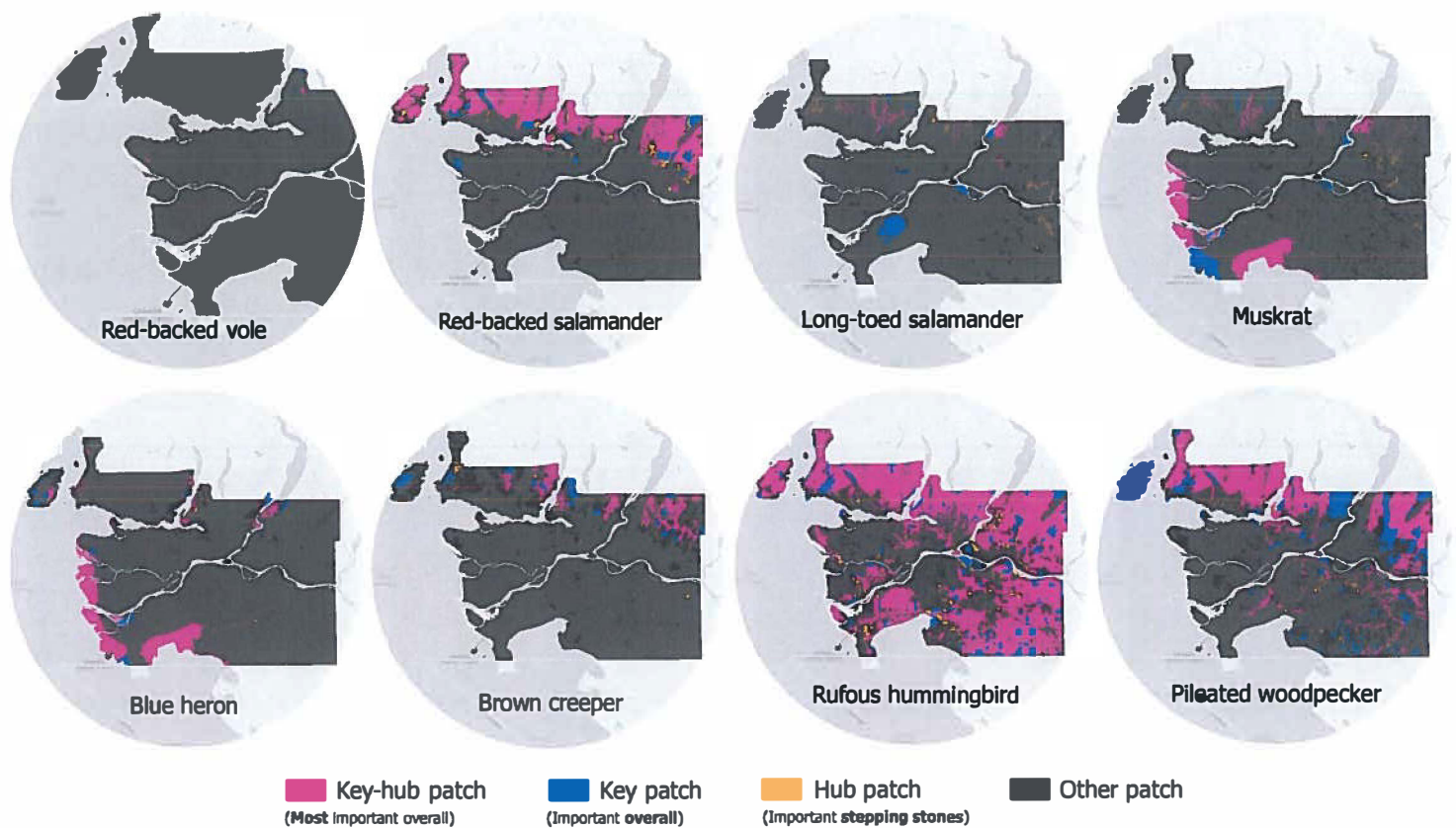


Figure 5. Key and hub patches for all 8 species modelled. Key patches are shown in blue, hubs in orange, and overlap in pink. Patches that are neither key nor hub are black.

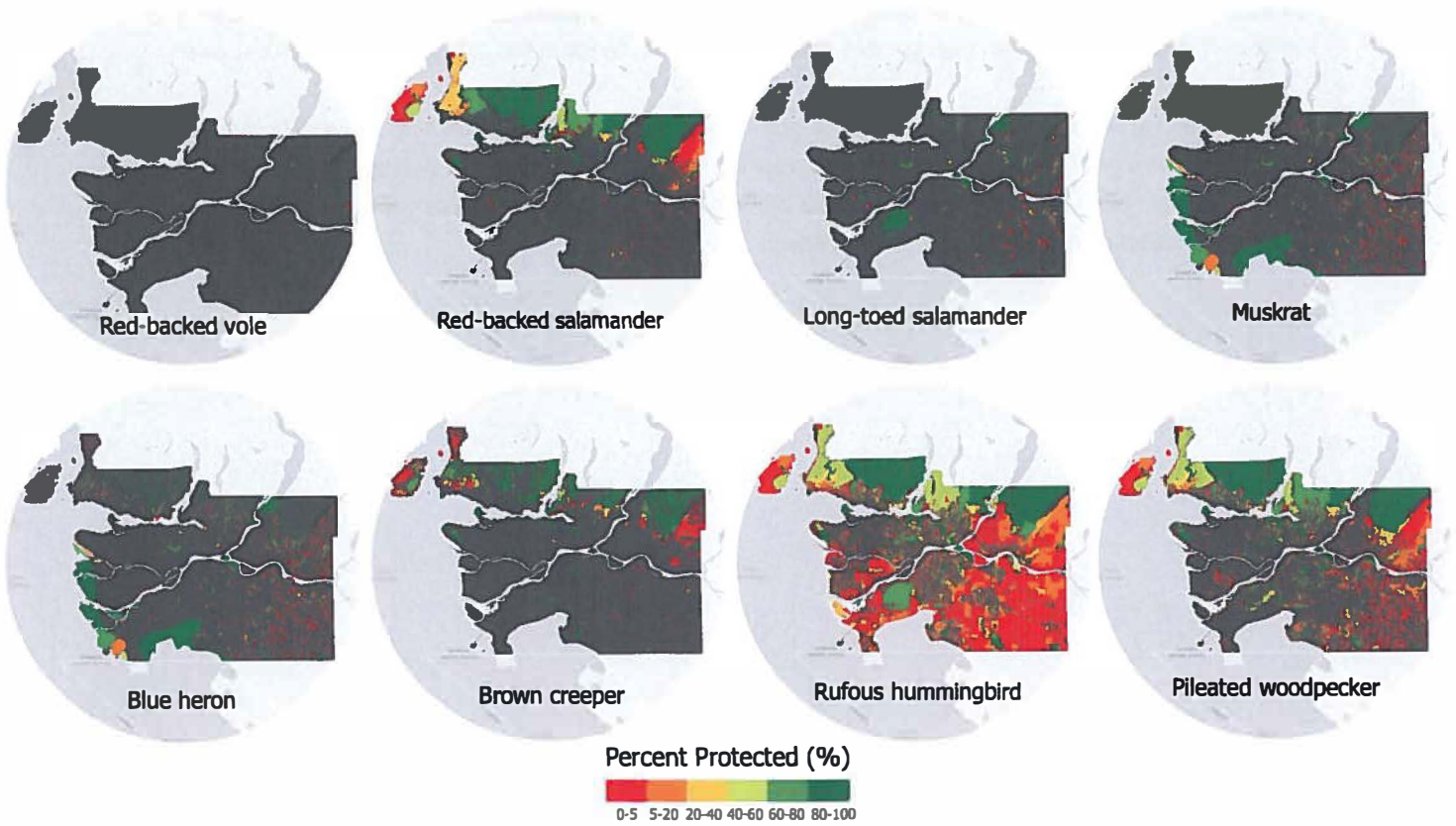


Figure 6. Habitat patches for all 8 species displayed by percent protected area. Protected Areas include those being protected through a land use designation as municipal, regional, or provincial park along with any other areas that municipalities included in their open data parks/protected area GIS layers.

Task 2 – Identify the overall most important patches for connectivity using Zonation

After identifying the key, hub, and key-hub patches per species, the resulting habitat patches needed to be prioritized within the larger network. Two methods were employed to identify the regionally most important patches for connectivity for all eight representative species. First, to highlight important connectivity habitat for all eight species, the overlap between key-hub patches was mapped (Figure 7).

Figure 7 illustrates the overlaid key-hub patches. The largest patches with the most overlap are located in the north of Metro Vancouver, specifically in the north of Bowen Island, near Lynn Valley in North Vancouver, in the northeast near Golden Ears Provincial Park, and Maple Ridge. These patches, shown in red, contain significant key-hub patches for 7 or 8 of the focal species. The south of Metro Vancouver also has areas with high species overlap, however, these areas are smaller and further apart.

While overlaying key-hub patches per species provides insight into the patches that provide habitat for the highest number of species, it does not incorporate the relative importance of the key-hub patches per species. The overlay does not differentiate between key-hub patches for each species; all key-hub patches are treated equally across the eight species.

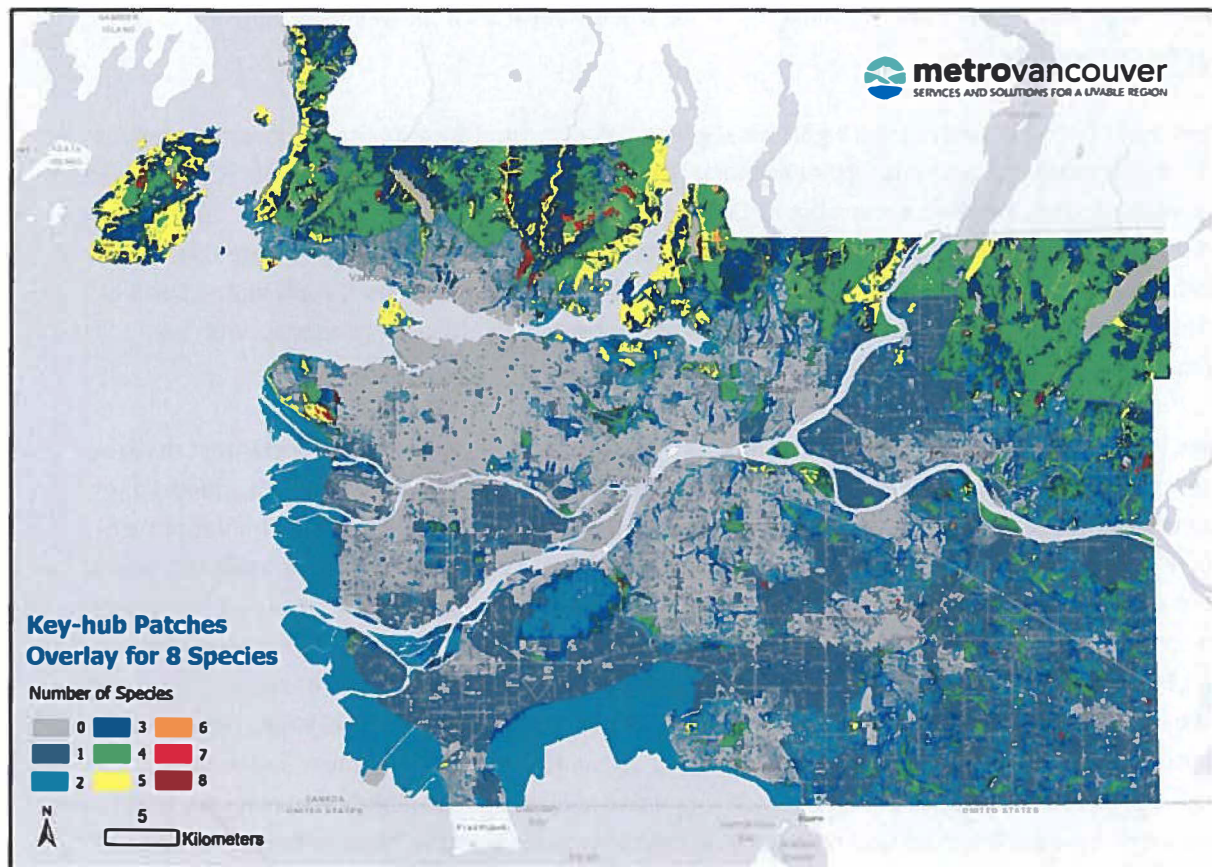


Figure 7. Overlap of key-hub patches for all 8 species modelled.

The modelling software Zonation was used to incorporate the variability in importance of key-hub patches per species, providing a more nuanced approach to identifying the most regionally significant key-hub patches for connectivity (Figures 8 & 9). Zonation provides a repeatable, quantitative assessment of habitat value while minimizing the influence of professional bias. dPC and dPCconnect, outputs of Conefor, were both modeled in Zonation; however, dPCconnect was identified as the more useful output to map as part of this report (Figure 8). dPCconnect is the measure of a patch's importance for connecting other patches together; as such, it is a more useful measure of interpatch connectivity. This enables us to better identify smaller patches in the network that may not provide a significant amount of habitat on their own but play an important role in connecting other habitat patches together. The loss of these habitat patches would have a disproportionately large effect on the regional connectivity.

The outputs from this analysis still highlights the large intact natural areas that are known to provide high habitat value. This analysis further supports their importance to connect habitat across the region. At a regional scale, the largest and most highly connected natural areas identified include the extensive forests that interface with the north side of Metro Vancouver (Figure 8). This area represents the interface of natural ecosystems that have been largely protected for our water supply and as parks or include rugged and inaccessible terrain. These areas are continuous and well connected with the extensive natural areas that continue to the north.

While this analysis does not include freshwater or marine species, it does include species that make use of these areas for habitat. As such, high value and highly connected habitat has been identified along the marine foreshore and mudflats that interface with the west and south sides of Metro Vancouver (Figure 8). This is in stark contrast to Figure 7, where only 2 species were identified as using this habitat. These areas, however, are prioritized by zonation as playing an important connectivity role in the region and providing high value habitat for the species that do make use of it. A number of foreshore habitat areas however, came out as less important for regional connectivity than one might expect. This is due to the inclusion of these foreshore areas solely on how they connect to terrestrial habitat and how they are used by the selected focal species. The emphasis on the terrestrial environment undervalues these foreshore areas as it excludes the importance for marine species and shorebirds. Unprotected foreshore areas were removed from the final map to avoid misinterpretation and to focus on terrestrial habitats (Figure 9).

The large, connected habitat patches at the north edges of Metro Vancouver are consistently identified as the most regionally important key-hub patches, even when minimizing the importance of intrapatch connectivity. This output makes it difficult to identify the unprotected and smaller key-hub patches that are most important to connectivity in urban and rural communities. In order to mask out these large, connected habitat patches, Zonation was run a second time with a Protected areas layer mask (Figure 9). By masking the protected patches, the model identified unprotected, key-hub habitat patches that are most important to connectivity and are not currently protected as parkland.

Most large natural areas are highlighted as moderate to high value. These are mostly protected as parks as shown in Figure 9. Examples include Stanley Park, Pacific Spirit Regional Park, Tynehead Regional Park, Burnaby Lake Regional Park, Burnaby Mountain Conservation Area, Campbell Valley Regional Park, Belcarra Regional Park, Mundy Park, Burns Bog Ecological Conservancy Area, Surrey Bend Regional Park, Richmond Nature Reserve, Colony Farm Regional Park, Green Timbers and Sunnyside Acres Urban Forests. Some of these areas are not rated as highly as may be expected; however, this is likely due to how continuous and connected the natural areas of the north shore mountains are. While many of these natural areas are intact and healthy, they are still isolated and not directly connected to other large natural areas. It is important to consider these fragmented areas during land use planning as these islands are inherently more at risk of having isolated populations that may experience genetic drift.

Figure 9 displays the importance of stepping stone habitat which lies outside of protected areas. The areas with highest importance (in yellow) often correspond to the areas in red in the key-hub patch overlap map (Figure 7). The highest ranked patches are forest patches in between farmland in Langley, in the south-east of Metro Vancouver, or adjacent to the already protected natural areas in the north of Metro Vancouver in North Vancouver, West Vancouver, Coquitlam, Maple Ridge, and Bowen Island.

The southwest marine foreshore contains protected estuaries, intertidal wetlands, and mud flats that are dynamic and rich in food sources for both terrestrial and aquatic species. Inland from the ocean, the arms of the Fraser River extend through Metro Vancouver. The results of this analysis highlighted the lack of high value habitat along the shorelines of many of the reaches of Fraser River (Figure 8). These areas have been degraded from a long history of industrialization of these shorelines and armoring to protect against flooding. There are, however, several remaining islands and floodplain areas that are identified as high value habitat areas.

The outputs of this analysis are not as defined as expected within areas used for agriculture. These areas generally provide a mosaic of cultivated vegetation intermixed with parks, and linear natural areas generally following major rivers. Within these areas, the more naturalised habitat patches are highlighted as important hubs for the species included in this study. However, the outputs from the connectivity analysis show these agricultural areas as providing continuous moderate value without differentiating the natural patches from the agricultural fields. This suggests these generally vegetated fields allow wildlife to move across the landscape without major barriers, providing better connectivity than urban areas.

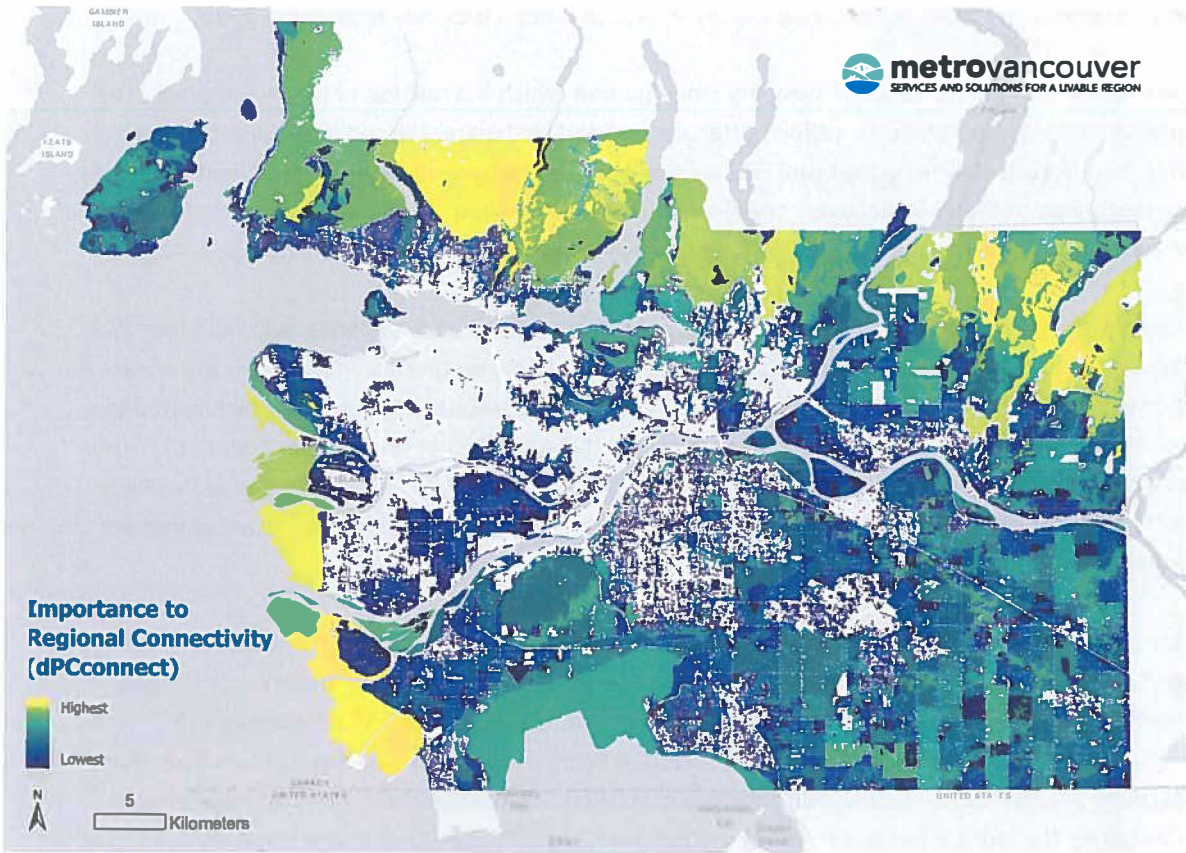


Figure 8 Spatial conservation prioritization based on stepping stone importance (dPCconnect), with all patches with the same weighting.

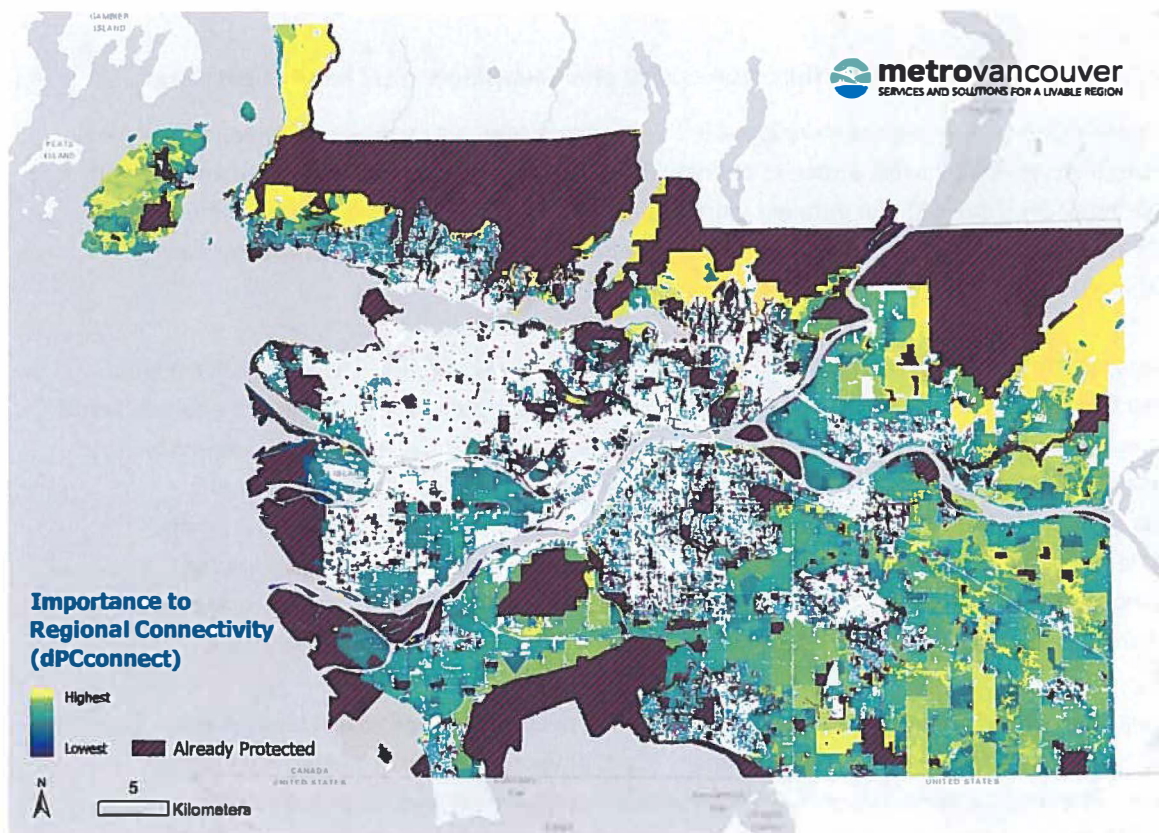


Figure 9 Spatial conservation prioritization based on stepping stone importance (dPCconnect), with lower weight to the already protected areas.

Land Cost Analysis

The model was run with an input layer based on land assessment data that accounts for the cost of land in Metro Vancouver. This was done to identify high value habitat areas that are also relatively cost effective to acquire. However, the initial results of this analysis were inconsistent. In some cases, fragmented areas that were previously identified as relatively unimportant to regional connectivity in earlier iterations were identified as very high importance in this iteration due to their relatively low cost. This is likely because it is difficult to account for the variation of cost across an area as big as Metro Vancouver using just land use and cost point data. It was decided that incorporating costing into this model skewed the results; therefore, the cost layer was not used in the analysis.

3.3 Task 3: Identify key areas for connectivity and ‘stepping-stone’ habitat patches

The highest value key-hub patches were identified throughout Metro Vancouver. They were identified per species (Figures 4 & 5), using a species overlay (Figure 7), and using dPCconnect, with and without the protected layer (Figure 8). For detailed municipality maps, refer to Appendix 4. These maps use zonation and DPC connect to incorporate key-hub patches for all 8 species and identify the most important patches for regional connectivity at a municipal level.

Often times existing parks were identified as high value connectivity patches. These areas have been protected from degradation and represent intact patches for multiple species used in this analysis. Some of these existing parks are also part of green infrastructure networks developed by local municipalities. Through agricultural areas, there is a broad moderate capacity to support wildlife movement, particularly for birds. While these areas were not identified as protected for the purposes of this analysis, lands located within the Agricultural Land Reserve are protected from many types of development, are often pervious, and contain vegetation. This offers a level of protection that is often absent from urban areas; however, it does not ensure that native ecosystems remain intact.

Identifying a prioritized connectivity network for wildlife movement proved to be complex and challenging. The prioritization of corridors changes depending on the scale of the network being developed. At a regional scale, connectivity follows large natural areas and major movement corridors. At this scale, many of the smaller corridors, such as riparian areas through developed neighborhoods, are not prioritized. These smaller corridors however are locally important.

Regional connectivity corridors were manually identified by project biologists by using the priority areas identified by the analysis; however, clear connectivity corridors did not emerge solely from the zonation results. While there are some obvious corridors throughout the landscape, these are often narrow and do not provide much intra-patch connectivity. The natural areas that extend through agricultural areas were not prioritized as clearly by Zonation as expected due to the ability of cultivated field to allow wildlife movement. This report provides the output of the model but does not include delineation of a region-wide connectivity network, as this work needs to be done at a finer scale and in conjunction with individual municipalities.

5.0 Limitations

This analysis was completed using prioritization software that provides a consistent output for all of Metro Vancouver, with minimal reliance on professional judgement, thereby reducing the potential for bias. The results illustrate the relative value of the fragmented habitat that remains within our urban areas to the extensive natural areas that extend north from our cities. The use of models, however, does have limitations, and assumption were made.

Results are limited by the accuracy of the input habitat mapping, the focal species chosen, and understandings of their life requirements. The lifecycle characteristics of each species was based on existing scientific findings. It was often difficult to derive exact habitat patch size and dispersal information of a species. There is always variability among individuals and populations of a species, and we were limited to species that have been studied extensively, and for which data was available in scientific literature. Another limitation is the use of Euclidean (straight-line) distances to model links between patches. More sophisticated software can generate least-cost resistance paths, which are more realistic pathways for species movement; however, for species such as birds this may be an accurate presentation of how they move through space and Euclidean distances were considered sufficient for this study.

In the absence of presence/absence data, landcover classes were used as proxies for species habitat. This analysis was largely a desktop-exercise, with the use of local expert knowledge of the study area applied in determining these habitat types. Inherently, there will be some inaccuracies between the modelled patches and the actual presence of species in those patches. Interspecific interactions can also affect how each species uses the landscape; this is especially true for territorial species and development-sensitive species. Finally, the landscape is continually changing and some of this data may not be accurate to current day conditions. These uncertainties must be considered when evaluating the results of this study.

6.0 Summary of Results and Next Steps

This regional study was undertaken to evaluate the value of natural areas for supporting and connecting a diversity of terrestrial wildlife habitat across Metro Vancouver. The results of this study are intended to help decision makers understand and prioritize which habitat patches are most valuable to regional connectivity.

Evaluating the value of natural areas for the health of wildlife is complex. There are variables that affect species from the scale of the population to the individual. The climate and ecosystems it effects are dynamic and continually changing. This model attempts to prioritize important habitat and the effect that patch loss will have on the connectivity of other areas. It provides a repeatable, quantitative assessment of habitat value while minimizing the influence of professional bias.

An overlay has been produced of all key-hub patches for the eight representative focal species; areas in red represent regionally significant key-hub patches that provide important habitat for 7 or 8 of the species modelled. These areas are likely biodiversity hotspots and should be protected to preserve biodiversity in the Region as it continues to grow.

Interpretation of the key-hub maps should include the collective outputs as well as the individual species. While overlaying all of the key-hub patches together provides valuable collective information, it does not account for the relative importance of the key-hub patches per species. Decisions for land use should consider at-risk species such as the blue-listed Great Blue Heron. They should also consider species which have few remaining key-hub patches such as the red-backed vole.

Interpreting the vulnerability of habitat areas should consider the designation of protected areas. For the purposes of this layer, protected areas include those being protected through a land use designation as municipal, regional, or provincial park along with any other areas municipalities included in their open data parks/protected area GIS layers. Lands protected through other means (ex. Agricultural Land Reserve (ALR), Development Permit Areas, covenants, etc.) were not included in this layer. Additionally, all parks were considered protected, even if they may not protect natural areas within them (i.e. urban recreational parks were not differentiated from natural areas parks).

There are many key-hub patches that have been identified by this modeling exercise that are not currently protected and are vulnerable to the impacts of urban development. The outputs of this modeling exercise should be used by land managers when considering the protection of areas for wildlife habitat. This analysis should be considered again in the future as our understanding of species home range sizes, dispersal patterns and tolerances to human impacts is further refined and additional input habitat data is made available for a wider range of species.

Future studies could look to include species which better represent the intertidal foreshore areas. They could also focus on understanding the connectivity of freshwater habitats in Metro Vancouver, as this study was focused on terrestrial species. In addition, the study chose to weigh all species equally; future studies could incorporate additional species or look to prioritize species at risk of extirpation or extinction. The patches identified in this study could be used to help understand the importance of patches to a regional Green Infrastructure Network (GIN); however, the development of this network should consider values beyond connectivity such as land use designation, the presence of sensitive habitat features and species at risk. A regional GIN could also look for opportunities to improve connectivity through habitat enhancement, incorporating areas that have value by nature of their location, but are currently largely developed (ex. along the Fraser River).

Appendix 1 Glossary

DHC: Diamond Head Consulting

dPC: dPC is a metric of PC, and measures the effect of node removal on overall network connectivity. dPC combines within-patch and between-patch connectivity to determine overall patch importance, identifying key patches within the landscape.

dNC: dNC is a measure of how important a patch is for maintaining component integrity. The value of dNC becomes more negative with the importance of the patch

dPCconnect: dPCconnect is the measure of a patch's importance for connecting *other* patches together.

Hub Patches (stepping stones): Hub patches are areas that are most important for each species as stepping stones for maintaining connectivity across a landscape. The removal of these patches have a disproportionately large negative effect on connectivity with nearby patches. Hub patches are determined using dPCconnect and dNC. Any patches with a dNC < 0 were identified as hub patches whose removal would increase habitat fragmentation.

Key Patches: Key patches are the most important areas for each species, and overall connectivity, as determined by dPC, which combines within-patch and between-patch connectivity to determine overall patch importance.

Key-Hub Patches: Key-hub patches are patches that meet the requirements of both key patches and hub patches and are the most important patches to protect from a connectivity perspective.

MV: Metro Vancouver

Probability of Connectivity (PC): PC can be interpreted as the probability that "...two animals randomly placed within the landscape fall into areas that are reachable from each other" (Saura & Pascual-Hortal, 2007a p.93). In other words, the PC metric describes the amount of reachable habitat within a landscape both among and within patches.

Connectivity metrics calculated using Conefor, adapted from Saura and de la Fuente (2011).

Metric Name	Formula/Explanation	Description
Probability of Connectivity (PC)	$PC = \frac{\sum_{i=1}^n \sum_{j=1}^n a_i \cdot a_j \cdot p_{ij}}{A_L^2}$ $= \frac{PCnum}{A_L^2}$	PC is the probability that "... two animals randomly placed within the landscape fall into areas that are reachable from each other." Probabilities between patches are based on median dispersal distances having a probability of 0.5. The patch attribute, <i>a</i> , is the area-weighted quality of a patch.
dPC	$dPC(\%) = \frac{PC - PC'}{PC} \times 100$ <p>and</p> $dPC = dPCintra + dPCflux + dPCconnector$	Measures the effect of node removal on overall network connectivity (PC). dPC is the percent contribution of a node (<i>k</i>) to PC. The value of PC after removing node <i>k</i> (PC') is subtracted from the overall value of PC. The difference between the two values is then expressed as a percentage of PC. dPC is composed of three node importance metrics explained below.
dPCintra	Available habitat provided by a patch (<i>k</i>) itself: $a_i \times a_j$ when $i = j = k$ (a_k^2). Where <i>a</i> is area-weighted quality.	dPCintra is the percent contribution of a patch to intrapatch (within-patch) connectivity . It is not affected by number of links or link probabilities.
dPCflux	Area-weighted dispersal flux from a patch (<i>k</i>) to or from all other patches in a network: $a_i \times a_j \times p_{ij}$	dPCflux measures how connected a patch is in the network . dPCflux depends on the area-weighted quality of a patch and its position in the network. It differs from dPCconnector in that it doesn't measure how important a given node is for connecting <i>other nodes</i> together, but rather how connected an individual node is itself to the rest of the network.
dPCconnector (Stepping Stone Importance)	Contribution of patch <i>k</i> to the connectivity of neighbouring patches. The sum of $a_i \times a_j \times p_{ij}$ for any number of pairs of patches, <i>i</i> and <i>j</i> , around a given patch <i>k</i> . Patch <i>k</i> must be part of the best path between <i>i</i> and <i>j</i> .	dPCconnector is a measure of how important a patch is for connecting other patches together. It can be thought of as stepping stone importance. dPCconnector is independent of a patch's area-weighted quality, and depends only a patch being part of the <i>best</i> path for dispersal (i.e. when $p_{ik} \times p_{kj}$ is highest).
NL (Degree)	e_k where <i>e</i> is the number of links for a given patch, <i>k</i> .	The number of links (also called edges) of a given patch. Node (patch) degree distributions can help to characterize a network into different typologies.
Number of Components (NC) and dNC	The number of components in the network (NC). dNC measures the importance of a patch for maintaining component integrity.	Components are groups of connected patches. In a component every patch is connected to every other patch by at least one link. Isolated patches are also components. NC allows for component ID but also individual patch membership in a component. For dNC, increasingly negative values denote greater patch importance.

Appendix 2 Detailed Methodology – Phase 1

NOTE: This appendix is a reproduction of the Phase 1 Methodology Report. It has not been systematically updated after the completion of phase 2.

For a general overview of the connectivity modelling methods used in this study, please see the Metro Vancouver pilot connectivity study conducted by Williams *et al.* (in Ruan *et al.*, 2017³), and the Regional Greenspace Connectivity User Guide (Nicoletti & Clark, 2018⁴). The methods below detail new or different steps taken in the expanded modelling analysis for RFSQ 19-361.

These methods are also best reviewed in concert with the Species Parameters and Selection criteria deliverable, the Excel file 191223_FocalSpp_w_SelectionCriteria.xlsx.

Tasks 1 and 2: Define a method or criteria to determine 7 to 10 suitable focal species for connectivity analysis and selection of focal species.

Deliverable: *Species Parameters and Selection Criteria*. Includes focal species list, species attributes, species selection criteria, quantitative visualizations, and calculations of modeling parameters. Sources for research also included.

6.1.1 Species research and data organization methods

The first goal in our analysis was to identify focal species for connectivity modelling. Candidate focal species were drawn from regional indicator species identified in a 2003 report for the Ministry of Water, Land and Air Protection (Lee & Rudd, 2003) as well as the extensive list of native species and their associated habitat included in Surrey's Biodiversity Conservation Strategy (BCS) (Diamond Head Consulting & City of Surrey, 2014). From our initial survey we chose 45 species with a diversity of connectivity and life history characteristics that fit into three broad classes: Birds (29), Mammals (10), and Amphibians/Reptiles (6).

Each species was researched using information from the Lee & Rudd and Surrey BCS reports, as well as peer-reviewed journal articles, NatureServe.org profiles, field guides, and species at risk documentation, among other sources. The Santini *et al.* (Table S1, 2013) table of dispersal distances for a number of mammal species, which itself cites multiple primary sources, was also used. Conefor modelling and life history parameters were documented (Table 2) as well as habitat types used for creating habitat patches and assigning habitat quality (Table 3). Sources used for each species are included in the tabular ***Species Parameters and Selection Criteria*** deliverable, with an accompanying folder of source material. Instructions and criteria for data collection are also included in this deliverable.

³ Available through Metro Vancouver

⁴ Available through Metro Vancouver.

Modelling and Life History Parameters

In general, a combination of natal⁵ and foraging dispersal distances, home range, and territory size were used to calculate the quantitative modelling parameters. Dispersal distances and minimum patch sizes were calculated using weighted averages from sample populations where possible. If less than 1ha, home ranges were considered as potential minimum patch sizes, otherwise minimum patch size was estimated from foraging dispersal, defended territory size, or other contextual information.

Dispersal data for many species was limited, necessitating the use of single sources and/or small samples in some cases, or the use of inferences regarding dispersal based on home ranges in others (for e.g. assuming the radius of a circle of a minimum foraging area). The process of assigning maximum and minimum dispersal distances was further complicated by a range of dispersal types reported for each species; for example, it was common to find migratory distances for birds that were generally too long (100s-1000s of kms) for regional connectivity modelling, while natal or foraging dispersal distances were much rarer. Indeed, data availability was one of the main drivers of focal species selection.

Table 2 Modelling and life history parameters collected for each candidate focal species. Median and maximum dispersal and minimum patch size are the essential parameters required for Conefor modelling. Dispersal limitations make networks more realistic by removing links that species are unlikely to actually use. Life history parameters informed species selection criteria to ensure a diverse selection of focal species. They could also be used in future multivariate statistical analyses for alternate species selection and to characterize the diversity of candidate species chosen.

Species Common Name	Patch Habitat Requirements			Life History Parameters			
	Median Dispersal (m)	Max Distance (m)	Minimum Patch Size (ha)	Average Lifespan (yrs)	# of Offspring per Year or Clutch Size	Maximum Body Length (m)	Average Body Mass (g)
Red-Backed Vole	220	500	0.1	0.5	4.5	0.11	25
Red-Backed Salamander	1.0	36	1.0	<10	5	0.115	-
Long-toed Salamander	200	3,200	30	6	110	0.17	7.5
Muskrat	57	4,000	3.0	3.5	15	0.7	1,200
Great Blue Heron <i>ssp. fannini</i>	2,000	10,000	1.0	23	2.9	1.4	2100 (female)
Brown Creeper	88	2,110	2.3	-	6	0.13	8
Rufous Hummingbird	31	2,000	0.3	1-8	2	0.1	3.4
Pileated Woodpecker	1,650	18,700	1.0	4	3 to 5	0.5	290

Life history parameters were recorded in the event they were useful when conducting a multivariate analysis of species to select them for modelling. In the end this sort of analysis (such as a PCA, RDA or

⁵ Dispersal of individuals from their birth site to their breeding site.

cluster analysis) was not deemed necessary, however, life history parameters were included in the final focal species selection criteria.

Habitat Type Assignment

Habitat types and modifiers were designed around the Metro Vancouver 2014 Landcover (Williams, Matasci, Coops, & Gergel, 2018) and the Metro Vancouver Sensitive Ecosystem Inventory, the two primary geospatial datasets used for patch creation (Table 3). The exception was the edginess requirement type, which was determined using internal buffers applied separately for each relevant species (Rufous hummingbird, southern red-backed vole and the western red-backed salamander). Edginess requirements were determined by reviewing a species’ life history. If a species preferred core or edge habitat this was noted as a condition modifier for species habitat. Shrub was included in the forest edge category because shrub was likely to be a landcover class encapsulated by forest edges, though the edge type could also contain any other forest class. The geospatial identification of core and edge is detailed below.

The first step in determining habitat types was to assign a different letter to each landcover type. Landcover types used by a species were tallied with Xs, which were cumulative from the perspective of patch creation. For example, if a species had Xs marked for both Mixed and Coniferous forest, both of those habitat types would be used to create habitat patches for a species. Other habitat types were assigned at least one of three alphabetical codes: C, R, and I.

C, for *Condition Modifier*, denotes that a species prefers that habitat type and/or the type is particularly important in a species’ life history, and should be more heavily weighted when calculating patch quality (discussed below). R, for *Restrictive*, denotes that a species only uses that habitat type. For example, a species that uses only riparian grass-herb habitat would have an X in the grass-herb class and an R in the riparian class. Rs could be placed in more than one class to create cumulative habitat restrictions. I stands for *Inclusive*, and denotes a habitat type used by a species but is neither preferred nor restrictive. R and C were regularly placed together in a habitat type to indicate that a species was both restricted to a certain type, and that it should be given extra weighting when calculating patch quality.

Table 3 Habitat types and condition modifiers collected for each focal species. Habitat types were separated into forest and non-forest. Landcover categories were taken from Metro Vancouver’s 2014 Landcover. All other classes were taken from Metro Vancouver’s SEI except for edginess, which was determined using buffer distances.

Forest Types	Landcover	All Forest (LC and Age Class)
		Mixed
		Coniferous
	Age (C = condition modifier, R = restrictive, I = inclusive)	Deciduous
		Old
		Mature
	Young	
	Core	

	Edginess Req. (C = condition modifier, R = restrictive)	Edge/ Shrub
	Other SEI classes (C = condition modifier, R = restrictive, I = inclusive)	Woodland Riparian Wetland
Non-Forested Types	Landcover	All Non-Forest (LC) Shrub Grass-Herb Soil
	Other SEI classes (C = condition modifier, R = restrictive, I = inclusive)	Riparian Wetland Estuarine Intertidal/ shallow sub-tidal Sparsely Vegetated Seasonally flooded Ag Field Old Field Other fields/ agriculture

6.1.2 Creating a shortlist of potential focal species

Data availability of modelling parameters became the main determinant of accepting a species into a shortlist of focal species. Those species for which, after a sustained research effort, we could not reasonably attribute modelling parameters were removed as focal species candidates.

Of the species remaining, those with very long median and maximum dispersal distances (tens to hundreds of km) were also removed, as they were deemed unsuitable for modelling at the scale of the Metro Vancouver region. Further removals were done for species that had modelling parameters less suited to our analysis – for example, species with longer dispersal distances and very generalist use of habitat types were removed because their landscapes would be hyper-connected. Following these steps resulted in a short list of potential focal species consisting of 5 birds, 5 mammals, and 6 amphibians or reptiles.

Once a shortlist was established, habitat types used by each species were tallied, and their frequency of occurrence reviewed to establish which habitats were more or less commonly used. Habitat types that were rarely (3 or less occurrences) used by the shortlisted species were noted. Rare type usage was then used as an input into the final focal species selection criteria.

6.1.3 Developing criteria to categorize potential focal species and guide final selection

Selection criteria were developed to make a final selection from the focal species shortlist. In total, ten criteria were developed, along with a landcover summary statement and other contextualizing notes. Three indicators represented habitat usage, which was summarized into a short statement and then coded as i) forest, ii) non-forest or iii) rare cover (or any combination of the three) (Table 4). Note that rare in this case is relevant only for the habitat types used by the shortlisted species, rather than rare in

the context of habitat types that exist in the Metro Vancouver region. Rarity in this case is also not a commentary on whether or not a species is a habitat generalist or specialist, but was used to add weight to habitat types that would have little or no representation should a species be removed from the shortlist.

Table 4 Habitat usage indicators and landcover summary statements for two example focal species of the eight modelled. Rare_cover denotes whether a species used a relatively rare landcover type among the shortlisted focal species, and was included to ensure a range of habitat types were included.

Common Name	Scientific Name	LC_summary	forest	nonforest	rare_cover
Brown creeper	<i>Certhia americana</i>	mature and old forest only, condition modifiers for woodland, riparian and wetland sites	y		
Great Blue Heron ssp. <i>fannini</i>	<i>Ardea herodias fannini</i>	mature riparian and coastal forest (10km buffer) only, wet non-forest only except old fields	y	y	y

Modelling and life history parameters were summarized into seven categorical criteria (Table 5). These parameters either had their quantitative values categorized into three classes (e.g. short, medium and long median dispersal) or were synthesized into new categories altogether, such as for sensitivity to development.

Table 5 Focal species selection criteria developed from modelling and life history parameters (7 in total). Species habitat usage was also coded for their use of forest, non-forest and rare habitats. Rare habitats were determined by a relative ranking of habitats used by the shortlist of candidate focal species.

Med. Dispersal: short (<50), medium (50-500), long (>500)	Sensitivity to barriers (low, medium, high)	Sensitivity to development (low, medium, high)	Min patch sizes: small (< 0.5ha), medium (0.5-3ha), large (>3ha)	Habitat: generalist, specialist, rare types used	Offspring: few, med, many	Longevity: short, medium, long
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For both the short and long list of focal species candidates, reasonable class breaks were determined for quantitative parameters such as median dispersal, minimum patch size, number of offspring and longevity using their respective frequency distributions. Other criteria were derived using a more qualitative review of the shortlisted species parameters – for example, sensitivity to development was determined by assessing if links among patches were limited by roads or water, as well as a broader review of a species' sensitivity to disturbance and habitat preferences. Similarly, whether a species is a habitat generalist or specialist was informed both by a quantitative tally of the habitat types used, as well as a contextualization of habitat usage and life history using information from our species sources.

Maximum dispersal was omitted in the selection criteria because median dispersal was thought to be more descriptive and relevant for the probabilistic modelling used by the PC index. For example, though the muskrat's network will have patches connected together by links as long as its maximum dispersal of

4000m, its median dispersal distance of only 57m has a probability of success of 0.5. Because Conefor uses an inverse distance-weighted method to calculate dispersal probabilities for links among patches, the probability of success for the muskrat's maximum dispersal distance will be very small. Therefore, links that are as long or shorter than a species' median dispersal will be considered far more likely for most species, rather than maximum dispersal, as modelled.

After the criteria were developed, a criteria table was created and populated with the shortlisted focal species candidates. From these, the final focal species were selected to ensure a range of habitat types, modelling and life history parameters were included. An effort was made to include at least one sub-category (e.g. short, medium, long) for each criterion while also considering the ease and utility of modelling. This goal was achieved for each criterion except for the "sensitivity to development" and "offspring" criteria, for which only two categories were fulfilled by the final focal species selection. Ultimately, the selection was made using a subjective interpretation of the available data informed by a range of quantitative, categorical and qualitative data.

Task 3: Create a list of example species represented by each focal species

Deliverable: Example Species List. *A list or table detailing groups of multiple species (minimum of 5 per focal species), with the same or similar habitat needs and dispersal distances. Each group is headed by one of the focal species selected in Task 1.*

Species with similar habitat requirements, dispersal characteristics and ecological roles or needs were selected for each focal species. At least five of these example species were selected per focal species. Though redundancy or overlap of species' ecological roles and niches has been demonstrated to exist, and is a key concept in ecological resilience theory, we present the example species list with a caveat: namely, all species are unique in some way by definition. Deciding on the right balance of habitat, dispersal and ecological function to decide whether an example species is represented by a focal species (and vice versa) is subjective. Regional experts may disagree with our assessments and propose changes, which we welcome. We believe the example species list should be a living document, updated as more information becomes available.

With those caveats in mind, example species were selected according to their similarities to the 8 focal species. We used three general categories or criteria to select example species. Habitat requirements and dispersal characteristics chiefly guided our selection of example species, while factors like taxonomic similarity, trophic level and ecological role supplemented our decision making:

1) Habitat requirements

- We grouped focal and example species by use of forested habitat or use of both forested and non forested habitat.
- We examined the unique habitats of both focal species and example species habitat.
- We matched the unique habitat preferences of the focal species to those of the example species.

2) Dispersal characteristics (median dispersal, minimum patch size)

- We categorized the 8 focal species and 40 example species into 3 classes of median dispersal (short <50m, medium 50-500m, long >500m) and 3 classes of minimum patch size (small <0.5 ha, medium 0.5-3ha, large >3ha).

3) Other considerations

- We ensured that each group of example species encompassed at least one species of another taxa than the focal species taxa.
- We also considered trophic level, functional roles and interspecific interactions when considering species. For example, though the northern flicker has a longer dispersal distance and minimum patch size than the Pacific Wren (one of the focal species modelled in the Pilot Study). However, both species are insectivorous, and the flicker might create cavities used by the Pacific Wren as nesting habitat, an example of a possible commensal relationship between the species. The species are, therefore, likely to co-occur in mature forest with an abundance of decaying trees.

Tasks 4 and 5: Run Conefor Analysis for Species and Collate Deliverables

6.1.4 Pre-processing

Using the Conefor Sensinode software package and Metro Vancouver's spatial data (land cover and SEI), DHC ran a network analysis for each of the chosen focal species. Geoprocessing methods to create habitat patches followed a similar methodology to the Metro Vancouver connectivity pilot study from 2017 (Williams et al. in Ruan et al., 2017).

The MV 2014 Landcover and SEI polygons were the primary geospatial data sources used to create habitat patches. For most terrestrial habitats SEI polygons were used to select MV landcover rather than the SEI polygons on their own. The exception was for the intertidal/estuarine SEI class which was outside the MV landcover footprint. SEI polygons were also selected from all three decile classes for most of the habitat types. As with the pilot study, roads were erased from species patches before running Conefor.

Further masks were created from a 500m elevation contour and from built-up areas to erase from the great blue heron and red-backed salamander species patches, respectively. Built-up polygons were selected from MV landuse with some manual review and selection. The decision to remove patches using these masks was based on the literature review conducted for each species which indicated that the great blue heron was unlikely to use forest habitat above 500m and that the red-backed salamander was highly disturbance averse. The small minimum patch size of the salamander also meant that more patches that fit its habitat requirements were likely to be found in more built-up areas.

Quality rasters were created individually for each species considering the condition rating provided in SEI. Quality ratings were increased for areas considered core and edge habitat. Buffer distances were chosen considering species dispersal ability and minimum patch size, which led to the following edge and core habitat buffers: (1) a 100m internal buffer to determine core habitat for the red-backed salamander; (2) a 100m internal buffer to determine edge habitat for the Rufous hummingbird; and (3) an internal 50m buffer to determine edge habitat for the red-backed vole.

A 2m spatial resolution was used for the condition rasters. Condition values ranged from 1-10, with a minimum of values from 1-7, depending on the number of modifiers added for each species. Area-weighted quality was then assigned to patches as per the Metro Van Pilot Study. The SEI condition values range from 1-5 and there are only 4 possible condition modifiers that can be added for either forest or non-forested habitat. However, because most SEI classes were taken from all three deciles of the SEI, occasional overlaps among the SEI polygons were likely to occur. This was seen as advantageous, because if multiple preferred habitat types of a species existed in close proximity the quality of that habitat would likely be higher.

6.1.5 Subset Landscapes

Subset landscapes, used to create reduce processing times for species with many patches and longer dispersal distances, are shown in Figure 1. Note that there are some overlaps of the landscapes for certain Fraser river, Pitt River and Indian Arm Islands. After testing whole-region runs for each focal species, we found that only two species required subset landscapes: the pileated woodpecker and Rufous hummingbird.

For these two species, subset landscape patches were selected with a 3000m buffer around each landscape. Doing so reduced the likelihood of creating artificial landscape boundaries by preventing patches neighbouring a subset landscape from being cut off. The neighbouring patches can then also be identified as overlap patches and their regional importance assessed.

The 3000m buffer distance is longer than the hummingbird maximum dispersal, and shorter than the woodpecker maximum dispersal. This means that the 3000m buffer around each subset landscape contains all the possible neighbouring patches that the hummingbird could disperse to in a single event. This is not the case for the woodpecker, but its long maximum dispersal distance corresponds to a relatively unlikely event as modelled, and the 3000m buffer distance is almost twice that of its median dispersal. This indicates that overlap patches within the 3000m buffer around each subset landscape are almost certainly part of a maximum product probability route across the region for the woodpecker. Use of components (groups of connected patches) for subset landscapes were also investigated, but too few components existed for these species; i.e. 1 or 2 components comprised the entire landscape and, therefore, too many patches to model efficiently.

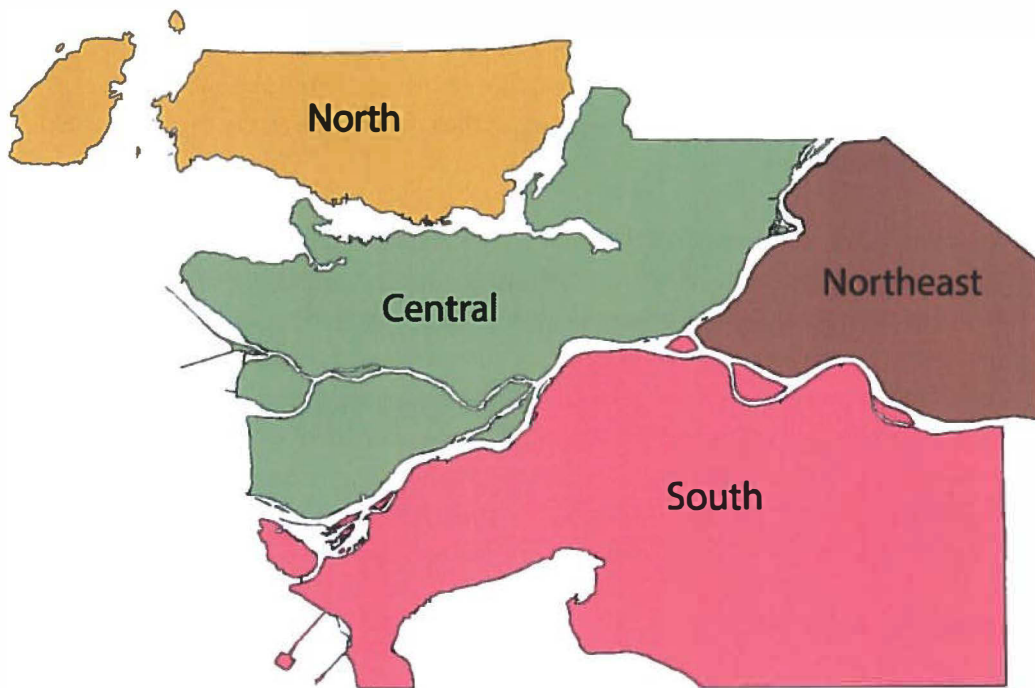


Figure 10 Subset landscapes used for the pileated woodpecker and Rufous hummingbird. Overlaps exist among the landscapes for some islands in the Fraser and Pitt Rivers as well as Indian Arm. Divisions between landscapes are major water bodies to choose the most realistic landscape borders possible. Patches for each landscape were selected with a 3000m search distance beyond each subset landscape boundary to enable the identification of overlap patches.

6.1.6 Running Conefor

Area-weighted quality (AWQ) is assigned to each patch in order to account for habitat quality when running Conefor. The intent of AWQ is to produce a more realistic habitat model than one based on patch area alone. For a discussion on how Conefor incorporates patch quality into its metric calculation, the reader is directed to Table 13 in Ruan et al. (2017) and Saura and Tourné (2009).

Once AWQ was assigned to each patch, each species' landscape connectivity was modelled using Conefor. Straight-line (Euclidean) links were used, as least-cost path creation proved to be too slow given the project deadline. Whole region runs were done for most species with individual patch results. Conefor parameters were largely similar to those of the pilot study, yielding the PC and IIC metrics and their components, as well as the number of components and links, among others. As with the pilot study, individual node importances were obtained, while link importances were omitted due being highly processing intensive.

Two notable differences from the pilot study Conefor runs are related to the maximum landscape attribute (A_L) and the use of probability thresholds for the subset landscapes. In the pilot study, maximum landscape attributes were calculated based on the subset landscape area alone, and did not

include the area of overlap patches. This arguably led to an underestimate of the maximum landscape area for the pilot study, slightly affecting the comparability of the overall IIC and PC metrics among species (note, however, that A_i does not affect $EC(PC)$ values or individual patch importances (e.g. dPC). For this expanded analysis, A_i included the area of overlap patches, which, due to the use of the 3000m buffer, were sometimes considerable.

Probability thresholds of 0.2 were also used for the woodpecker and hummingbird runs for all subset landscapes in order to increase processing efficiency. Links with dispersal probabilities below that threshold were removed from consideration when calculating patch importances for the PC metric – the most process intensive part of each Conefor model run. Both the woodpecker and hummingbird had many patches on the landscape with hundreds of thousands of links among those patches, so while the longest links were removed from patch importance consideration, the effect of using a probability threshold of 0.2 was small. A comparison of overall results for the hummingbird's central landscape between a run using a probability threshold of 0.2 for PC, and one without a threshold, showed no difference in PC values to 4 significant figures (with rounding the two results are 0.0086 and 0.0087).

6.1.7. Conefor Metric Selection

Connectivity was measured using the Probability of Connectivity (PC) index and its component metrics (Saura & Fuente, 2011; Saura & Pascual-Hortal, 2007a) as well as the number of components in a network. PC can be interpreted as the probability that "...two animals randomly placed within the landscape fall into areas that are reachable from each other" (Saura & Pascual-Hortal, 2007a p.93). **In other words, the PC metric describes the amount of reachable habitat within a landscape both among and within patches.** PC uses probabilities of dispersal between patches (p_{ij}) and the area-weighted quality of patches (a) to determine an overall connectivity measure for a network. The probability of successfully moving from one patch to another was set at 0.5 for each mammal's median dispersal distance, a standard assumption made for dispersal success.

The importance of any given patch in a network is dPC , calculated as the percent contribution of that patch to overall PC for a network. dPC itself is the sum of three other node importance metrics: dPC_{intra} , which measures within-patch connectivity; dPC_{flux} , which measures how connected a patch is to the rest of the network; and $dPC_{connector}$, which measures how important a patch is for connecting *other patches* together (i.e. stepping stone importance). These node importance metrics can also be summed for each patch in the network (e.g. $sum\ dPC_{connector}$) and compared to understand the overall relative importance of, say, stepping stones in a network. It should be noted that, though the node importance metrics are calculated as percentages, their sum will often be greater than 100.

Task deliverables: Species patches with individual patch results attached, condition rasters, elevation and built-up no-habitat masks, and roads/watercourses barrier shapefiles. Overall and individual patch results for each species and subset landscape (where applicable). Output data layers from Conefor analysis. ArcGIS maps with results displayed to aid interpretation. Any ancillary data required for further technical analysis will also be included, in consultation with Metro Vancouver.

Appendix 3 Detailed Methodology – Phase 2

The first phase of the study identified key-hub patches throughout Metro Vancouver for each of the eight focal species. The second step of this study was to use a spatial analysis software to analyse all of the species' habitat collectively and to prioritize their value towards regional connectivity. The prioritization software Zonation was used to complete this analysis. The inputs for this model included the habitat analysis completed in Phase 1, as well as a Protected Areas layer.

The Protected Areas layer was developed by DHC and contains all areas in Metro Vancouver that are already protected as parkland. This layer was derived from a 2013 Parks Protected Areas layer, supplemented by Metro Vancouver's Parks data. Areas identified as "Protected Areas" were those being protected through a land use designation as municipal, regional, or provincial park. Lands protected through other means (ex. Agricultural Land Reserve (ALR), Development Permit Areas, covenants, etc.) were not included. Additionally, all parks were considered protected, even if they may not protect natural areas within them (i.e. urban recreational parks were not differentiated from natural areas parks).

There were three tasks associated with this connectivity analysis (illustrated in Figure 1):

1. **Analyze Conefor results** to identify important patches for the 8 focal species.
2. **Process Zonation rasters to identify important areas** for the greatest number of species. Rerun with the Protected Areas layer to identify priority areas outside of already protected land.
3. **Identify major connectivity routes** by digitizing key pathways over the Zonation results.

Task 1 – Create a prioritized multispecies habitat network

Conefor results from Phase 1 were analyzed to characterize patches, species networks, and identify sites of high connectivity value for each of the eight focal species. This analysis included the identification of the most important patches (key patches) for each species and overlaying these patches to determine which areas provide the greatest value. Areas that are protected as parks were overlaid with these findings to determine which areas are most at risk.

Key patches are the most important area for each species as determined by dPC, which combines within-patch and between-patch connectivity to determine overall patch importance. *Hub patches* are the most important patches for each species for maintaining the connectivity of their respective networks. Hub patches were determined using dPCconnect, which is the measure of a patch's importance for connecting *other* patches together (i.e., stepping stone importance), and dNC, which is a measure of how important a patch is for maintaining component integrity. The value of dNC becomes more negative with the importance of the patch. Any patches with a dNC < 0 were, therefore, identified as hub patches whose removal would increase habitat fragmentation.

First, we identified key patches and hub patches for each species based on frequency distribution of dPC and dPCconnect, with a default threshold of 95th percentile (i.e., a cut-off value of 0.95 for dPC and

dPCconnect). The default cut-off value was adjusted for species with fewer patches, including: long toed salamander (0.85 dPC, 0.9 dPCconnect) and red-backed vole (0.8 dPC, 0.9 dPCconnect).

Second, we used key-hub patches identified in the first step to do an overlay of important patches for the 8 focal species. We created binary raster for each species: 1 for cells with dPC/dPCconnect values > 0 and 0 for remaining cells across the study site. Afterward, we added 8 binary rasters together to gain a final raster output that shows important sites on the landscape in terms of connectivity for the most species.

Finally, we overlaid these patches with areas that are protected areas layer to determine which ones are currently not at risk. This layer was created from the ParksProtectedAreas2013 layer and Metro Vancouver's Parks data (Agricultural Land was excluded from protected areas). Summary statistics were produced including the percent of each patch that is protected.

Task 2 – Identify important areas for the greatest number of species using Zonation

Zonation raster analyses were completed to identify important areas in terms of connectivity for the greatest number of species. The outputs from Conefor were rasterized for input into Zonation. A protected area raster was created and given a weight of -1 indicating areas that are already protected. A 5-meter spatial resolution was used for all rasters during this analysis.

Zonation takes raster inputs and ranks each cell based on a given cell removal rule, weights for species that use different habitats, and other indicators such as removal masks (i.e., weighted protected areas, land values). In this project, we used Core-Area Zonation (CAZ) removal rule, with equal weights for all species because we considered all 8 species are equally important for conservation purposes, and represent 8 unique life history parameters. Protected areas were weighted deliberately so that the outputs would highlight the important habitat areas that are not currently protected.

Zonation identified areas that have a high proportion of connectivity distribution (dPC or dPCconnect values) of each species across the landscape. The software removed cells that had smallest connectivity distribution for each species first. The last site to remain in the landscape were the cells with the highest connectivity distribution for the greatest number of species. Zonation assigned ranking values, ranging from 0 – 1, to cells across the landscape based on the order that the cells were removed. The cells removed first received lower values and are considered less important. The cells removed last received higher values and are considered more important in terms of connectivity.

Zonation raster processing included multiple iterations in consultation with Metro Vancouver's staff. There are two sets of final maps produced. These were created from the following combinations of inputs:

- 1 Combination of dPC and dPCconnect. This identifies the important areas in terms of connectivity values regionwide.

- 2 Combination of dPCconnect and protected areas. This identifies the important areas located outside protected areas that contribute the greatest to regional connectivity.
- 3 Incorporate land cost to identify “low-hanging fruit” for parkland acquisition

We incorporated the cost of land (hereafter cost) into the zonation analysis to identify areas that are most efficient to both conserve and acquire. A cost layer was created using the regional land use and cost point data provided by Metro Vancouver. Both total and average land costs were calculated and assigned to land use polygons, and then rasterized to use as inputs into zonation analysis. However, the initial results of including cost indicated no important difference compared to outputs of zonation analyses without cost (i.e., as described in Task 2). In some cases, the analysis with cost can be misleading as some fragmented areas came through with very high importance. This likely because it is difficult to account for the variation of cost across an area as big as Metro Vancouver using just land use and cost point data. Therefore, we omitted the cost layer from the final stage of analysis.

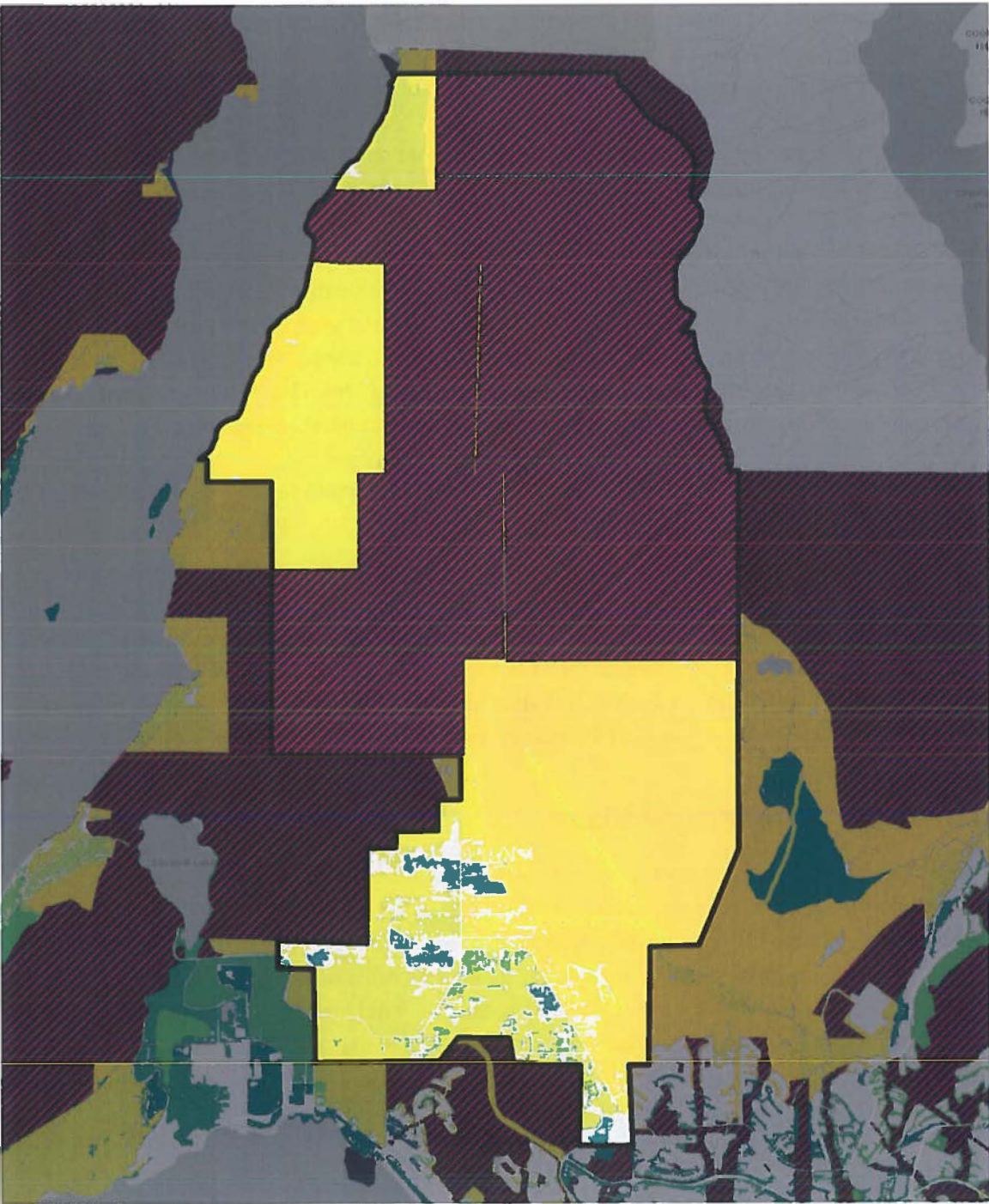
Task 3 – Review results and identify key areas for connectivity and ‘stepping-stone’ habitat patches

Using the results of the zonation analysis, an attempt was made to identify important regional connectivity corridors throughout Metro Vancouver. In some cases, clear, high value routes were evident. In many cases, particularly in the agricultural areas, they were not clear enough to definitively identify a preferred route. Providing a region wide connectivity network will require interpretation by a professional biologist, and therefore the incorporation of values. It was decided that this report should provide the outputs of the model and that the interpretation will be completed in a subsequent phase.

Appendix 4 Municipal Maps

In order to identify important patches for connectivity in each Metro Vancouver municipality, municipal level maps were produced. These maps build off Figure 8B, using a combination of dPCconnect and protected areas. Protected areas were defined as being protected through a land use designation as municipal, regional, or provincial park. Lands protected through other means (ex. Agricultural Land Reserve (ALR), Development Permit Areas, covenants, etc.) were not included in this layer. These maps can help municipalities identify patches important for connectivity that are currently outside protected areas. These patches would be good candidates for protection using available municipal tools (ex. by natural area park acquisition, Development Permit Areas, etc.).

The regional raster layer was clipped to each municipal boundary, and retain the original importance ranking generated by the Zonation analysis. The clipped municipal raster was then displayed using the same color scheme as the regional Zonation maps. The final municipal maps provide additional insight and more focused results on important locations at a local scale (i.e., by keeping the same ranking and adjusting the colour to only the local scale, some areas that have higher levels of connectivity importance at a local scale can be identified that may not be visible at the regional scale).



Connectivity Importance
Village of Anmore

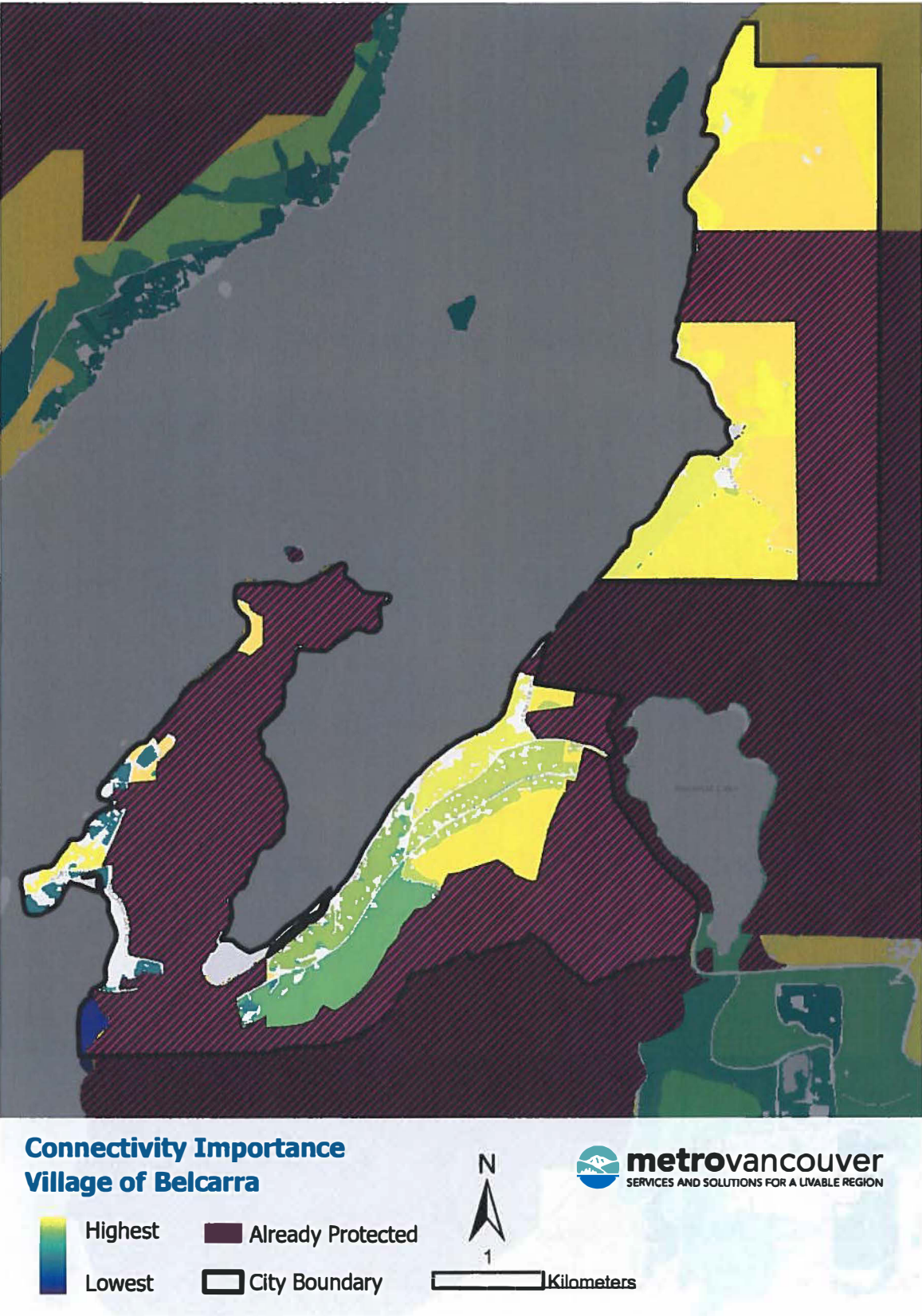
Highest
Lowest

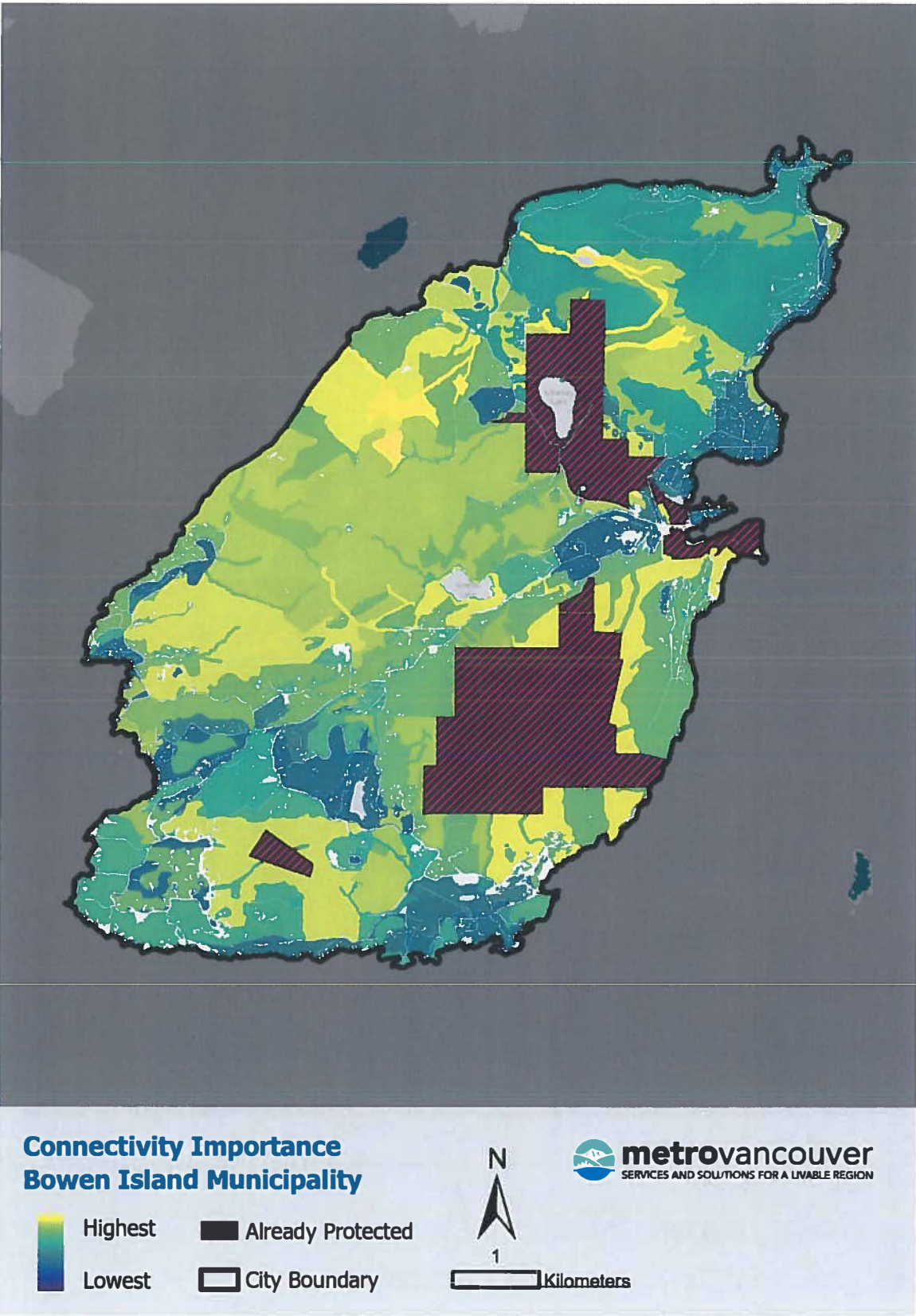
Already Protected
City Boundary

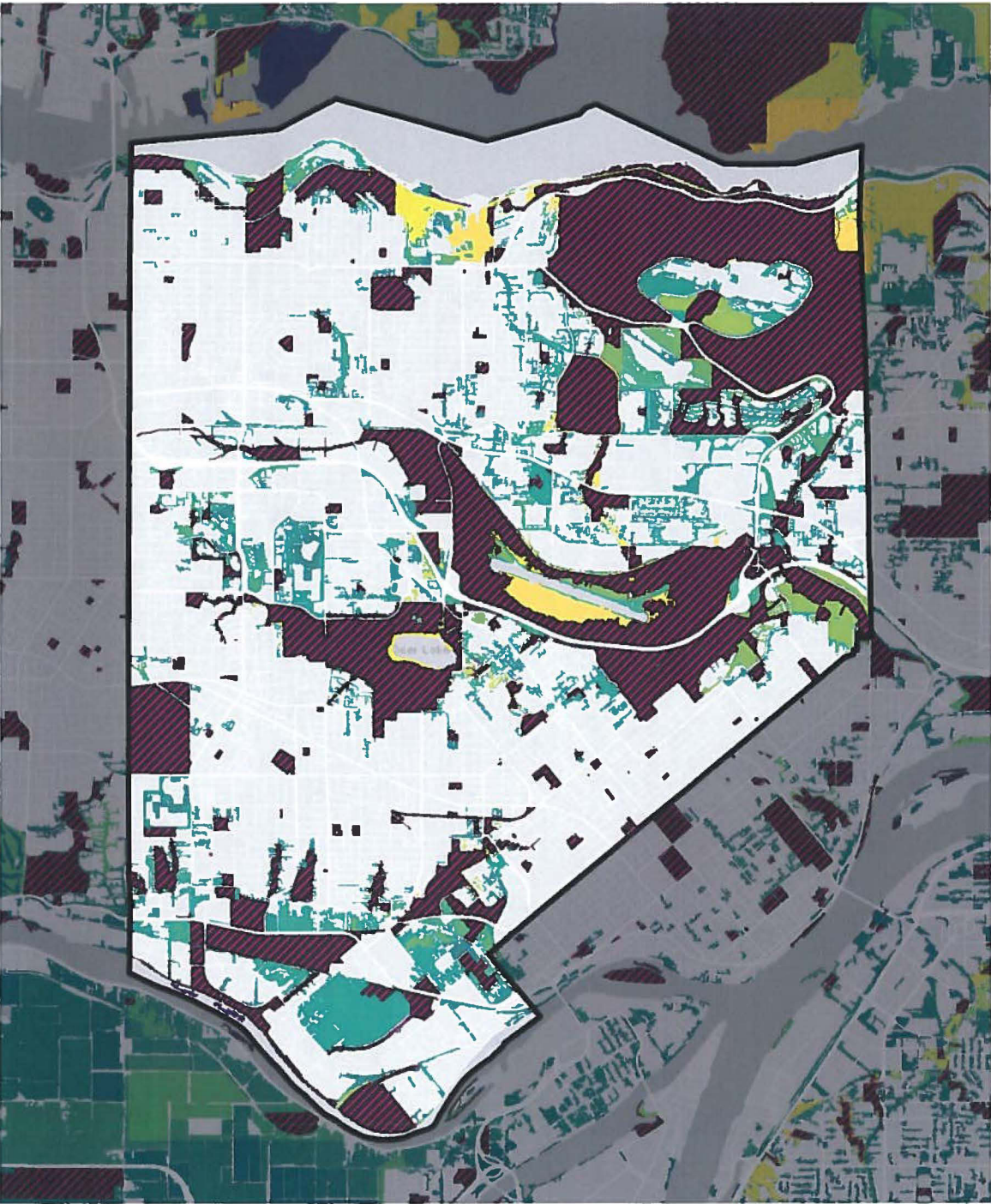


1 Kilometers











Connectivity Importance
City of Burnaby

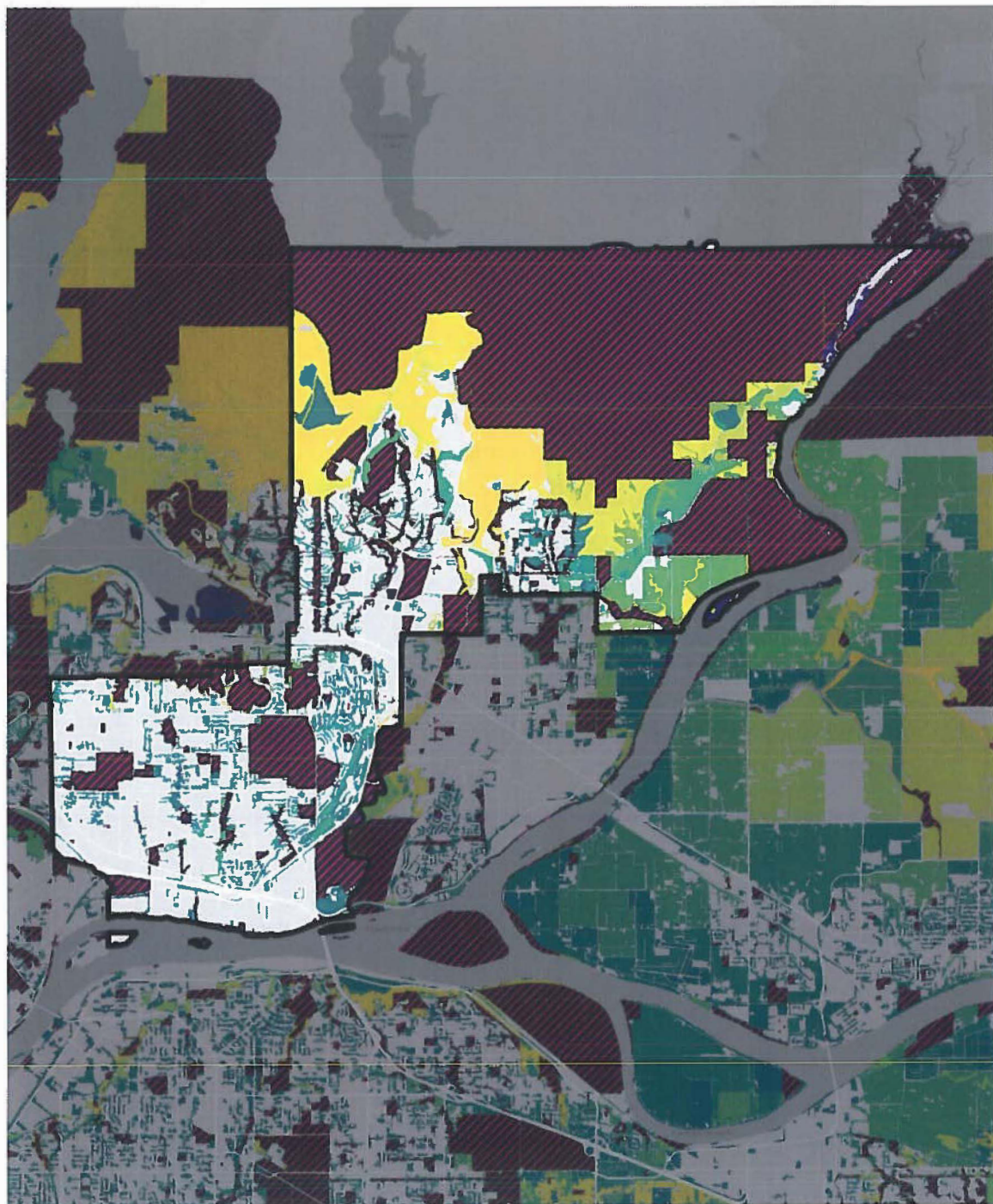
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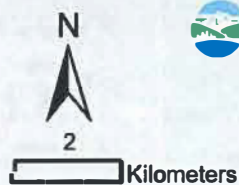


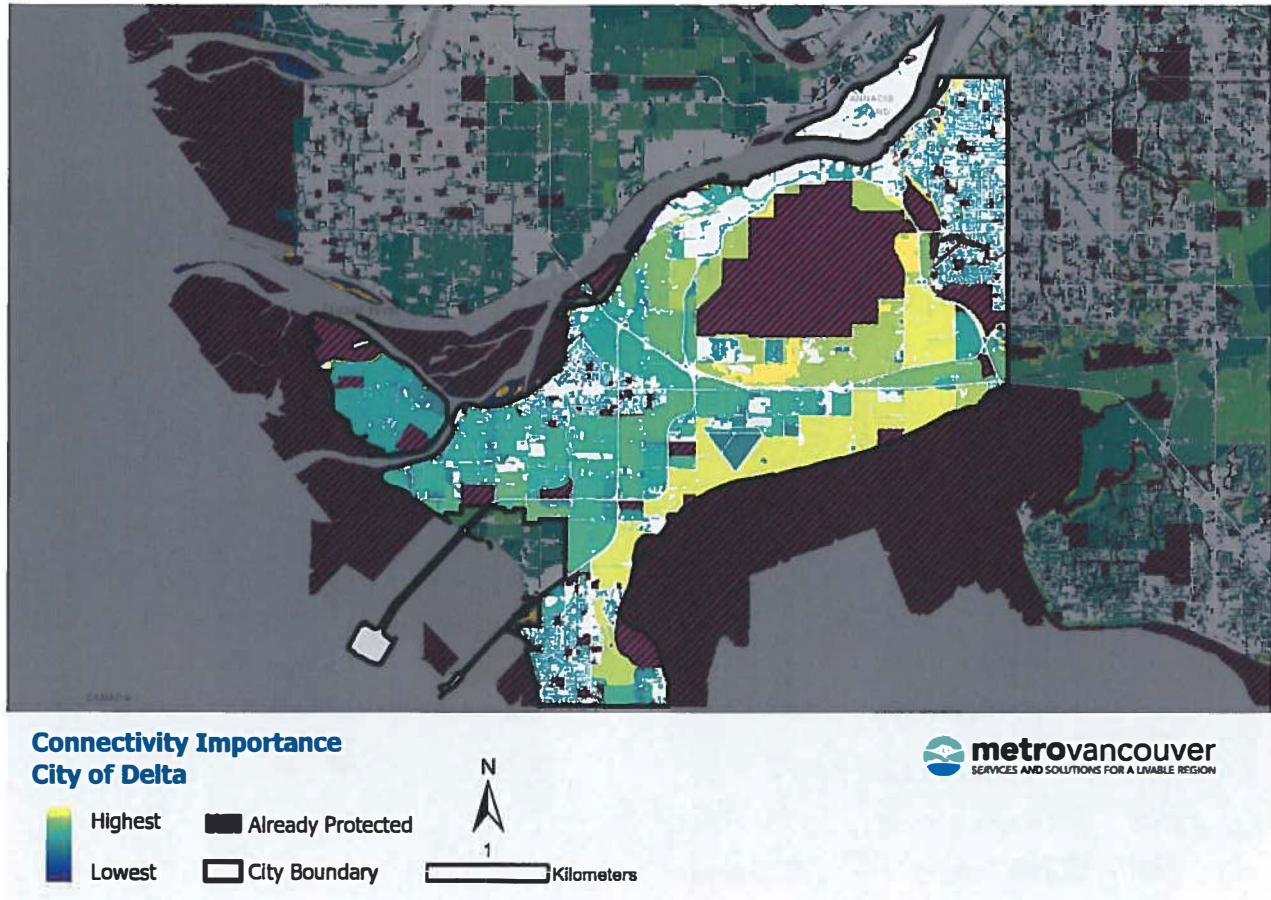


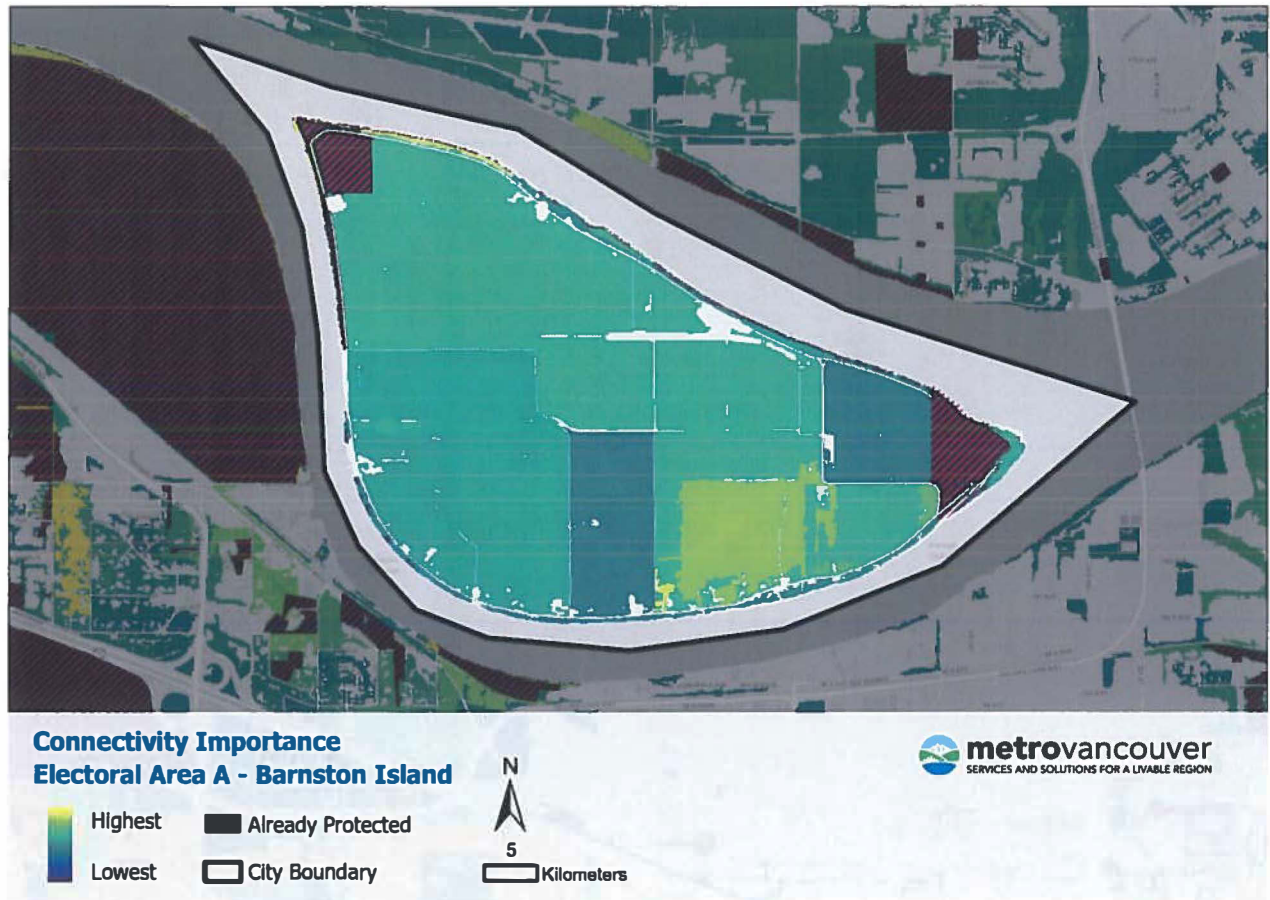
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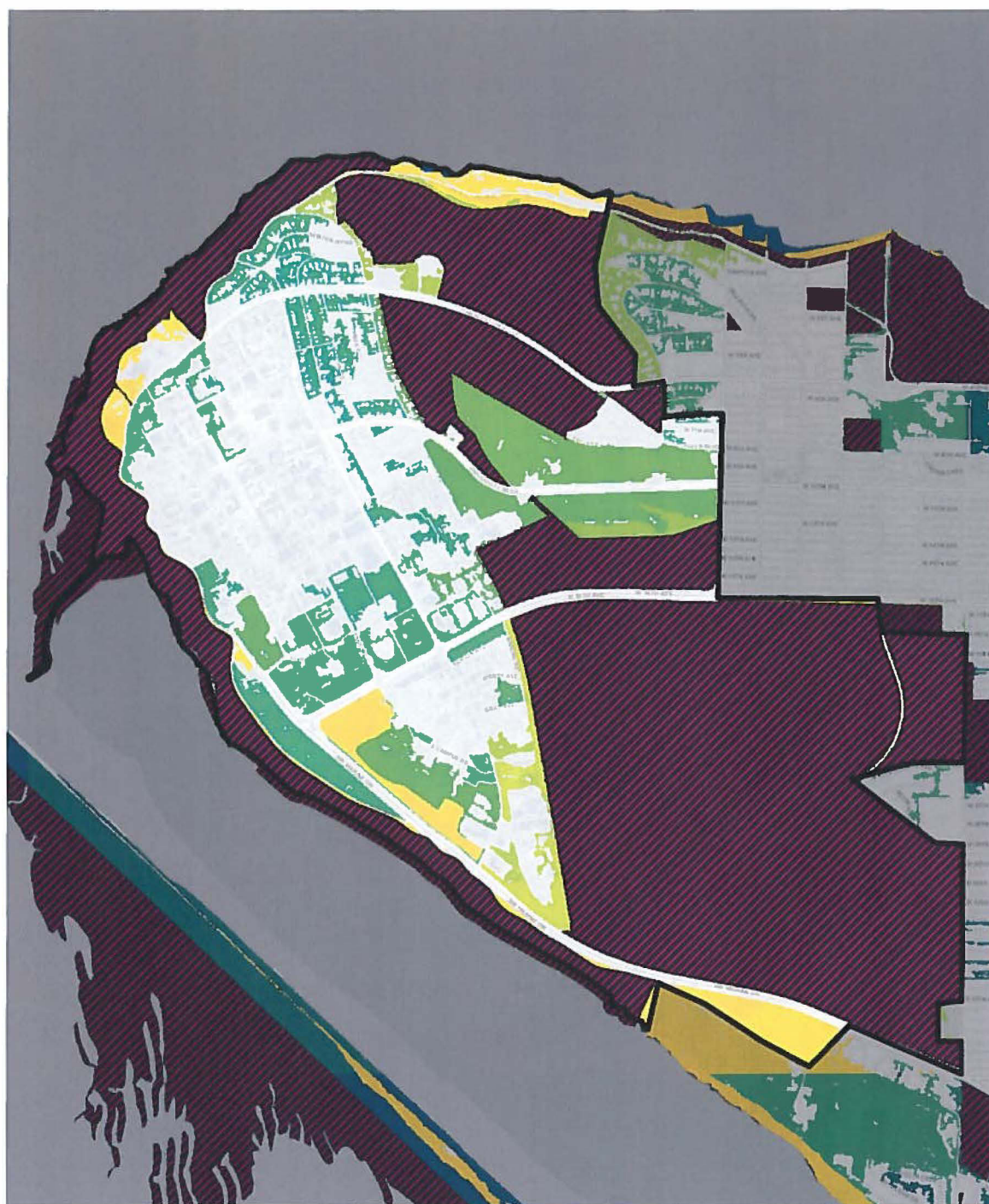
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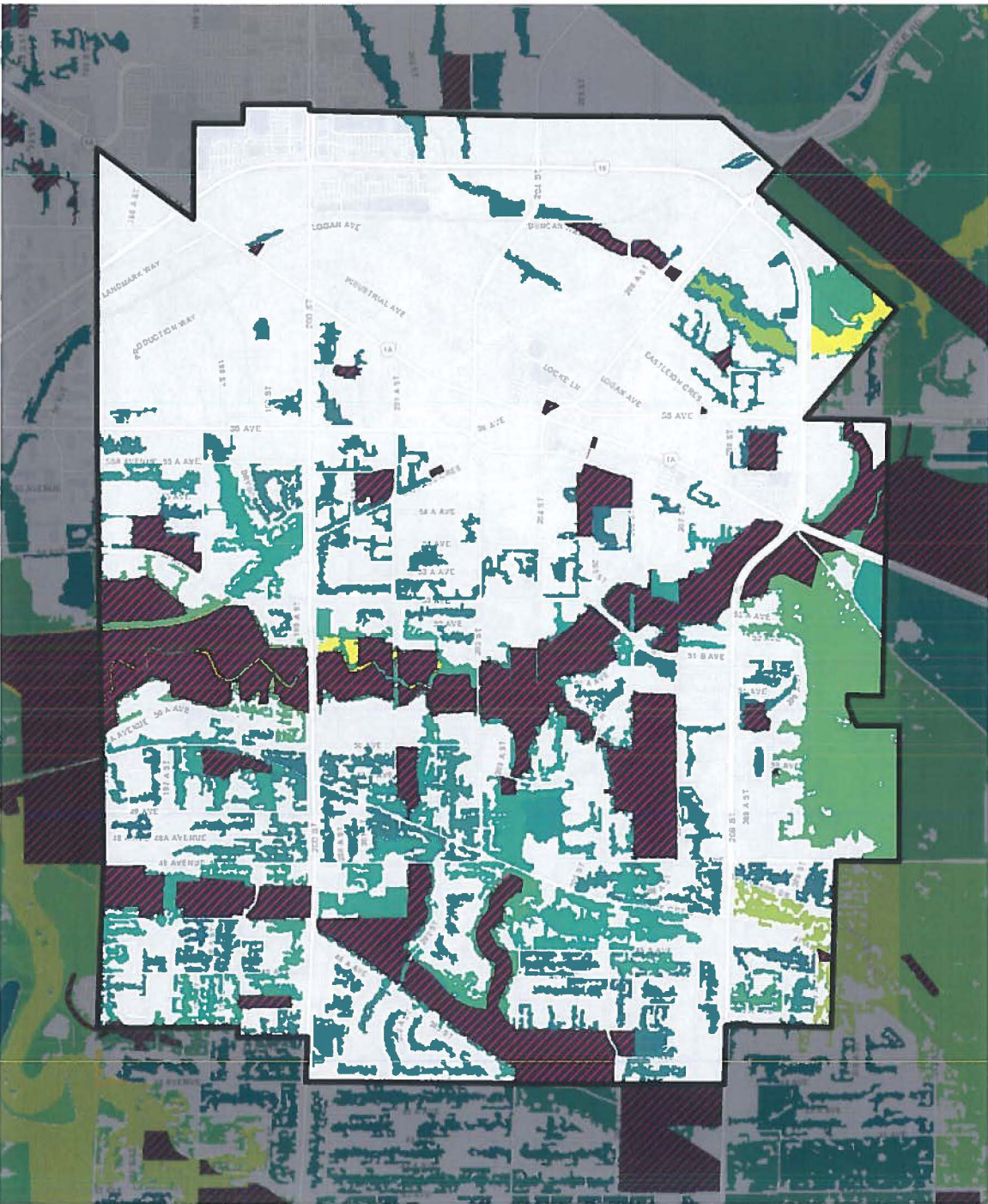
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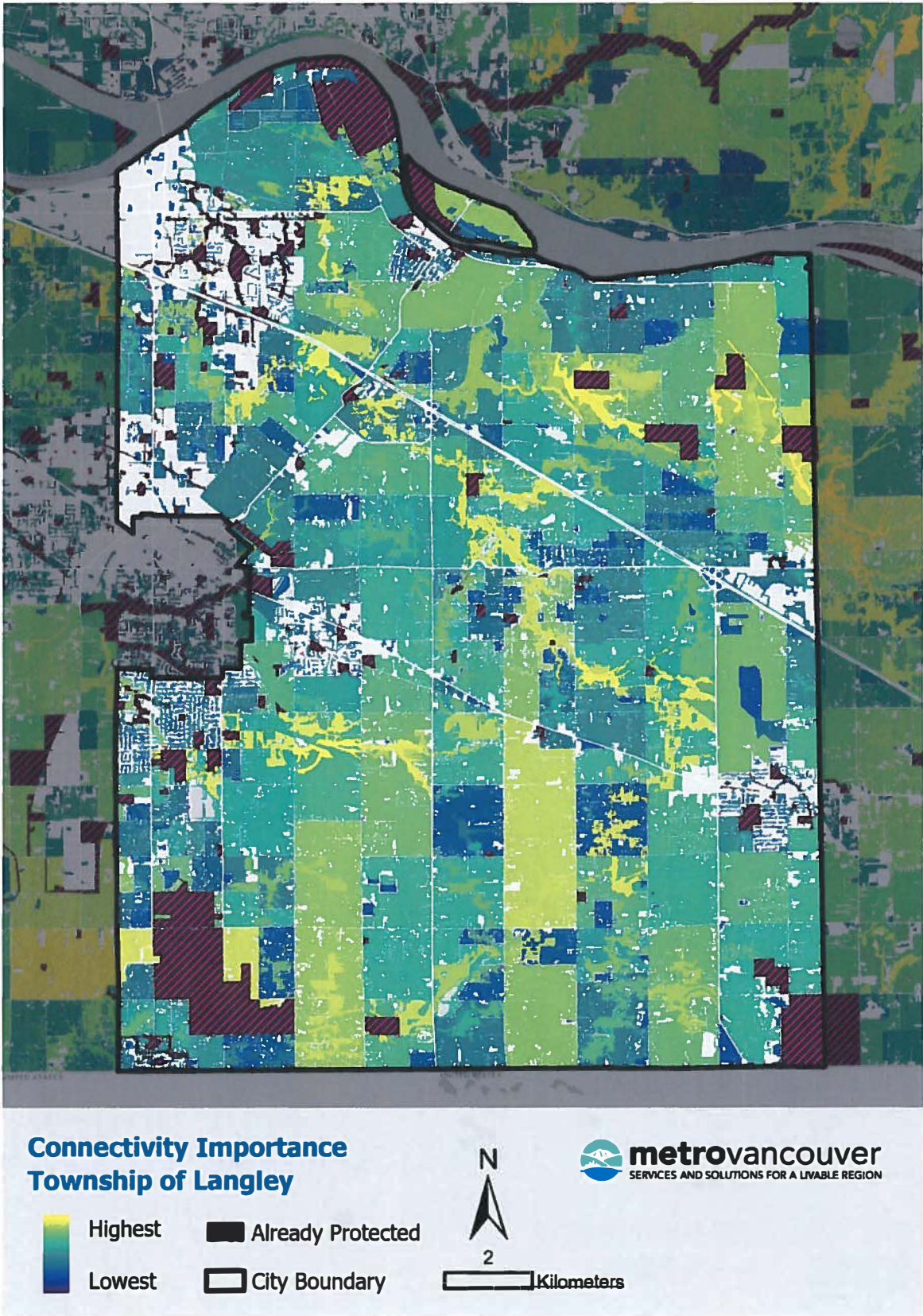
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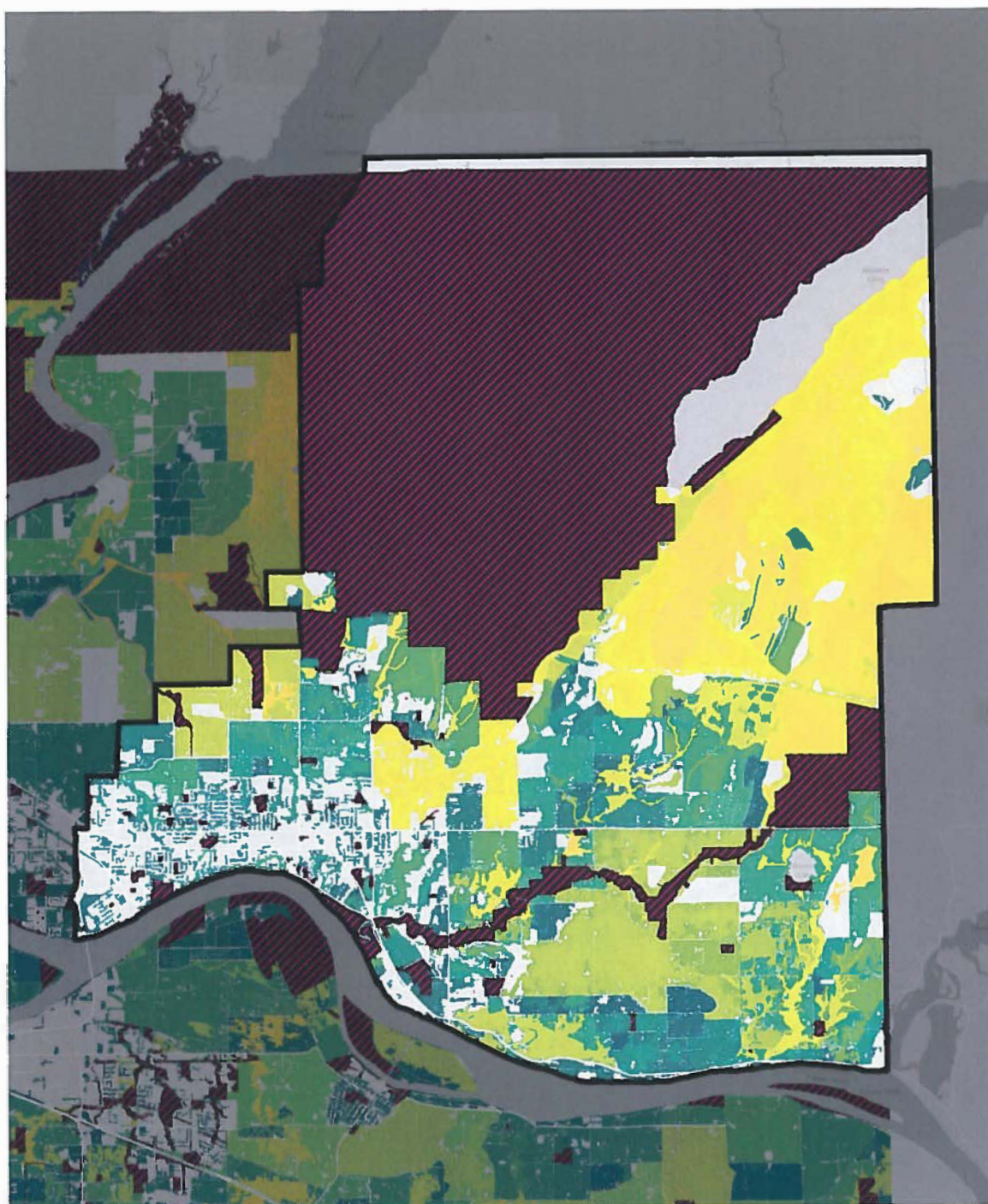


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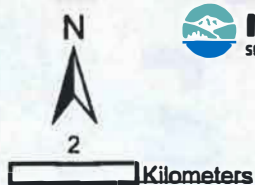




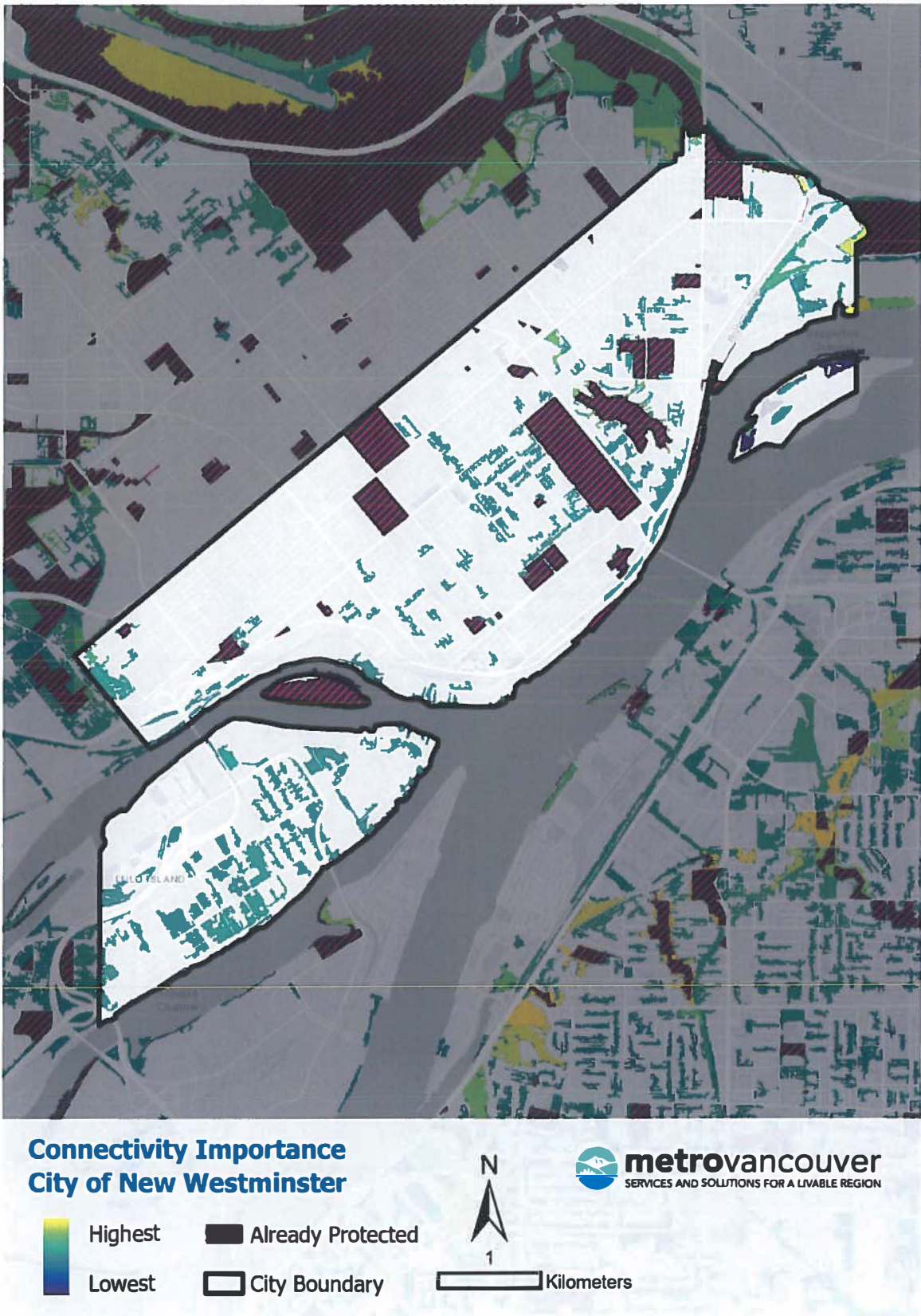
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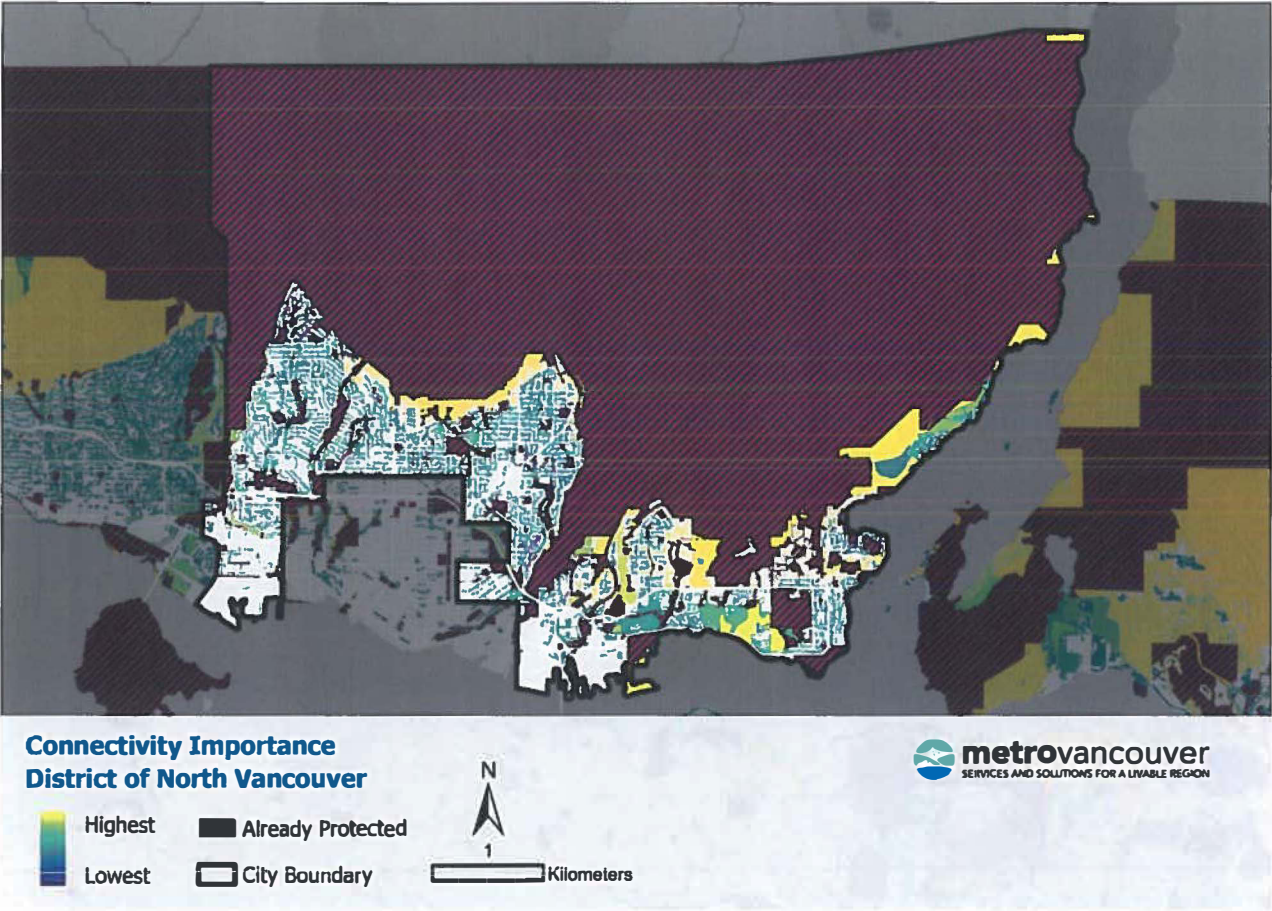
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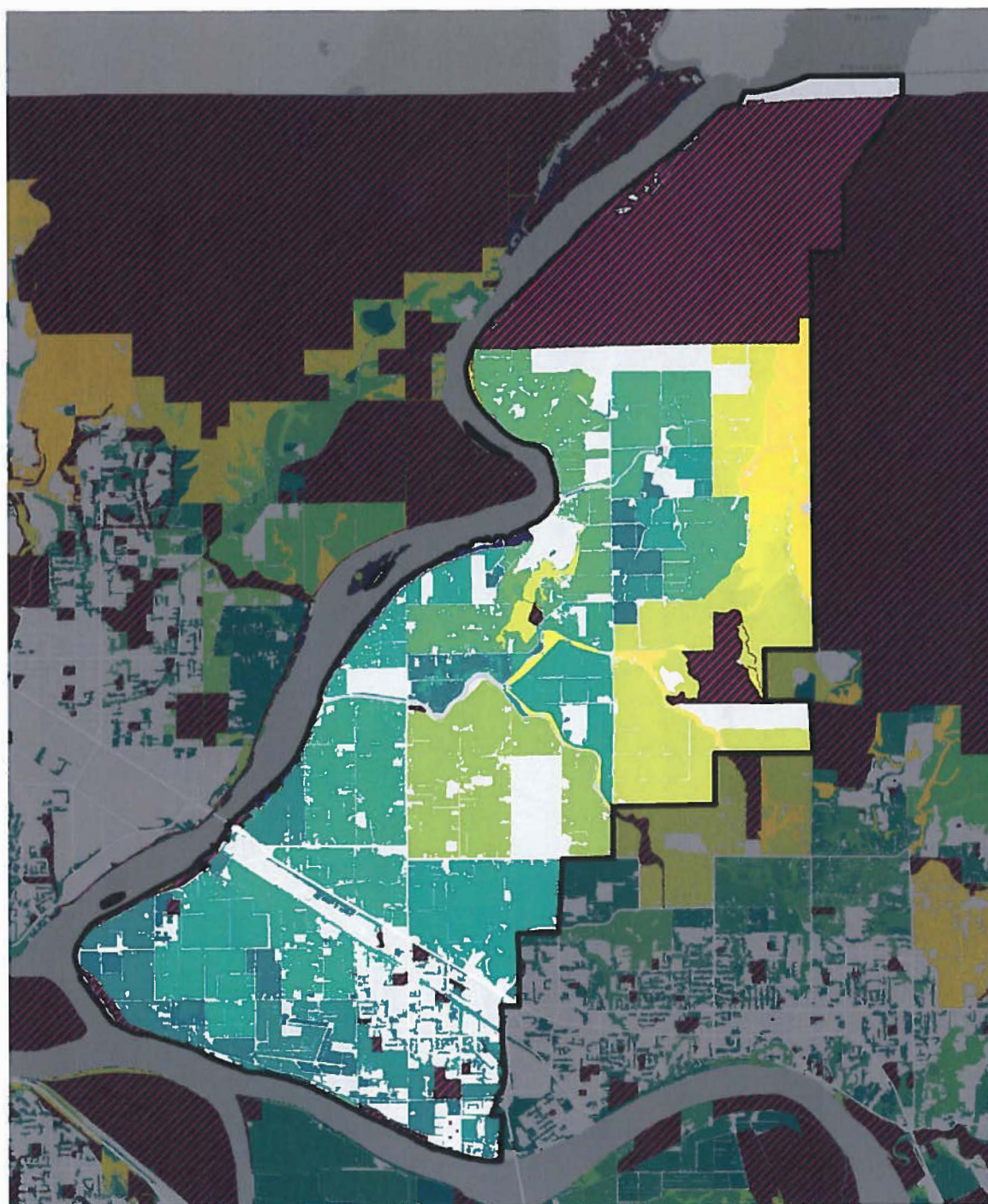


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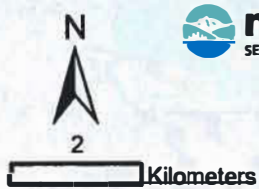


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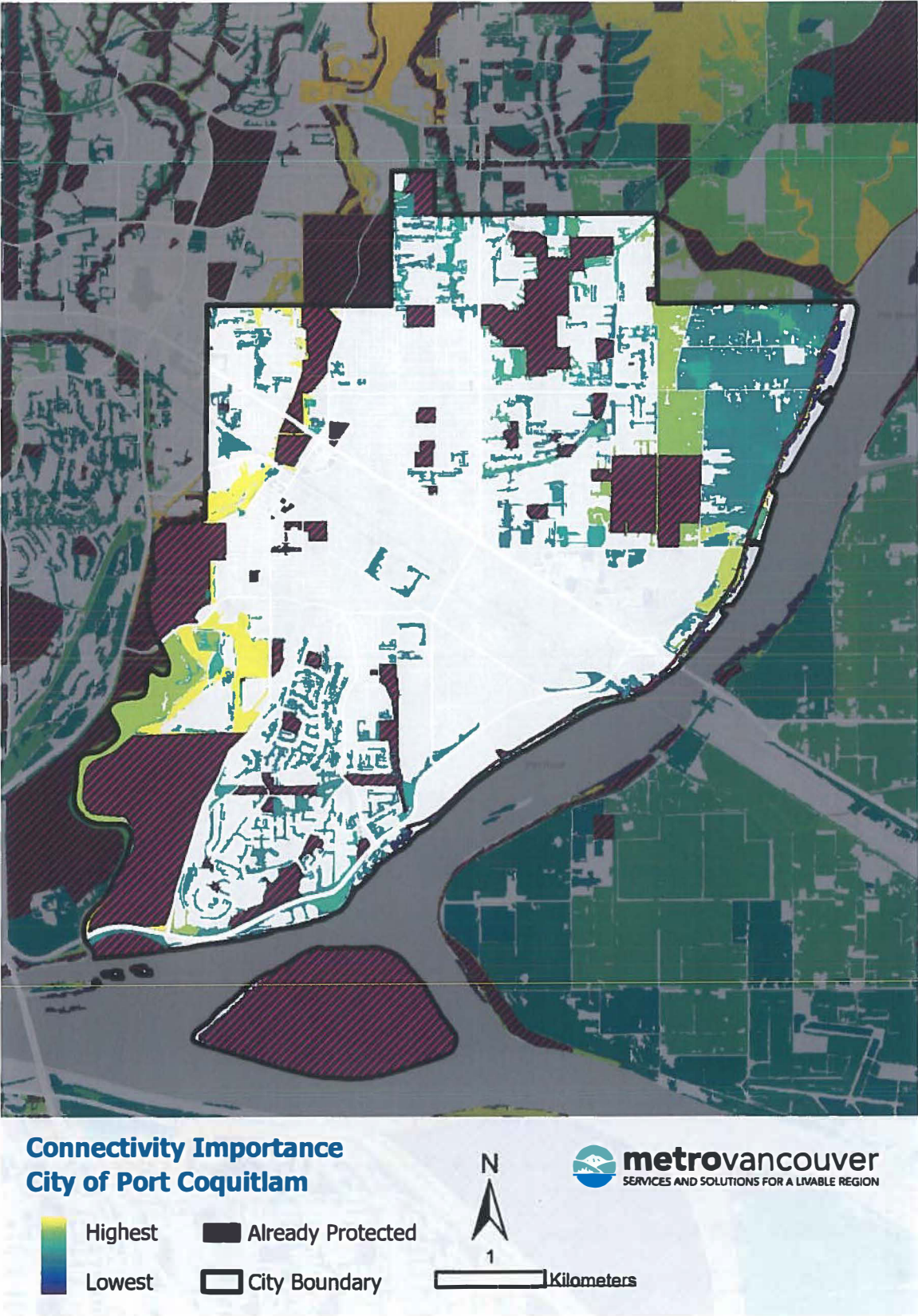
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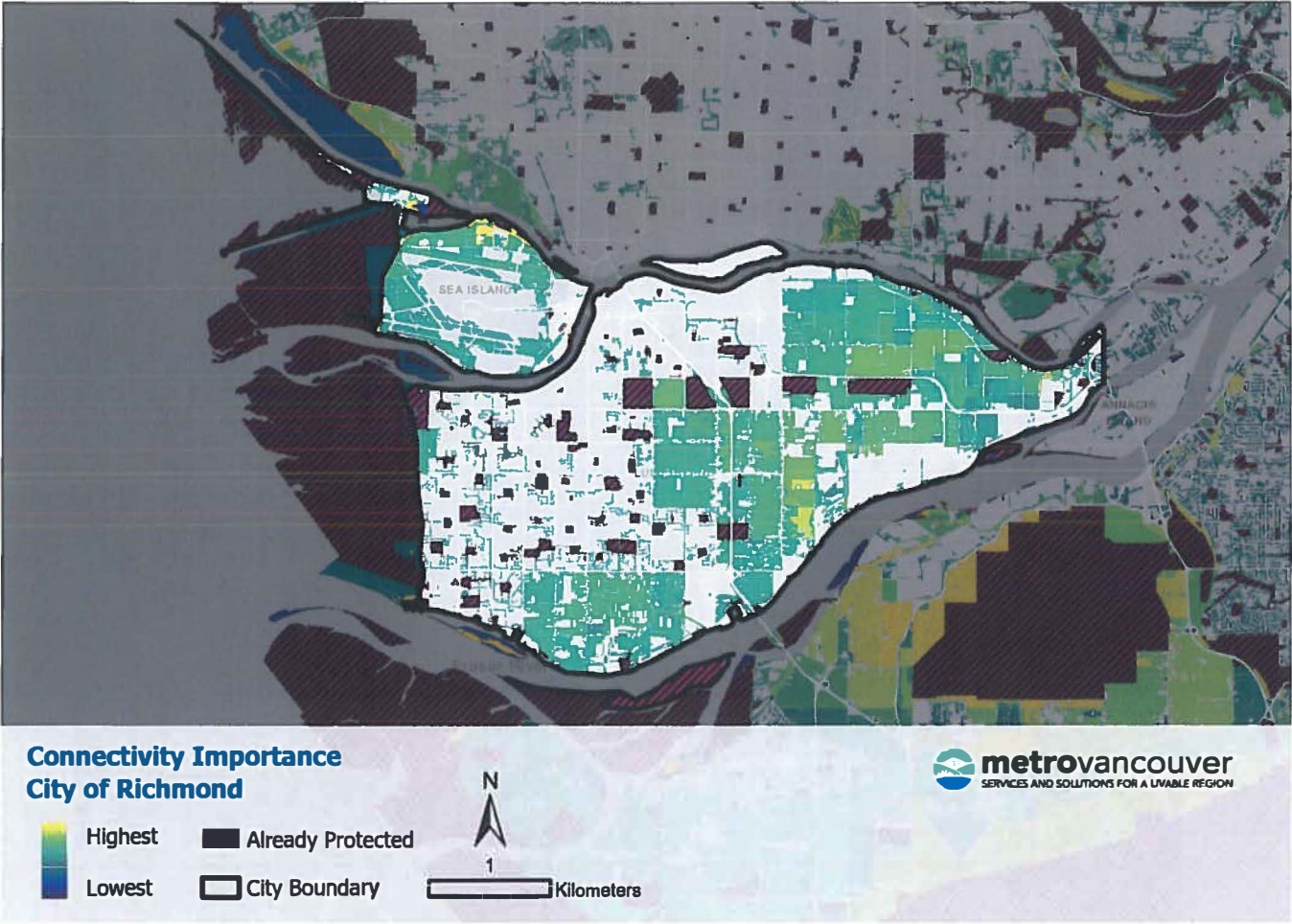
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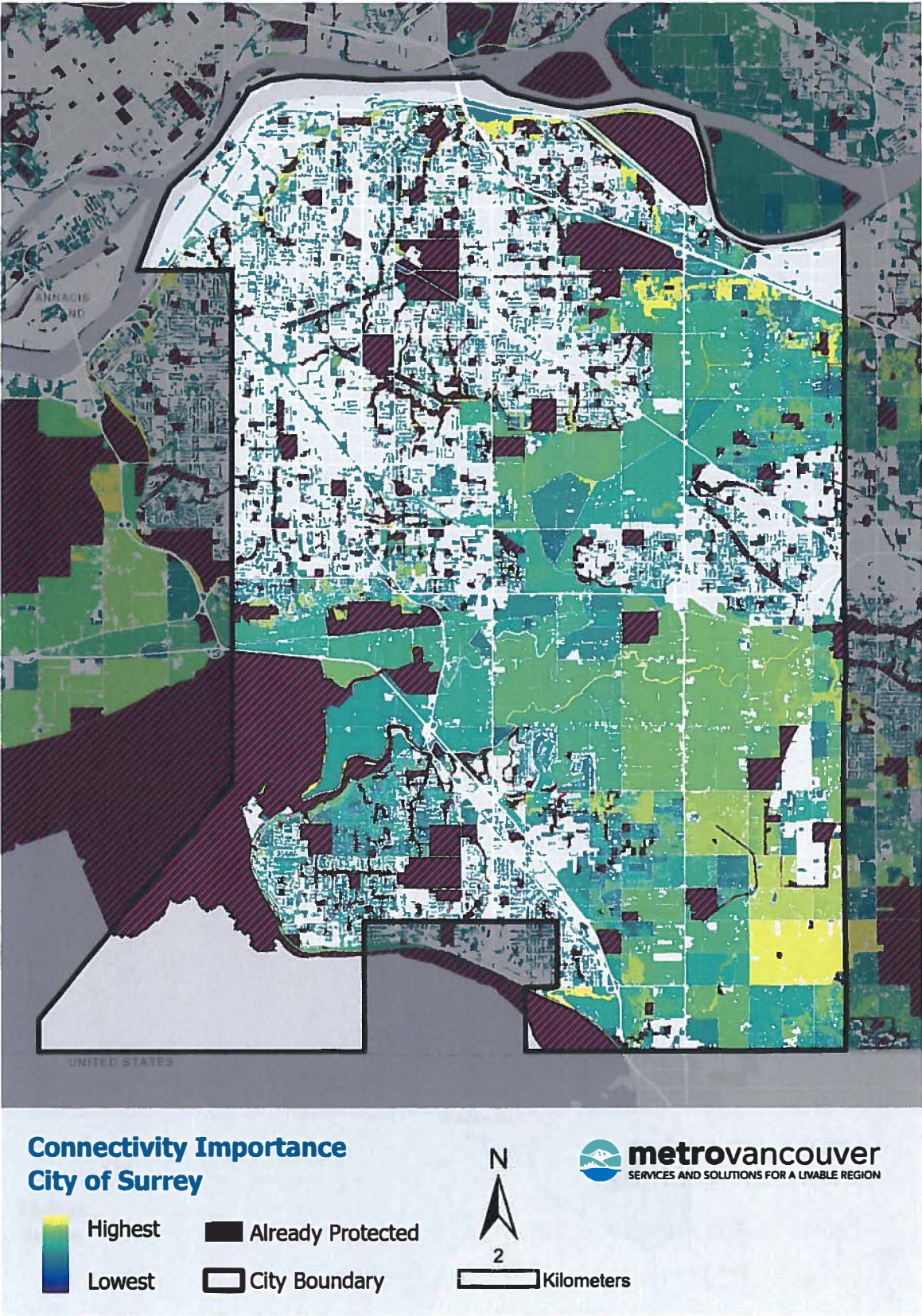


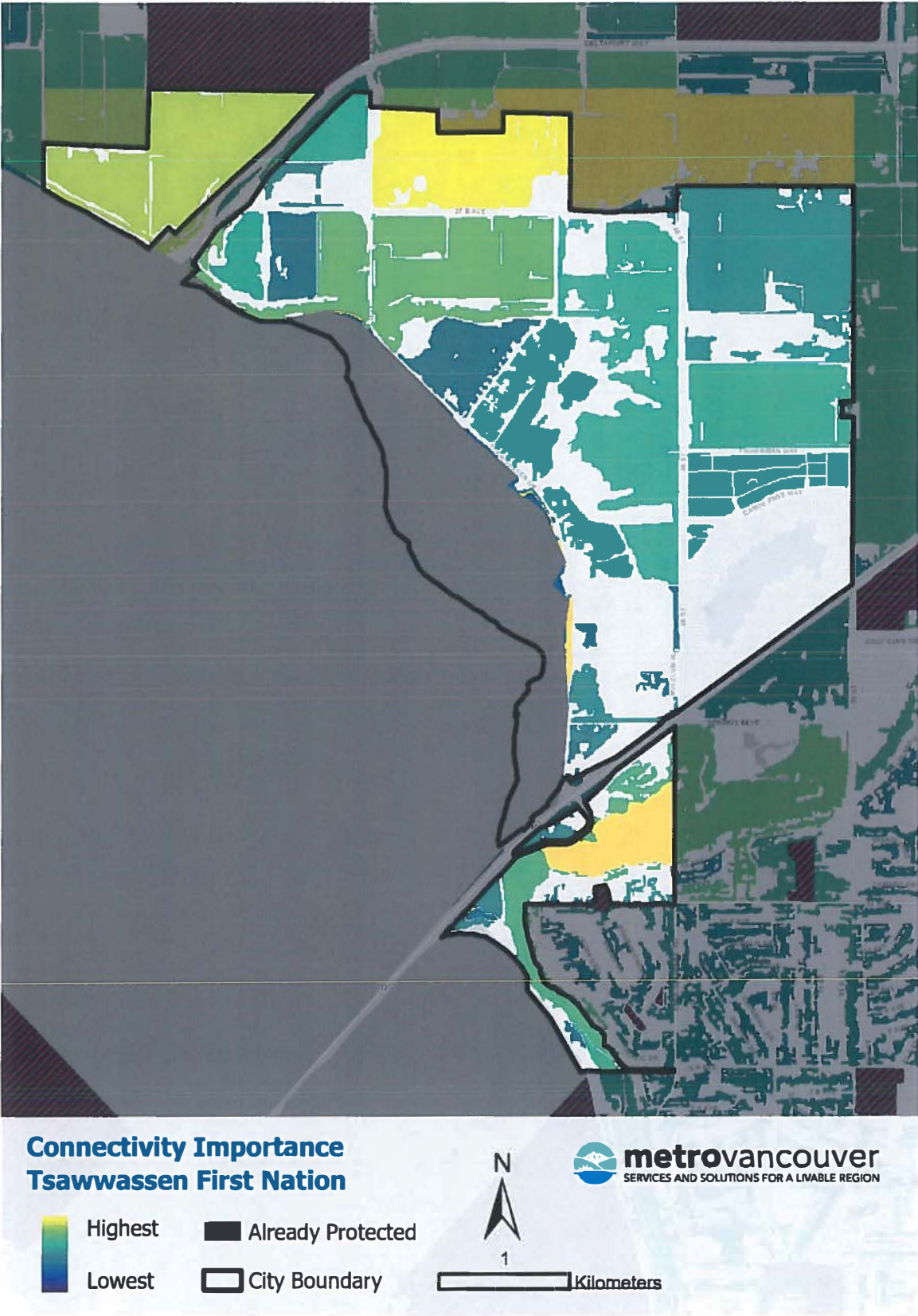
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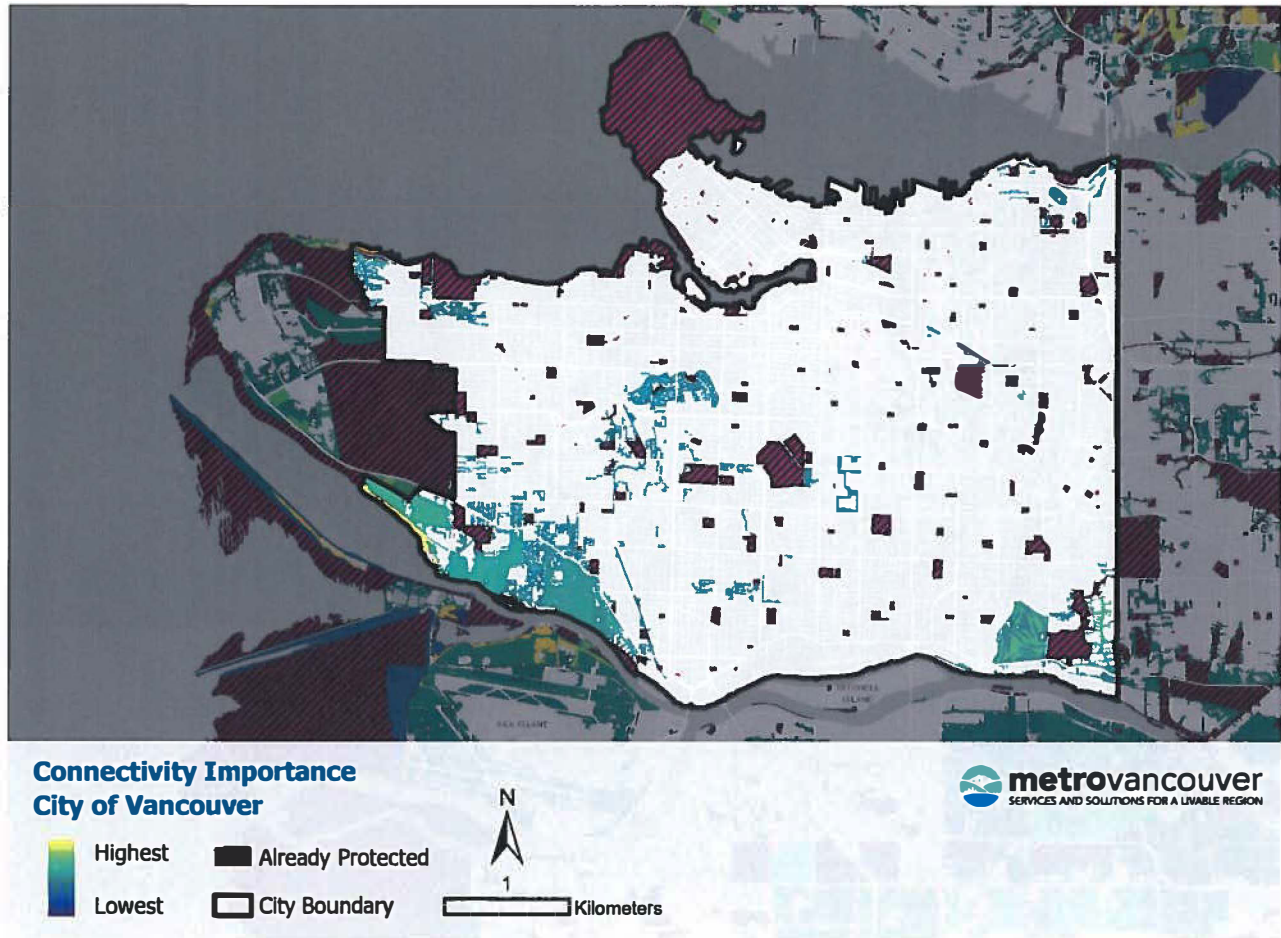


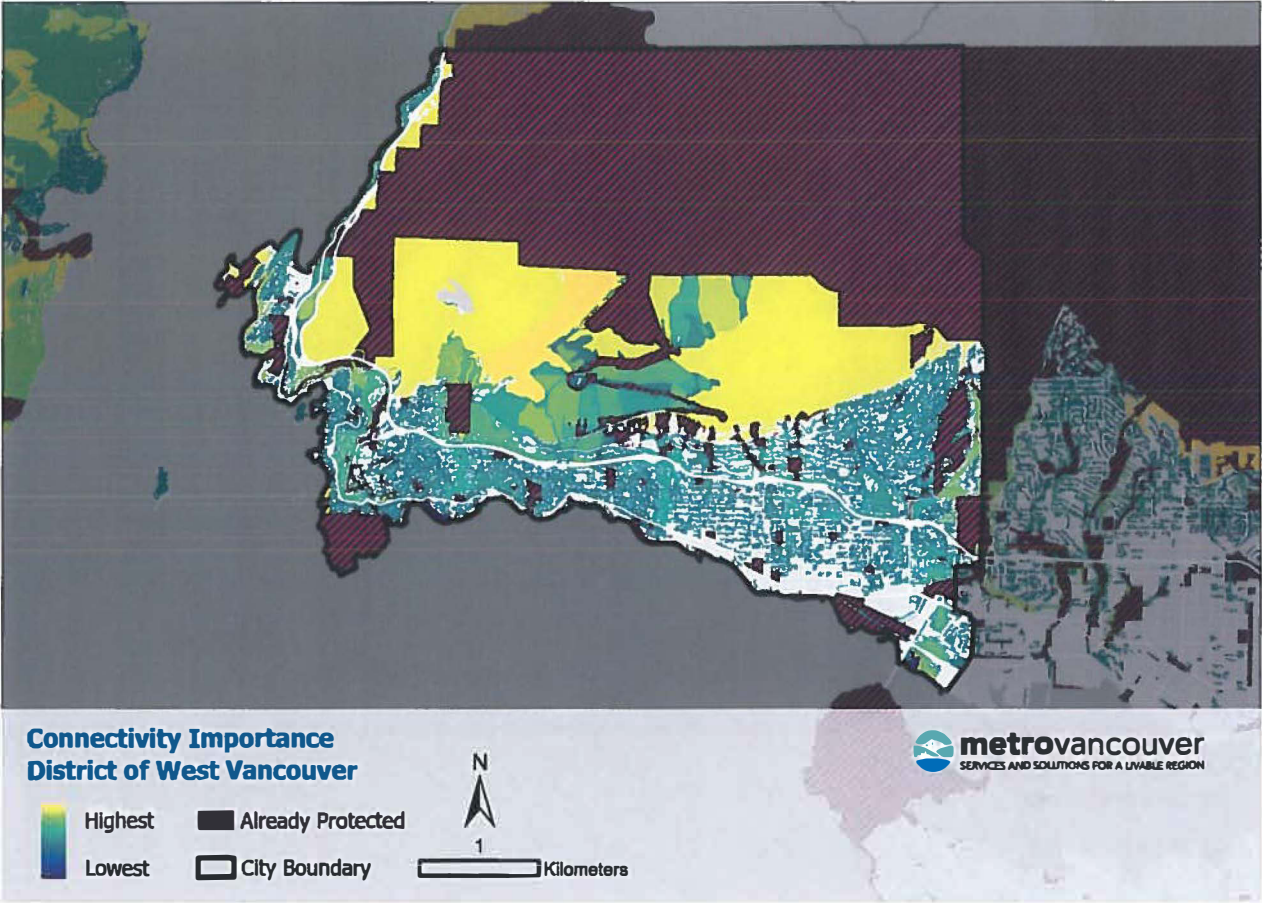


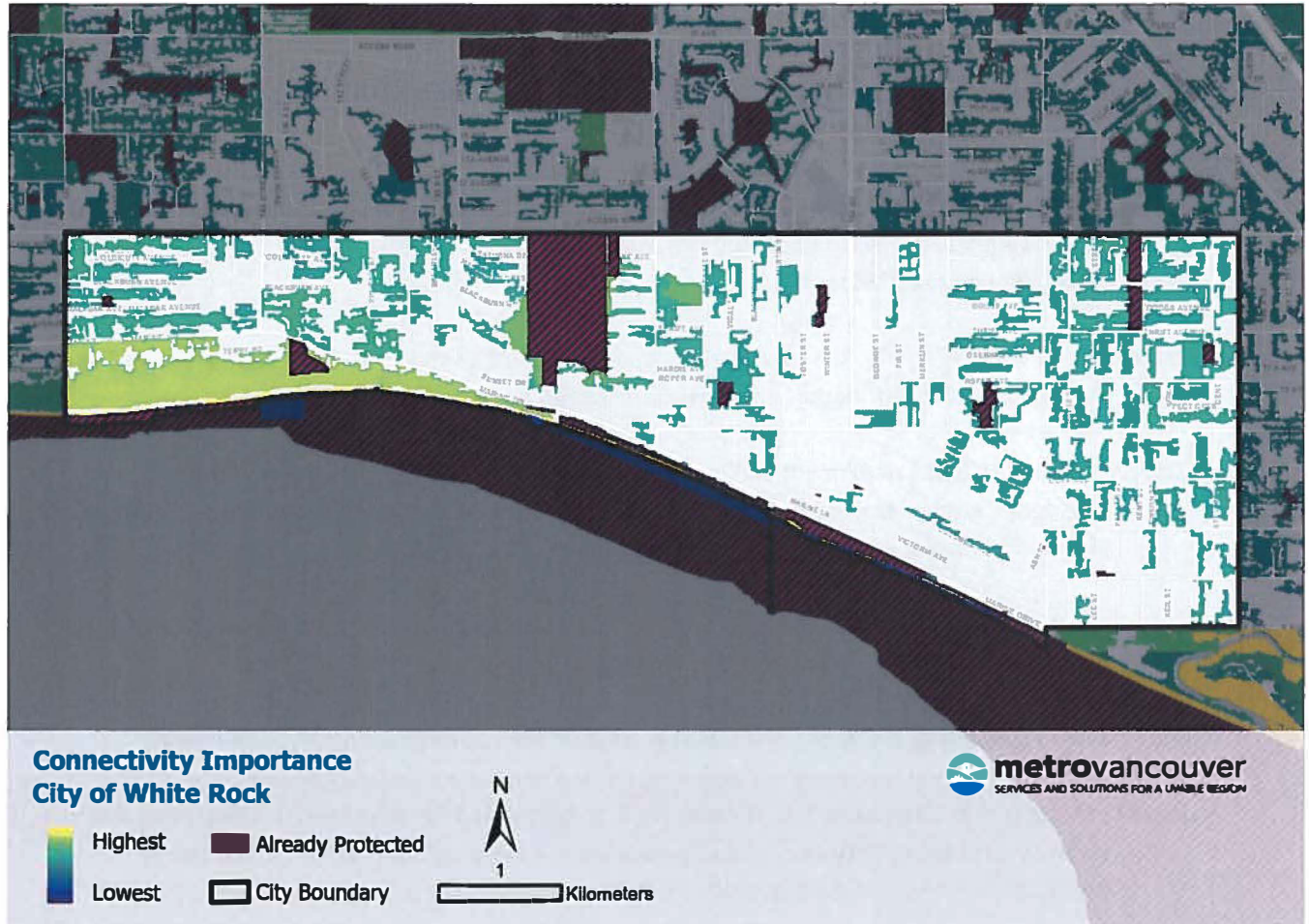












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To: Regional Planning Committee

From: Edward Nichol, Regional Planner, Regional Planning and Housing Services

Date: May 14, 2021 Meeting Date: June 9, 2021

Subject: **Metro Vancouver Tree Regulations Toolkit**

RECOMMENDATION

That the MVRD Board receive for information the report dated May 14, 2021, titled “Metro Vancouver Tree Regulations Toolkit”.

EXECUTIVE SUMMARY

This report highlights the Metro Vancouver Tree Regulations Toolkit, which provides guidance on regulatory tools for member jurisdictions to help preserve trees and increase tree canopy cover. Metro Vancouver commissioned Diamond Head Consulting Ltd. to develop the toolkit in response to projected tree canopy cover decline within the Urban Containment Boundary over the next 20-30 years, and a lack of regionally-specific guidance related to tree regulations available to member jurisdictions. The toolkit identifies the available approaches to regulate trees in British Columbia, highlights considerations for selecting appropriate tools based on the local community context, and assesses the tools that regulate both land use (e.g. zoning bylaws and subdivision and servicing bylaws) and trees (e.g. environmental development permit areas, covenants, and tree bylaws). As a next step, Metro Vancouver will promote and share the toolkit to inform planning efforts at the local level.

PURPOSE

To provide the Regional Planning Committee and MVRD Board with the completed Metro Vancouver Tree Regulations Toolkit for information (Attachment).

BACKGROUND

Healthy trees provide communities with important ecosystem services, including shading and cooling, flood absorption, habitat, and carbon storage. Collectively, the trees within the public and private lands of a community (including the trees in parks, around buildings, along streets and in backyards) make up the urban forest. Since 2016, Metro Vancouver has supported its member jurisdictions in ensuring a healthy and resilient urban forest by providing data and resources, convening practitioners, and advocating for innovative approaches.

In October 2019, the Regional Planning Committee received the report titled “Ecological Health – Tree Canopy Cover and Impervious Surfaces” for information (Reference 1). This report conveyed the results of the Regional Tree Canopy Cover and Impervious Surfaces study (Reference 2). The study revealed that tree canopy cover within the Urban Containment Boundary is expected to decrease from 32% to 28% over the next 20-30 years due to projected urban growth and development.

Member jurisdictions are developing or updating tree bylaws or related regulations in order to help maintain (or increase) the number of trees in their local communities; however, regionally-specific best practices and guidance materials are not readily available to support this work, and several member jurisdictions have requested this information from Metro Vancouver staff. To help address this gap, Metro Vancouver commissioned Diamond Head Consulting to prepare a toolkit that provides guidance on selecting and using regulatory tools that can help preserve trees and increase tree canopy cover in the region. The toolkit has been completed and is attached to this report for information.

TOOLKIT OVERVIEW

The Metro Vancouver Tree Regulations Toolkit provides guidance on selecting and using regulatory tools that help preserve trees and increase tree canopy cover within British Columbia's current legislative framework. The Toolkit is a resource for member jurisdiction staff, decision makers, and practitioners.

No single best practices approach to regulating trees was identified, therefore, the toolkit presents guidance on multiple tools based on best practices and recommends alternatives and options for consideration based on the local community context. Deciding on the most appropriate regulatory approach will require consideration of the community's values and objectives, as well as budgetary and staff resourcing implications.

The toolkit was informed by survey input from member jurisdiction staff and consulting arborists in the region, as well as a review of scientific literature, practitioner guides, and bylaws from across Canada and the United States.

This toolkit contains an overview of:

- The available approaches to regulating trees in British Columbia;
- Considerations for selecting the appropriate tools based on the local community context;
- Higher-level plans that can support tree preservation and an increase in tree canopy cover, such as regional growth strategies and official community plans;
- Tools that regulate land use and influence the space available to retain or replace trees, such as zoning bylaws and subdivision and servicing bylaws, including key bylaw components that impact tree preservation and tree canopy cover; and
- Tools that regulate trees as their primary purpose, such as environmental development permit areas, covenants and tree bylaws, including key bylaw components and alternative options for each component based on local community contexts.

Content pertaining to tools that primarily regulate trees (e.g. tree bylaws) is emphasized; content on higher-level plans and tools that regulate land use is included as supplemental information. The Toolkit may be updated in the future to add more substantial content to the land use-focused sections (e.g. official community plans).

RELATIONSHIP TO OTHER INITIATIVES

The Metro Vancouver Tree Regulations Toolkit complements several Metro Vancouver initiatives, plans, and policies, including:

- *Metro 2050*: The current draft of *Metro 2050* includes actions for Metro Vancouver to collect and maintain tree canopy cover data, and to implement the strategies and actions that support increasing tree canopy cover from 32% to 40% within the region's Urban Containment Boundary by the year 2050. Draft actions for member jurisdictions include the adoption of local tree canopy cover targets and policies that enable the retention and expansion of urban forests, by employing tools such as tree regulations (Reference 3).
- *Climate 2050*: In the Nature and Ecosystems Discussion Paper, Big Idea 1 explores the need to accelerate and expand the restoration and protection of natural areas and urban ecosystems, including a potential 40% tree canopy cover target within the Urban Containment Boundary (Reference 4). This target, in addition to other urban forestry-related policies, will continue to be explored as the Nature and Ecosystems Roadmap is developed.
- *The Urban Forest Climate Adaptation Initiative*: Metro Vancouver developed the Urban Forest Climate Adaptation Initiative to assess the risks and predicted changes to the region's urban forest. The resources developed through this initiative provide guidance to help practitioners manage trees and urban forests in a changing climate (Reference 5).
- *The Ecological Health Framework*: The Ecological Health Framework encapsulates Metro Vancouver's collective efforts around ecological health and provides guiding principles, goals, and strategies to help achieve a vision for a beautiful, healthy, and resilient environment. Adopted by the MVRD Board in 2018, the framework highlights Metro Vancouver's roles in providing data, conducting research, convening forums, developing best practices, and continuing to support member jurisdictions to plan communities with sufficient green spaces such as parks, nature trails, and urban forests (Reference 6).

NEXT STEPS

Metro Vancouver will promote and share the toolkit broadly throughout the region as a resource to inform planning efforts at the local level. The Toolkit may be updated in the future to add more substantial content to the land use-focused sections. Metro Vancouver will continue to provide data and resources, convene practitioners, and advocate for innovative approaches to ensure a healthy and resilient regional urban forest.

ALTERNATIVES

This is an information report. No alternatives are presented.

FINANCIAL IMPLICATIONS

There are no financial implications to this consultant study; it was undertaken as part of Regional Planning's regular work program and Board-approved 2020 Regional Planning budget.

CONCLUSION

To help address projected tree canopy cover decline within the Urban Containment Boundary over the next 20-30 years and the lack of regionally-specific tree regulations guidance available to member jurisdictions, Metro Vancouver commissioned a consultant to develop the Metro Vancouver Tree Regulations Toolkit. The toolkit identifies the available approaches to regulate trees in British Columbia, highlights considerations for selecting appropriate tools based on the local community context, and details the higher-level plans and regulatory tools that can help to preserve trees and increase tree canopy cover.

Attachment (45840173)

“Metro Vancouver Tree Regulations Toolkit”, dated May 2021

References

1. [Ecological Health – Tree Canopy Cover and Impervious Surfaces](#), report dated September 21, 2019
2. [Regional Tree Canopy Cover and Impervious Surfaces](#)
3. [Metro 2050 Draft Policy Language – Goal 3: Protect the Environment and Respond to Climate Change Impacts and the Implementation Section](#), report dated March 26, 2021
4. [Climate 2050 Nature and Ecosystems Discussion Paper](#)
5. [Metro Vancouver Urban Forest Climate Adaptation Initiative](#)
6. [Ecological Health Framework](#)

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Metro Vancouver Tree Regulations Toolkit

May 2021

Prepared by:



Commissioned by Metro Vancouver

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SERVICES AND SOLUTIONS FOR A LIVABLE REGION



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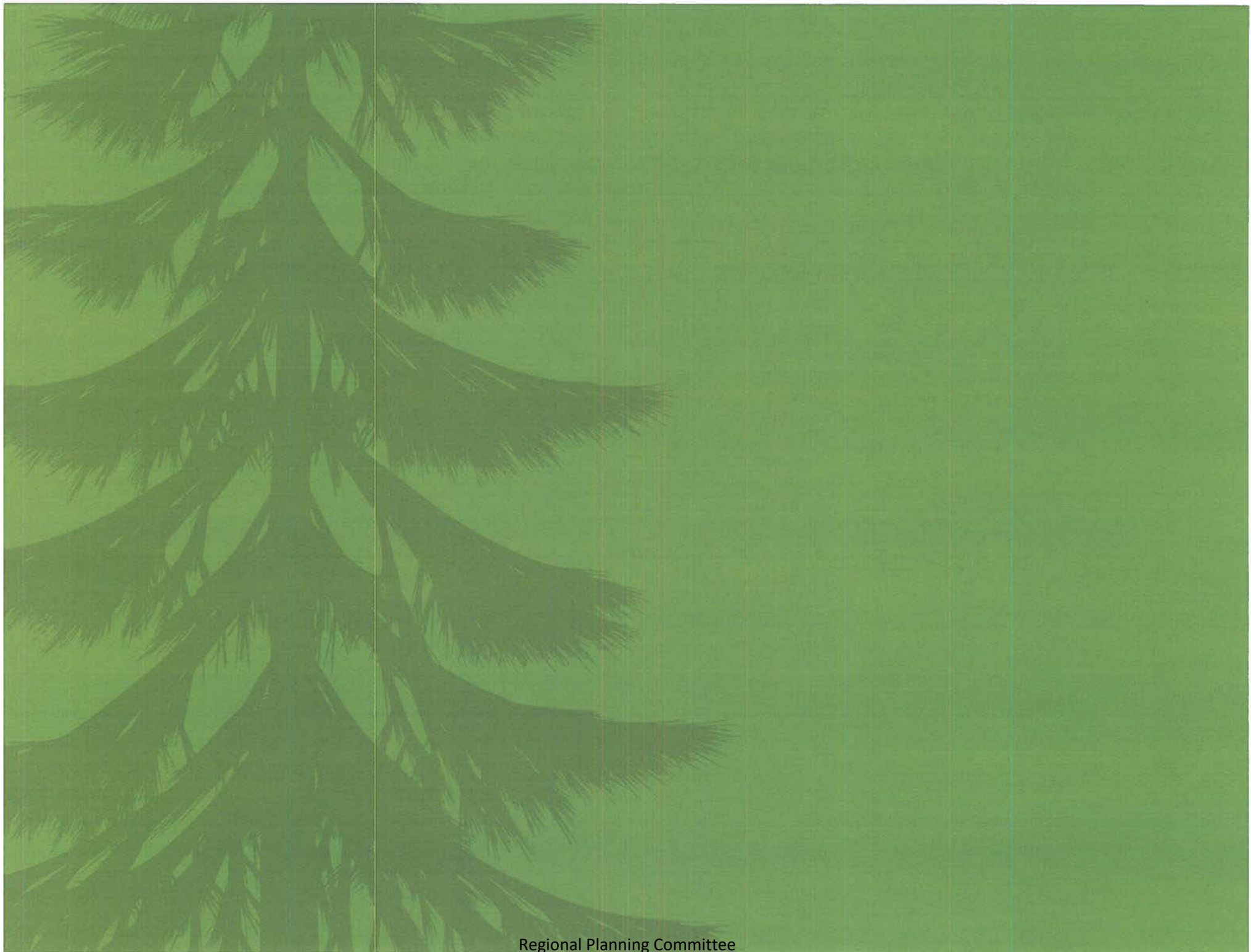
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RECOMMENDED CITATION

Metro Vancouver. (2021). *Tree Regulations Toolkit*.
Contract report prepared by Diamond Head Consulting.



1.0 Introduction

Trees provide Metro Vancouver communities with shade and cooling, intercept stormwater, store carbon, create habitat, and make our cities beautiful. Healthy forests in both urban and natural areas are an essential component of regional livability and resilience to climate change. However, the area covered by trees in Metro Vancouver's urban areas (i.e., within the Urban Containment Boundary) is expected to decline from 32% to 28% over the next 20 to 30 years (Metro Vancouver, 2019). This canopy loss is anticipated due to development and lower density housing areas being re-developed as part of the region's planned growth. At the same time, the urban forest is vulnerable to climate change, and unexpected canopy loss could occur in the region because of heat, drought, extreme weather events or pest and disease outbreaks. As a result, approaches to preserve trees and grow canopy cover need to consider a wide range of factors, from the impact of land use on the availability of permeable land to grow trees to the future climate suitability of tree species.

The *Metro Vancouver Tree Regulations Toolkit* (Toolkit) provides guidance for Metro Vancouver member jurisdictions on how they can develop comprehensive policy and regulations to preserve trees and grow tree canopy within British Columbia's current legislative frame-

work. Municipalities in British Columbia can use legislative tools to offset or prevent canopy loss.

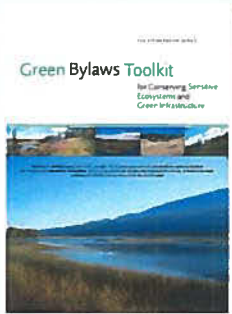
This Toolkit is a resource for municipal staff, decision makers and other practitioners, including planners, arborists, biologists, engineers and landscape architects, on using regulatory tools that influence the preservation and growth of trees and tree canopy. This Toolkit provides a framework for selecting regulatory tools to help achieve municipal tree preservation or canopy growth objectives.

No single best practices approach to regulating trees was identified during this review. The Toolkit therefore presents guidance based on best practices when available and recommends alternatives and options for consideration. Deciding on the most appropriate regulatory approach will require consideration of the community's values and canopy cover objectives, as well as the budgetary implications for local governments and permit applicants.

This Toolkit is not legal advice. Users must conduct their own legal review of any bylaws, regulations, or policies developed using this Toolkit.

ADDITIONAL TOOLKITS AND GUIDANCE DOCUMENTS

There are several other useful guides and toolkits that may help readers and inform the development of a comprehensive set of bylaws to manage natural assets, including:



- The Green Bylaws Toolkit for Conserving Sensitive Ecosystems and Green Infrastructure (Stewardship Centre BC, 2016) provides guidance on tools for local governments to protect green infrastructure (natural and engineered).
- Environmental Development Permit Areas: In Practice and in Caselaw (Britton-Foster, Grant, & Curran, 2016) provides information about using Environmental Development Permit Areas to protect riparian and terrestrial ecosystems. This report provides information about key components of environmental development permit areas (DPAs) and their judicial treatment in British Columbia.
- Enhancing Climate Resilience of Subdivision and Development Servicing (SDS) Bylaws in the Columbia Basin: A Guidance Document (Nelitz, Cooke, Curran, & Glotze, 2013) provides information to guide the update of subdivision and development servicing bylaws for the purpose of increasing climate resiliency and reducing the cost of building and operating infrastructure.
- The Topsoil Bylaws Toolkit (Curran, Dumont, Low, & Tesche, 2012) provides information and guidance for local governments to create effective topsoil policies that support rainwater management and reduce the impact of development.

1.1 STRUCTURE OF THE TOOLKIT

This Toolkit provides:

1. An overview of the available approaches to regulating trees in British Columbia
2. Considerations for selecting the right tools for your community
3. Descriptions of each tool including:
 - a. **Higher-level plans** that can support tree preservation or canopy growth through their vision and policy guidance (regional growth strategies and official community plans)
 - b. **Tools regulating land use** that influence the space available to retain or replace trees (zoning bylaws and subdivision and servicing bylaws)
 - i. The Toolkit lists key bylaw components that impact tree preservation and growth
 - c. **Tools regulating trees** as their primary purpose (environmental development permit areas, covenants, and tree bylaws)
 - i. The Toolkit provides detailed information about:
 - Key components listed in typical bylaw sections
 - The purpose of each component within the bylaw
 - Options for each component, either as a recommended best practice or a list of alternatives for readers to select from based on their community context

The majority of the content in this Toolkit is focused on tools regulating trees as their primary purpose because Metro Vancouver had identified a gap in regional guidance on this topic. Information about higher-level plans and tools regulating land use has been included because they provide the foundation for long term preservation of trees and growth of tree canopy in the region. Readers seeking to preserve trees and grow canopy cover should begin with higher-level plans and tools regulating land use before selecting tools to regulate trees. Callout boxes throughout this Toolkit provide examples, external resources, and findings from the practitioner surveys conducted for the development of this Toolkit.



1.2 TOOLKIT DEVELOPMENT

The Toolkit was developed with input from a practitioner survey of municipal staff and consulting arborists in the region. In addition, the project team conducted a review of scientific literature, practitioner guides and bylaws from several regions across Canada and the United States to explore best practices for regulating trees and tree canopy.

Practitioners in Metro Vancouver were surveyed to better understand regional perceptions of the strengths and needs for improvement of tree regulations. Two practitioner surveys were sent, the first targeting municipal staff involved in tree bylaw implementation, and the second targeting consulting arborists who have experience working through the development process (listed on the International Society of Arboriculture's list of consulting arborists for municipalities in Metro Vancouver).

Fourteen staff from Metro Vancouver member jurisdictions with private tree bylaws answered the municipal survey. Twenty-nine consulting arborists (who have experience preparing arborist reports on devel-

opment projects across Metro Vancouver) answered the consulting arborist survey. Appendix 1 contains the survey results.

The project team conducted a review of academic literature and practitioner guides to identify components of successful tree regulations and key considerations for governance, planning and implementation supporting effective regulations. Appendix 2 contains the literature review.

Several Canadian tree bylaws were reviewed to inform the tree bylaws section. In Canada, only some provinces have legislation that explicitly enables the regulation of trees on private property. Municipalities in Ontario, Québec and British Columbia have private tree bylaws. Although bylaws from Ontario, Québec and the US were reviewed, British Columbia bylaws were selected for comparison in the Toolkit because of their legal compatibility with legislation in the Metro Vancouver region.

2.0 British Columbia's Institutional Framework for Regulating Trees

British Columbia's institutional framework provides a range of policy and regulatory tools to preserve or grow trees in forest stands and urban areas. Figure 1 summarizes how tree and tree canopy considerations can be incorporated into British Columbia's available regulatory tools, including:

1. Higher-level plans:
 - a. Regional Growth Strategy
 - b. Official Community Plans and neighbourhood plans
2. Tools regulating land use and therefore the space available for tree retention and replacement:
 - a. Zoning bylaws
 - b. Subdivision and servicing bylaws
3. Tools primarily regulating trees:
 - a. Environmental development permit areas
 - b. Covenants
 - c. Tree bylaws

These tools provide opportunities to regulate trees in British Columbia but may not be applicable in all instances; the relevance of each tool depends on each jurisdiction's context and the trees that are the focus of regulation. Figure 1 includes examples for how each tool can be used to regulate trees growing on private (blue headings) and public (red headings) land for two types of canopy: naturalized stands and urban areas. Each column on the figure indicates if and how a tool would typically apply to this type of public or private tree canopy. For example, Figure 1 does not list content for 'Regional Growth Strat-


egies' under private yard trees and private trees in a development because they are not typically addressed by that tool.

In addition to the regulations represented in Figure 1, some bylaws can stand alone or have their content addressed within zoning bylaws, subdivision and servicing bylaws or development permit areas.

These bylaws include:

- **Runoff control bylaws** | Runoff control bylaws can establish maximum percentage areas covered by impermeable surfaces varied by land use, zones, geography and size of paved areas
- **Screening and landscape bylaws** | These bylaws can require screening or landscaping to preserve, protect, restore and enhance the natural environment, screen or buffer land uses, and to prevent hazardous conditions (e.g., require certain types of plants in wildfire hazard areas)
- **Soil removal and deposit bylaws** | Sometimes called sediment and erosion bylaws, these bylaws regulate grading, soil removal and deposition, soil storage and erosion control guidelines
- **Watercourse protection bylaws** | Watercourse protection bylaws can regulate specific activities and development in riparian setback areas

HOW REGULATORY TOOLS CAN BE USED TO PRESERVE TREES AND GROW TREE CANOPY IN THE REGION



1 | Trees in Forest Stands and Naturalized Areas

	PRIVATE FOREST	MUNICIPAL FOREST
REGIONAL GROWTH STRATEGIES (OCP* must be consistent with RGS*)	Encourage development patterns that avoid urban sprawl, minimize risks from natural hazards, protect environmentally sensitive areas (ESAs) and water quality.	Encourage preserving, creating and linking urban and rural open spaces including parks and recreation areas.
OFFICIAL COMMUNITY PLANS & NEIGHBOURHOOD PLANS (Other bylaws must be consistent with OCP*)	Direct development away from ESAs* and environmental hazards. Policies supporting preservation, protection, and enhancement of tree stands and wildlife trees, clustering and density bonusing in exchange for conservation covenants.	Policies supporting the preservation, protection and enhancement of tree stands and wildlife trees. Policies that support clustering and density bonusing in exchange for parkland.
ZONING BYLAWS (Or contained in related land use bylaws for runoff control, parking, landscaping etc.)	Require setbacks from riparian areas and ESAs*, enable clustering and density bonusing, set out standards for preserving, protecting, enhancing and restoring ESAs	At rezoning, parkland acquisitions can be negotiated through density bonusing.
SUBDIVISION SERVICING BYLAWS	Sets standards for drainage and onsite stormwater management that can be made low impact.	Sets standards for drainage and onsite stormwater management that can be made low impact.
DEVELOPMENT PERMIT AREAS	Establish riparian setbacks, ESA* soil and vegetation protection and restoration guidelines, environmental assessment requirements.	DPA's on private land can enhance connectivity, restoration and enhancement of natural areas adjacent to municipal forest.
COVENANTS	Protect natural areas and sensitive ecosystems on title and place maintenance or restoration requirements and restrict actions that could damage the protected features.	
TREE BYLAWS	Regulate all trees in ESAs*, on slopes and significant trees. Specify assessment, protection, replacement standards.	Regulate all municipal trees. Specify assessment, protection, compensation standards.

*Short forms: ESA – Environmentally Sensitive Area | OCP – Official Community Plan | RGS – Regional Growth Strategy

Figure 1. The key regulatory tools in BC that can be used to protect or grow urban forest canopy types.

2 | Trees in Urban Areas



MUNICIPAL STREET & PARK TREES

Develop settlement patterns that minimize the use of automobiles and encourage walking, cycling and the efficient use of public transit.

Policies and targets supporting parkland amenity contributions, new parkland, expansion of the urban forest, treed character of streets and areas, integration with goals such as stormwater management, biodiversity, energy conservation and walkability.

At rezoning, negotiate amenity contributions for new parkland. Require setbacks of above and below ground structures, signage and weather protection favourable for street trees.

Set standards for boulevard trees, spacing, soil volume, planting standards, access, utilities favourable for street trees.

Regulate all municipal trees. Specify assessment, protection, compensation standards.

PRIVATE YARD TREES

Policies supporting the treed character of new landscaping in land uses and neighbourhoods.

Require lot sizes, trees per lot, impermeable/permeable cover, off-street parking, screening | and landscaping, favourable to yard trees.

Set standards for access and utilities placement favourable to yard trees.

Promote energy conservation, water conservation and reduction of greenhouse gas emissions using trees.

Regulate certain trees and require a minimum number of trees/canopy per lot. Specify assessment and replacement standards.

PRIVATE TREE IN A DEVELOPMENT

Policies and targets supporting tree and canopy retention, protection and enhancement.

IMPORTANT: The tree bylaw may not apply to the extent necessary to allow a permitted use or density.

Set standards for access and utilities placement favourable to retaining private trees.

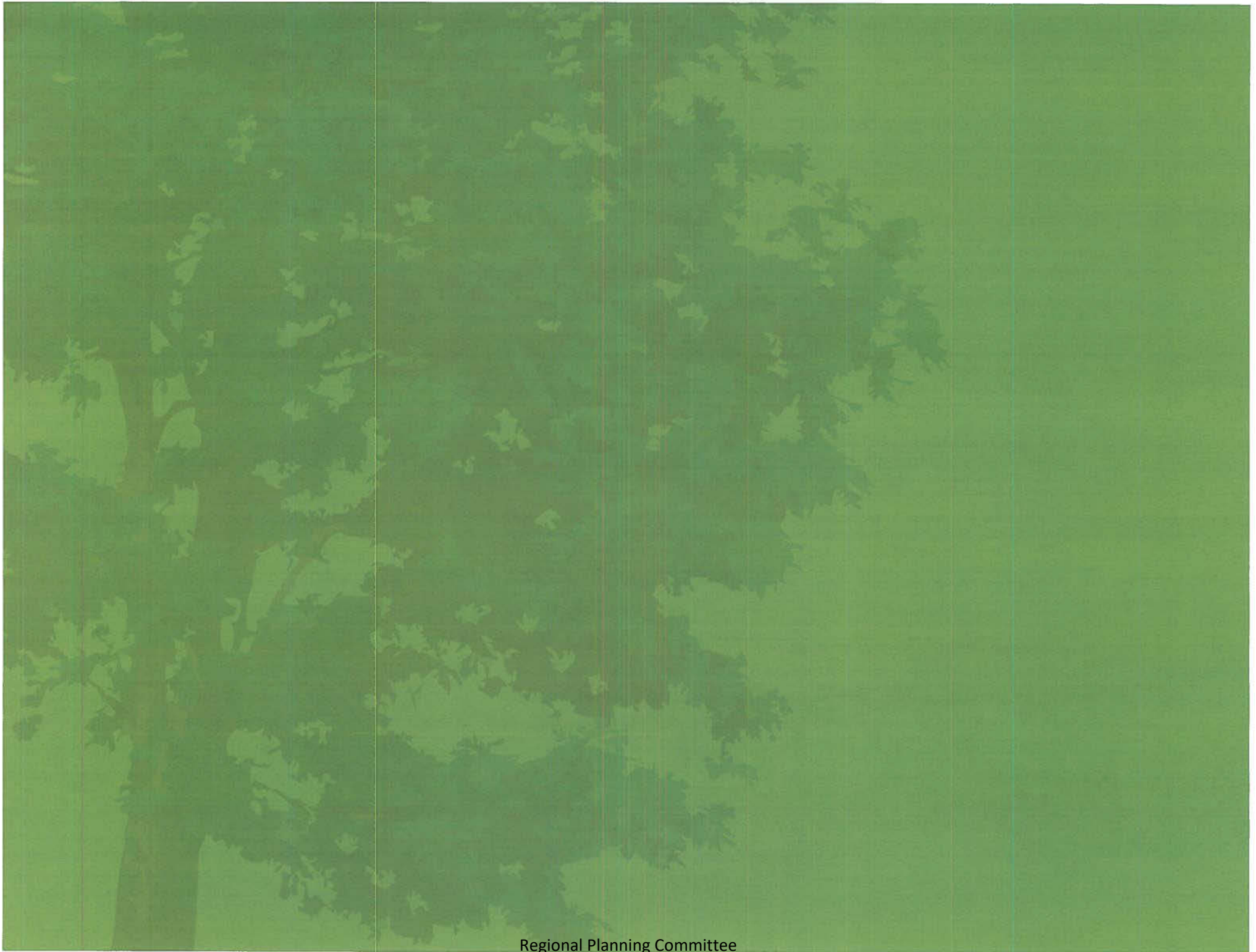
Protect trees or tree groups on developing properties, place maintenance requirements and restrict actions that could damage the protected features.

Regulate certain trees and require a minimum number of trees/canopy per lot. Specify assessment, protection, replacement standards.

Tree types: ■ Forest stands and naturalized areas | ■ Urban trees

Jurisdiction: Public | Private

***Short forms:** ESA – Environmentally Sensitive Area | OCP – Official Community Plan | RGS – Regional Growth Strategy





3.0 Selecting the Right Tools and Options for your Community

This Toolkit provides options for content that municipalities could include in policy and regulatory tools to preserve trees and grow tree canopy. For a municipality considering what tool(s) to select, an urban forest governance lens may be helpful to identify the decision-making factors. Urban forest governance refers to the processes, interactions, organizations, and decisions that lead to the establishment and maintenance of urban forest resources and benefits (Lawrence, De Vreese, Johnston, Konijnendijk, & Sanesi, 2013). Applying an urban forest governance lens means defining the governance approach used by a specific municipality and using that information to help inform decisions about which tool(s) are likely to be most successful.

The paper “*Urban forest governance: Towards a framework for comparing approaches*” (Lawrence, De Vreese, Johnston, Konijnendijk, & Sanesi, 2013) defines a set of variables for systematically analysing urban forest governance. This Toolkit poses a set of analysis questions related to urban forest governance; these questions can be used to help define the relevant focus, level of effort, extent of change, key actors, capacity, and processes for developing new tree regulations.



Urban forest governance analysis questions

1. Community context:

- ◊ What are the urban forest canopy types that are the target of canopy preservation or growth: canopy in forest stands and naturalized areas, canopy in urban areas, or canopy in both naturalized forest stands and urban areas? Please refer to Figure 1 for the canopy types and how they might be regulated with different tools.
- ◊ What level of administration and enforcement effort can be supported by the jurisdiction's population size and geographic area?
- ◊ What level of regulation would align with community values?

2. Institutional frameworks:

- ◊ What types of policies, plans and regulations are already in place and how could they be enhanced or complemented with updates or new regulation?
- ◊ Will new policies or plans be required to support new regulation?
- ◊ What urban forest canopy or tree targets exist in policies and plans, and how could new regulations be used to achieve them?

3. Actors and coalitions:

- ◊ Who are the key internal and external stakeholders who need to be consulted?
- ◊ Who needs to support the decision and who will make the final decision?

4. Resources:

- ◊ Will funding and staffing need to increase to support the new regulation?
- ◊ What new technical information will need to be provided to internal and external stakeholders?
- ◊ Can other policies, programs or staff be used to implement the changes more effectively?

5. Processes:

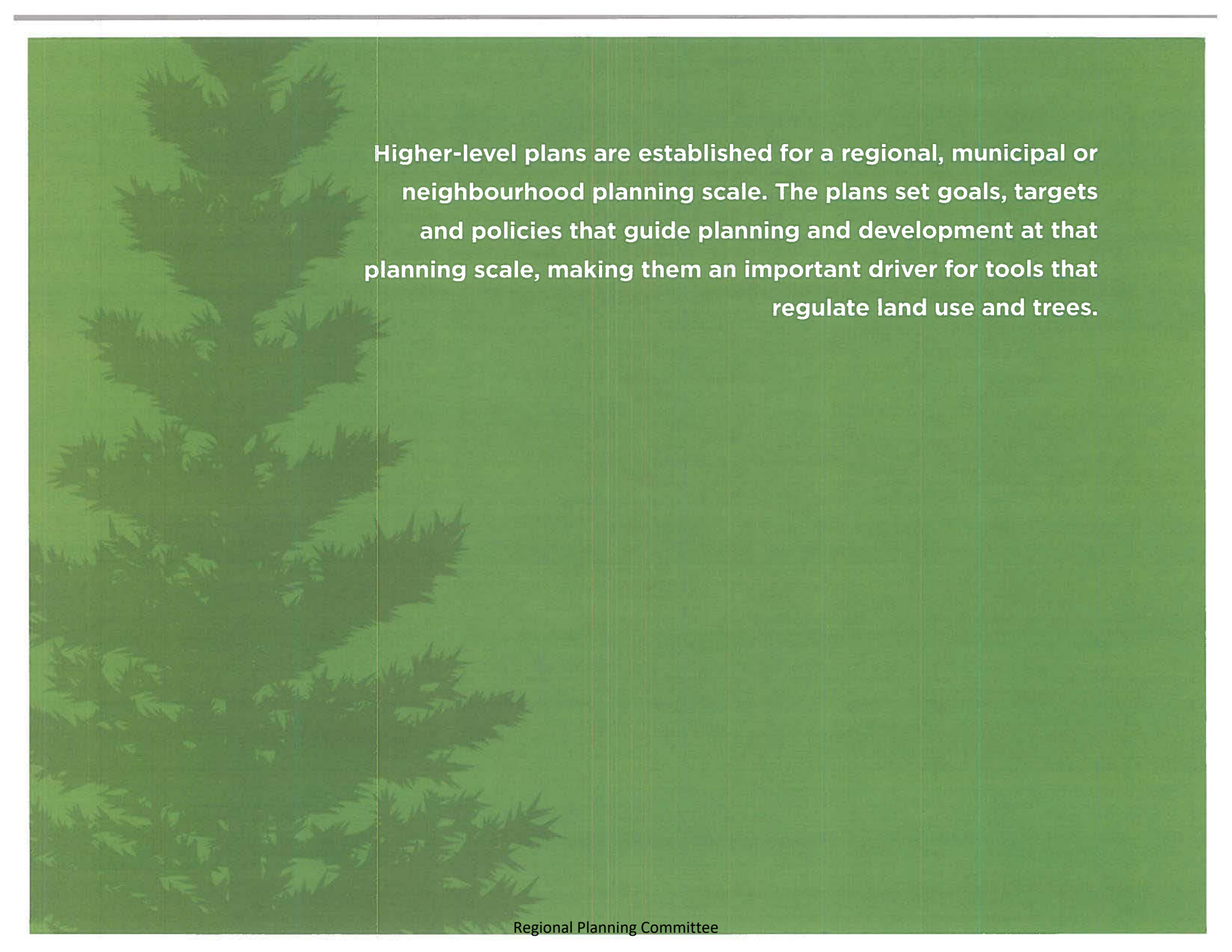
- ◊ What are the narratives, conflicts and framing that justify the changes being made?
- ◊ What are the specific ways that actors and stakeholders will be consulted, engaged, involved, and empowered in decisions and implementation?
- ◊ What are the performance targets¹ for the change? How will success be measured and reported in relation to targets?

Answering these questions will help choose the right tools and options for your community. Your answers will inform the selection and design of policy and regulatory tools that will be appropriate for the community's governance context; and help identify the engagement and resourcing required to support their effective implementation.

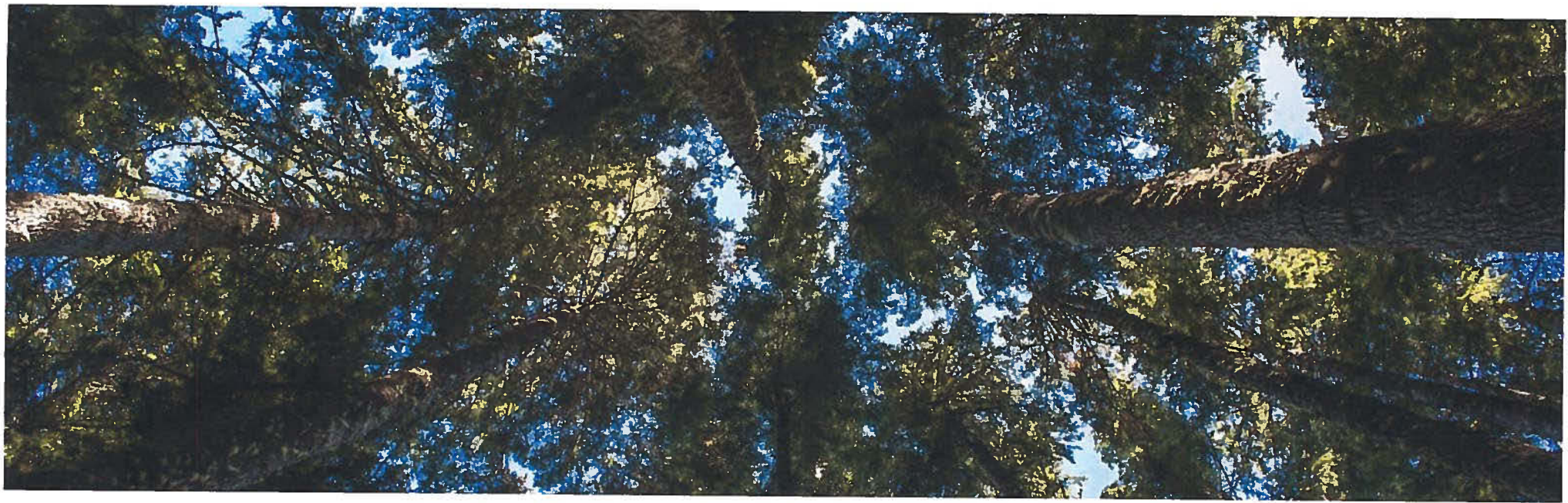
¹ Examples of measurable targets include metrics such as canopy cover, rate of tree removal and replacement, replacement tree survival rates, or pervious cover.



Regional Planning Committee



Higher-level plans are established for a regional, municipal or neighbourhood planning scale. The plans set goals, targets and policies that guide planning and development at that planning scale, making them an important driver for tools that regulate land use and trees.



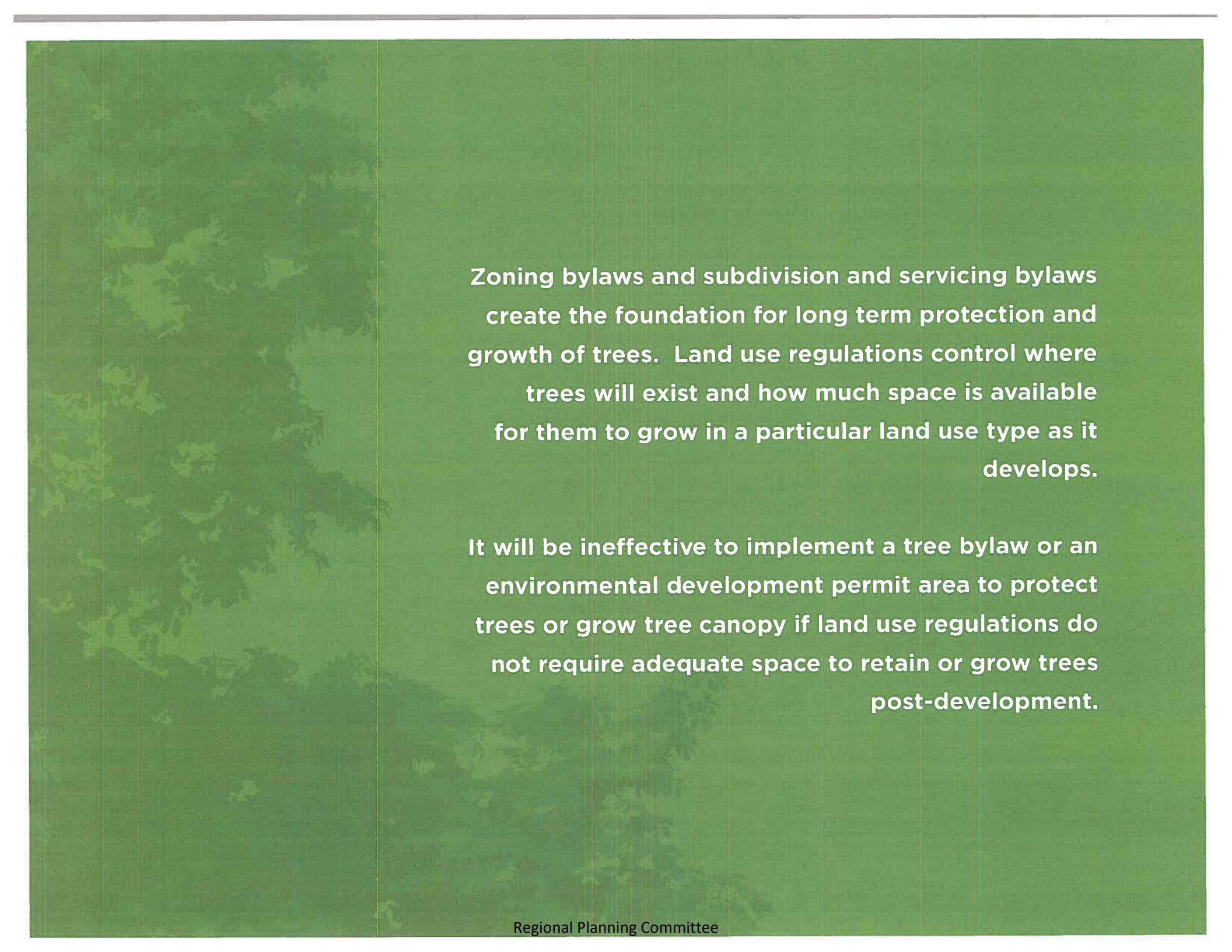
4.0 Higher-level Plans

The higher-level plans described in this section include Regional Growth Strategies, Official Community Plans and Neighbourhood Plans. Regional Growth Strategies are an agreement across local governments on the future, population in the region and employment projections, actions proposed, and targets, policies and actions, for example for the reduction of greenhouse gas emissions (Local Government Act, RSBC 2015, c 1, 2015). A Regional Growth Strategy describes objectives for and ways to protect environmentally sensitive areas. Local governments are required to include a regional context statement within Official Community Plans (OCPs) to demonstrate consistency with matters in the regional growth strategy.

Official Community Plans are comprehensive plans that can include environmental protection policies. They provide the policy support for the bylaws adopted in the community. Official Community Plans can

also define settlement patterns that guide development and avoid sprawl, map key areas, and designate development permit areas and guidelines for development permits responsible for tree protection and replacement (Stewardship Centre BC, 2016). Official Community Plans can establish goals and indicators related to the preservation and growth of a community's urban forest and support the implementation of community-supported bylaws and policies for that purpose.

Neighbourhood Plans can be a helpful accompanying policy tool to set out targets for canopy cover. They can also define policy objectives and character elements of importance for the urban forest and neighbourhood character. This smaller planning scale enables more consideration to be given to the local land use and unique context of each neighbourhood within a municipality.



Zoning bylaws and subdivision and servicing bylaws create the foundation for long term protection and growth of trees. Land use regulations control where trees will exist and how much space is available for them to grow in a particular land use type as it develops.

It will be ineffective to implement a tree bylaw or an environmental development permit area to protect trees or grow tree canopy if land use regulations do not require adequate space to retain or grow trees post-development.

5.0 Tools Regulating Land Use

Land use regulations have a significant impact on tree preservation and growth because they influence the space available to retain or replace trees with development. The two land use bylaws discussed in this section include:

- **Zoning bylaws**, which influence tree retention based on the permitted use and density and the private landscape space available to replant trees
- **Subdivision and servicing bylaws**, which control the placement of street trees and soil volume provided, and construction standards

Key components for tree retention or planting have been identified in each bylaw. They are discussed with technical guidance and recommendations for the reader's consideration.

5.1 ZONING BYLAWS

Metro Vancouver's 2019 Regional Tree Canopy Cover and Impervious Surfaces report (Metro Vancouver, 2019) found that 54% of the region and 32% of the land within the Urban Containment Boundary is covered with tree canopy, and 50% of the land within the Urban Containment Boundary is impervious surfaces. The study revealed that higher

density housing developments had shown a trend of increasing tree canopy and pervious cover up until the 1980s, and that it has trended downwards in recent years. In contrast, single-family housing (particularly detached) had steadily supported higher canopy and pervious cover until the 1970s but has since trended downwards with larger home sizes on smaller lots. The decline of canopy cover and pervious cover is expected to continue. Zoning influences the tree canopy and pervious cover retained or provided with development.

Several components of zoning bylaws can impact a municipality's ability to preserve trees or grow canopy cover. Firstly, zoning bylaws regulate permitted use and density on a parcel and a tree bylaw may not apply if it would prevent that use or density. Secondly, zoning bylaws impact the private landscape space available to retain or replace trees by influencing the extent of impervious cover on those sites.

Zoning bylaws include rules for lot sizes, setbacks, building coverage, and how land can be used, which can in turn affect land cover and where tree canopy (and associated environmental benefits such as urban heat mitigation and stormwater interception) is distributed (Wilson, Clay, Martin, Stuckey, & Vedder-Risch, 2003). Many studies have found that canopy cover declines significantly with median building lot coverage or housing density (Bernhardt & Swiecki, 2001; Hilbert,

LAND USE AND CANOPY COVER IN METRO VANCOUVER

Recent work by Metro Vancouver found that most of the tree canopy cover in the urban areas is in “Residential – single-family detached with no secondary unit”. “Parking” and “Retail and other commercial” areas have the least canopy cover at 5% and most impervious surface cover at more than 90% (Metro Vancouver, 2019).

The study found a relationship between tree canopy cover and the time period of development. High density housing stock actually showed gains in canopy cover from the 1940s to 1980s. The increase in high density canopy cover over time was attributed to the ‘skyscraper’ boom in 1960s, 1970s, and 1980s, characterized by tall and slender buildings with low Floor to Area Ratio (FAR), and enough space between them to preserve view corridors (Metro Vancouver, 2019).

Low density housing canopy cover was relatively steady until the 1970s and then showed a declining trend up to 2000. This decline indicated that fewer, or smaller, trees were being retained or planted during construction of low density housing over time as lot sizes shrunk and demand for bigger homes increased, resulting in increased lot coverage and lower tree canopy (Metro Vancouver, 2019).

The Vancouverism architectural model featured residential buildings that used up little lot coverage and allowed abundant greenspace, street trees and other public space at ground-level (Metro Vancouver, 2019). However, average canopy cover has declined in both high density and low density housing stock in Metro Vancouver between 1980 and 2000.

et al., 2019). Practitioners surveyed during the development of the Toolkit also noted maximum lot coverage as being impactful for canopy preservation or growth. However, despite useful documentation about the impact of zoning on tree canopy preservation and growth, research points out this relationship is still not well enough understood to inform fine scale land use planning (Mincey, Schmitt-harsh, & Thura, 2013).

The common denominator affecting canopy cover, as highlighted in research and by practitioners, is the permeable space that will remain on a site after development. A strong inverse relationship exists between impermeability and canopy cover, as found in the 2019 Metro Vancouver study (Metro Vancouver, 2019). In the City of Vancouver, data analysis for the urban forest strategy showed that once impermeability exceeded 50% of a city block, tree canopy was on average less than 10%. Once a city block reached 80% impermeability, there was essentially no canopy cover.

The majority of municipal staff survey respondents indicated that they thought their zoning bylaws were not currently effective for preserving or growing canopy cover.

Given this close relationship between impervious surfaces and canopy cover, municipalities seeking to preserve or grow canopy cover should ensure that their zoning bylaw results in adequate pervious surface and soil to grow trees in the land uses where the community wants to see tree canopy.

5.1.1 Defining Minimum Pervious Cover

The minimum pervious cover required to sustain trees is related to the amount of soil volume required for trees to grow. To meet minimum soil volume requirements, at least 0.3 m³ of soil and preferably 0.6 m³ of soil per metre square of mature canopy area is recommended (Metro Vancouver, 2017). These soil volumes relate approximately to a surface area per tree, 8 m² for a small tree and 35 m² or more for a large tree (Table 1) assuming 1 m depth. Where trees must be installed in hardscape, soil cells or structural soil can be used to provide the soil under paved areas; however, the extent of these soils must be larger to provide the equivalent volume of soil.

If zoning bylaws explicitly consider the minimum pervious cover required to support trees on a lot, then the ability to either retain or replant trees with development will be greatly improved.

5.1.2 Bylaw Components to Achieve Minimum Pervious Cover

Many components of zoning bylaws can significantly impact pervious surfaces and canopy cover. The key components below are identified in the literature and by practitioners:

- **Site/lot coverage** | The maximum site coverage defines the proportion of a lot that can be occupied by structures. With the exception of landscaping grown on structure (discussed below), this represents an area that will not be available as pervious cover.
- **Maximum impervious cover** | Pervious cover is often further reduced by impervious surfaces additional to structures, such as walkways, parking pads or patios. Municipalities interested in retaining pervious cover should consider including a requirement for maximum impervious coverage to limit the additional impact of surfaces on site permeability.

Table 1. Surface area of soil per tree assuming 1 m depth

TREE SIZE	APPROXIMATE SURFACE AREA (M ²) OF SOIL REQUIRED PER TREE (ASSUMING 1 M SOIL DEPTH)		
	On ground	Under hardscape – soil cells ⁺	Under hardscape – structural soil ⁺⁺
Small tree canopy spread is up to 6 m	8	x1.1	x5
Medium tree canopy spread is up to 10 m	20	x1.1	x5
Large tree canopy spread is greater than 10 m	35	x1.1	x5

⁺Soil cells are 92% soil, ⁺⁺Structural soil is 20% soil.

PERVIOUS TREE ZONE

The City of Ottawa recently amended its Residential Fourth Density zones, which consist of intensive low-rise residential. As part of the amendments, applicants are now required to provide a pervious area meant for tree planting that must provide a minimum connected surface area with a minimum width that will enable tree planting. The amendment specifically requires applicants to provide *“at least one aggregated rectangular area of at least 25m² whose width is not more than twice its length, for the purposes of tree planting.”*

The area must contain sufficient soil volume and space to enable tree planting.

City of Ottawa (2020). R4 Zoning Review: Proposed Zoning Amendments.

GREEN ROOFS AND TREE PLANTING ON STRUCTURE

Green roofs may provide an opportunity to plant vegetation and small trees to offset canopy loss and can provide many benefits. However, trees growing on structure will provide less and shorted lived canopy compared to trees planted in the ground because of the soil volumes available and the need to remove trees periodically to repair membranes.

- **Setbacks** | Trees require space from buildings and paved surfaces to grow to maturity without conflict with adjacent infrastructure. As such, municipalities should consider the threshold below which the setback will prevent tree planting from happening on that side of the lot.
- **Underground structures** | Setbacks do not explicitly apply to underground structures in all zoning bylaws. It should be noted that, where underground structures are permitted to reach the property line, it will result in tree impacts both on and beyond that property. For instance, underground parkades that reach the property line may require the removal of adjacent street trees and may also hinder the potential to replace a tree on those adjacent sites. Being explicit about where zero setbacks for underground structures will be permitted would help to manage expectations about tree retention, planting and canopy cover potential in adjacent streetscapes and sites as redevelopment occurs, and enable proactive planning for alternative greening options in these future low-canopy areas.
- **Parking requirements** | On site parking requirements can increase impervious cover, or the extent of underground parkades. Numerous municipalities have implemented or investigated reducing or increasing the flexibility of parking requirements as a way to meet objectives for affordability or greenhouse gas reduction, and this flexibility would also increase the ability to retain or replace trees on a lot.

5.1.3 Additional Bylaw Components to Preserve Trees and Grow Tree Canopy

Several additional components of zoning bylaws can significantly impact the preservation of trees and growth of canopy cover, including:

- **Screening and landscaping guidelines** | Landscaping and screening guidelines can be used to require minimum numbers of trees, certain types and cover of trees either in general or in specific zoning. For example, certain species can be required in wildland urban interface zones, vegetation buffers can be required between land uses, or a minimum density of trees can be required in landscape planting. The Canadian Nursery Tree Stock Standard establishes standards for stock size and quality. Typically, a warranty period is attached to the landscaping requirement, which should be attached to a bond amount that includes the cost of stock, installation, maintenance, and inspections.
- **Density clustering** | Density clustering can be used to preserve tree stands or larger plantable areas. The overall density on the site may not be increased but the developer may benefit from smaller lots than would otherwise be permitted, or a density bonus may be provided, in exchange for conserving certain areas. Conservation covenants in favour of the municipality are often used to protect the green space for the long-term. Clustering can be accomplished through density averaging and density transfer, amenity density bonuses, bare-land strata, or comprehensive development zoning or a combination of those options.
- **Density bonusing** | Amenity density bonuses can be used to preserve tree stands in exchange for additional density or variations in lot configuration. Conservation covenants in favour of the municipality are often used to protect the green space for the long-term.
- **Comprehensive development** | Comprehensive development zones can be used to drive landscape-level planning for larger parcels of land. Communities may find it useful to achieve stand preservation goals or to enable innovative treatments on sites with particular constraints or strategic locations.



SEATTLE'S EXCEPTIONAL TREE PROTECTION ZONING

The City of Seattle defines exceptional trees as species of a certain size growing individually or in groves. The City has a defined process to adjust building setbacks and height to retain exceptional trees. The process and development requirements vary based on the zone:

- **Single-family zones:** Applicants must take advantage of front and rear yard setback departures to enable the retention of exceptional trees.
- **Lowrise zones:** Where an exceptional tree is threatened, applicants must either follow a Streamlined Design Review process to make adjustments to enable tree retention, or they must consider increases in the permitted height detailed in the Tree Protection Code to achieve the same purpose. Additional departures to increase FAR and height or reduce the number and standard of required parking spaces may also be explored with applicants to enable the retention of exceptional trees.
- **Midrise and commercial zones:** Applicants must explore options such as departures from the land use code (as approved by a Design Review) or changes to parking plans to retain exceptional trees.

Seattle Department of Construction & Inspections (2019) – Tree Protection Regulations in Seattle.

5.2 SUBDIVISION AND SERVICING BYLAWS

Subdivision and servicing bylaws influence the retention and replacement of trees in new subdivisions. These bylaws often regulate street trees by controlling the width of boulevard, street lanes and sidewalks, tree selection and spacing, required soil volume and road construction standards. The bylaw also impacts private trees on new subdivisions through the placement and width of utility connections and driveways and can include landscaping requirements for both on site and offsite areas. By regulating drainage, subdivision and servicing bylaws can also influence the extent to which grading and topography changes impact stands of trees on or adjacent to new developments.

The amount of soil volume provided for municipal street trees is one of the most significant ways these bylaws affect urban tree canopy. Table 2 provides recommended soil volume minimums for street trees (Metro Vancouver, 2017).

Table 2. Minimum recommended soil volume per tree

TREE SIZE	Minimum soil volume (m ³)	Shared or irrigated soil volume (m ³)
Small tree canopy spread is up to 6 m	8	6
Medium tree canopy spread is up to 10 m	20	15
Large tree canopy spread is greater than 10 m	35	30

Soil volume shall be calculated as:

- Soil: Surface area (Length x Width) of connected pervious x 1
- Soil under hardscape:
 - Soil: Volume of soil (Length x Width x Depth)
 - Soil cells: Volume of soil cell installation (Length x Width x Depth) x .92

If subdivision and servicing bylaws explicitly consider the minimum soil volume required to support trees in a street, then the survival and quality of street trees can be greatly improved.

When updating subdivision and servicing bylaws, municipalities that seek to preserve trees and grow canopy cover should consider the following components:

- **Boulevard width** | In general, the largest boulevard width possible should be provided for the tree planting strip. Where trees are planted in a planting strip and sharing space with utilities, a minimum width of 2 m is recommended in order to be able to provide space for the tree to grow and an adequate setback from utilities. The absolute minimum planting strip width should be 1.5 m to allow for growth of the trunk and trunk flare but additional soil volume should then be provided under the sidewalk, or via root bridges to adjacent soil volume areas.

UK TREES AND DESIGN ACTION GROUP

The Trees and Design Action Group is a not-for-profit, collaborative and cross-sector forum from the United Kingdom that promotes urban forestry throughout the country. They have published useful guides that help decision-makers integrate, plan and design for trees in their jurisdictions, notably:

Trees in Hard Landscapes: A Guide for Delivery – this guide includes detailed information from the planning stages through to technical design for tree planting spaces and species selection.

The UK Trees and Design Action Group (2014) has published many other guides that readers may find helpful to review on their website.

- **Soil volume** | Soil volume minimums are essential to ensuring that newly constructed streetscapes can accommodate trees. Soil volumes can be met either in ground where native soils have been retained, or with a combination of top-soil and soil cells or structural soil. When adequate soil volumes are not achievable via planting strips, use soil cells to increase soil volumes and connect root zones of planting under paving.
- **Landscaping requirements** | Standards for the landscape plan, plant spacing, type, stock quality, irrigation and drainage are essential to ensure that trees are planted in appropriate locations and are of a quality and size to survive and thrive. The Canadian Nursery Tree Stock Standard establishes standards for stock size and quality. Typically, a warranty period is attached to the landscaping requirement, which should be attached to a bond amount that includes the cost of stock, installation, maintenance, and inspections.
- **Utility and infrastructure setbacks** | Utility and infrastructure setbacks can result in trees being excluded from a streetscape or private yard. It is necessary to balance the potential for infrastructure conflict with the flexibility to include trees in spaces shared with utilities. Setbacks should be firm when a hazard could be created (e.g., intersection visibility, gas main connections) but allow for reasonable flexibility in other situations.
- **Streetscape component locations** | Streetscape design standards define the standard location for streetscape components such as utilities, sidewalks, road lanes, bicycle lands, boulevards, storm-water, trees and lighting in a streetscape. Standards should leave room for flexibility to adjust streetscape design when there are competing interests in the streetscape by establishing a hierarchy of preferred and alternative compliance methods for different streetscape components.



RIGHT-OF-WAY STANDARDS TO GROW TREE CANOPY

Many municipalities in North America have soil volume standards that meet or exceed the minimums recommended in this Toolkit. Deeproot maintains a database that reports minimum soil volumes for street trees in Canadian and US municipalities (Marritz & Hunter, 2020). For example, in Canada:

- Kitchener (ON) surpasses the recommended soil volumes for small, medium and large trees in the Urban Forest Appendix of their Development Manual (City of Kitchener, 2015).
- Guelph (ON) surpasses recommended the minimum soil volumes for small, medium and large trees in their Downtown Streetscape Manual (City of Guelph, 2014).

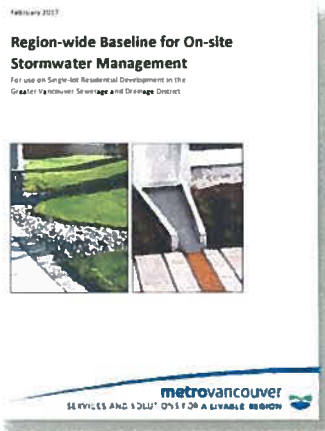
More examples can be found on [Deeproot's website](#).

- **Tree protection requirements** | Subdivision and servicing bylaws can include tree protection requirements guiding tree retention and replacement during the subdivision permitting process. However, it is recommended that tree protection requirements only be included in a subdivision and servicing bylaw when the municipality either does not have a tree bylaw, or if approved subdivisions are exempted from the tree bylaw. Tree protection requirements included in a subdivision and servicing bylaw should meet an equivalent standard to those expected of a tree bylaw (see Section 6.2 Tree Bylaws).
- **Drainage and on site stormwater management** | Drainage standards should incorporate protection or restoration of natural

watercourses, native soil and trees whenever feasible. Stormwater management systems can incorporate on site capture and infiltration facilities. Such measures can support healthy tree canopy by enabling infiltration and soil water storage accessible to retained trees.

ALIGNING CANOPY COVER GOALS WITH STORMWATER MANAGEMENT INITIATIVES

Municipalities are increasingly seeking solutions to improve integrated stormwater management to lessen the demand on traditional grey infrastructure and reduce adverse impacts such as water pollution and erosion. Many integrated stormwater management approaches rely on pervious cover, and may therefore align with canopy cover goals by helping to preserve or restore potential planting areas.



- **Metro Vancouver's Region-wide Baseline for On-Site Stormwater Management** provides best management practices for drainage on single-lot residential development
- **Metro Vancouver's Stormwater Source Control Design Guidelines** provide guidance for absorbent landscaping, bioretention, vegetated swales, pervious paving, infiltration trenches and extensive green roofs
- **Toronto's Green Streets Technical Guidelines** report provides detailed guidance on the implementation of green infrastructure into streetscapes
- **Seattle's Stormwater Manual** (vol. 3 – Project Stormwater Control) provides guidance on how to integrate retained or newly planted trees to stormwater control projects
- **San Francisco's Stormwater Management Requirements and Design Guidelines** report provides guidance for post-construction stormwater runoff control with street tree implementation





Environmental development permit areas, covenants, and tree bylaws can be effective tools to regulate the protection, restoration, and replacement of trees. They should be supported by higher-level plans and land use regulations to effectively preserve trees and grow tree canopy.

6.0 Tools Primarily Regulating Trees

This Toolkit provides detailed information about regulatory tools focused on preserving trees and growing tree canopy, specifically:

- **Environmental development permit areas**, which identify locations that need special treatment for certain purposes such as the protection of the natural environment, its ecosystems and biological diversity and typically include:
 - Identification of the development permit area
 - Development permit area guidelines
- **Covenants**, which can require that an amenity be protected, preserved, conserved, maintained, enhanced, restored or kept in its natural or existing state
- **Tree Bylaws**, which regulate the protection and replacement of individual trees and typically include:
 - Bylaw definitions
 - Prohibitions
 - Permitted removal reasons
 - Permit application information requirements
 - Requirements and incentives for tree retention and replacement

- Replacement tree planting standards
- Actions on site
- Securities
- Penalties
- Tree bylaw implementation

The following sections provide the detailed information for each key component of the two regulations, including:

- Purpose of the component
- Recommendations for each element, either as:
 - Must have – a recommended best practice or list of alternatives that should be chosen based on the community context, values, goals and impacts
 - Recommended or additional options – listed for every community's consideration, where they may help achieve specific goals or manage impacts
- Examples of where each option is found in existing regulations



6.1 ENVIRONMENTAL DEVELOPMENT PERMIT AREAS

The Local Government Act allows land to be designated under a development permit area (DPA) for the protection of the natural environment that may “require protection measures, including that vegetation or trees be planted or retained” (section 491(1) of the *Local Government Act*).

Regional and community planning processes will often identify natural values and hazards related to forest stands that overlap with but are not adequately addressed by tree bylaws. Using development permit areas (DPAs) can define land with a specific management intent to align it with strategic objectives for protection of the natural environment. For example, in British Columbia, DPAs can be used for the (LGA, 2015):

- *Protection of the natural environment, its ecosystems and biological diversity;*
- *Protection of development from hazardous conditions;*
- *Establishment of objectives to promote energy conservation;*
- *Establishment of objectives to promote water conservation; or*
- *Establishment of objectives to promote the reduction of greenhouse gas emissions.*

DPAs can complement tree bylaws by providing protection,

restoration or enhancement guidelines to achieve a broader range of objectives in these areas when development occurs.

Practitioners surveyed emphasized the importance of environmentally sensitive areas, waterfront and riparian areas for protecting tree stands. Some communities have also found form and character DPAs and energy DPAs to be helpful in managing urban trees or tree stands.

Environmental DPAs are used to protect natural features from the impacts of construction or land alteration activities (Britton-Foster, Grant, & Curran, 2016). They are often used to protect environmentally sensitive areas including the marine foreshore, watercourses, wetlands and sensitive terrestrial ecosystems. Environmental DPAs can help protect trees from development activity by identifying significant forest stands and enforcing design guidelines to protect them. Environmental DPAs can be designed to require that identified forested areas be protected and, if degraded, restored or enhanced as a requirement of a development application. Environmental DPAs can be designed to work with, or independently of, a tree bylaw.

6.1.1 Identification of the Development Permit Area

PURPOSE | Identify the environmentally sensitive areas where the development permit applies and “describe the special conditions or objectives that justify the designation” (Local Government Act, 2015)

MUST HAVE: Mapping Environmentally Sensitive Areas

Environmentally sensitive areas must be defined in order to provide landowners with information on whether the development permit guidelines will apply to their development application.

EDPAs may use mapping of varying precision to designate areas where the development permit guidelines may apply. The designation of those areas is often done using external mapping data from regional or provincial sources. At a minimum, environmental DPAs should provide a principled basis for landowners to understand what falls within or does not fall within the approximate area boundary (Britton-Foster, Grant, & Curran, 2016).

Available technology and spatial information for mapping allows municipalities to provide relatively detailed locations of DPAs. The scale, precision and update frequency of mapping must be carefully considered, as environmental DPAs with precise but inaccurate mapping have been challenged.

ADDITIONAL OPTIONS | In addition to the mapping of environmentally sensitive areas, municipalities may wish to consider the mapping and protection of a network of ecosystems to preserve landscape level ecosystem connectivity. This network of ecosystems is called green infrastructure network mapping.

- **Green infrastructure network mapping**

Green infrastructure networks seek to identify a network of interconnected natural areas that will conserve ecosystem values and functions as well as provide benefits to wildlife and people. A green infrastructure network consists of:

- Core habitat areas that provide a home range for species
- Natural corridors across urban areas that prevent the fragmentation of core habitat areas

Once mapped, green infrastructure network areas can be included and protected within environmental DPAs. The mapping can also serve to inform Neighbourhood Plans and other landscape-level plans.

At the regional level, Metro Vancouver manages and updates the Sensitive Ecosystem Inventory. This inventory may be a good starting point for municipalities wishing to map environmentally sensitive areas. It would however need to be accompanied by a detailed assessment of environmentally sensitive areas to develop mapping at the municipal and neighbourhood scales.

PROTECTING TREES WITHIN DPAS

It is common for jurisdictions that have a tree bylaw and an environmental DPA to include trees within DPAs in the bylaw's definition of protected trees. The inclusion of trees within development permit areas in the tree bylaw strengthens their protection because of the enforcement mechanisms included in the tree bylaw. The tree bylaw can also ensure that, when the development permit is waived or not required, a suitable tree permitting and replacement process applies. If both an environmental development permit area and tree bylaw exist, consideration should be given to exempting applicants from a tree removal permit in cases where a development permit has been granted and ensuring that both policies are designed to have essentially the same requirements for tree protection, removal and replacement in DPAs.



In practice

The City of Surrey implements a sensitive ecosystems DPA that encompasses both a streamside protection DPA and green infrastructure network. It allows the City to protect habitat patches, to avoid the fragmentation of ecosystems, and to require habitat restoration with development.

6.1.2 Development Permit Area Guidelines

PURPOSE | Development guidelines inform landowners about what the requirements are for protecting DPAs when they develop adjacent lands.

OPTIONS

Many guidelines exist that can help preserve trees and grow tree canopy. The options highlighted in this Toolkit include tree protection within DPAs, the preservation and enhancement of forested ecosystems, restoration, and information requirements.

Tree protection within DPAs

Trees within EDPAs are usually protected unless deemed hazardous. Tree protection measures include:

- **Relocating** proposed buildings, structures, servicing or roads to prevent root impacts
- **Fencing** can be required during construction, or as a permanent fixture
- **Pruning** to carefully select branches for removal to reduce the wind load in trees (Stubbs et al., 2019)

Preservation or enhancement of forested ecosystems

Forested ecosystems can be preserved or enhanced with measures such as:

- **Tree species requirements** to maintain the composition and density of native species with replanting
- **Retention of wildlife trees** to provide habitat within forested stands
- **Preservation or enhancement of specific areas** to prevent fragmentation or maintain connectivity
- **Buffer zone planting** in the zone adjacent to the DPA. Natural landscaping may be required to provide a soft transition from the environmentally sensitive area to the development area

Restoration

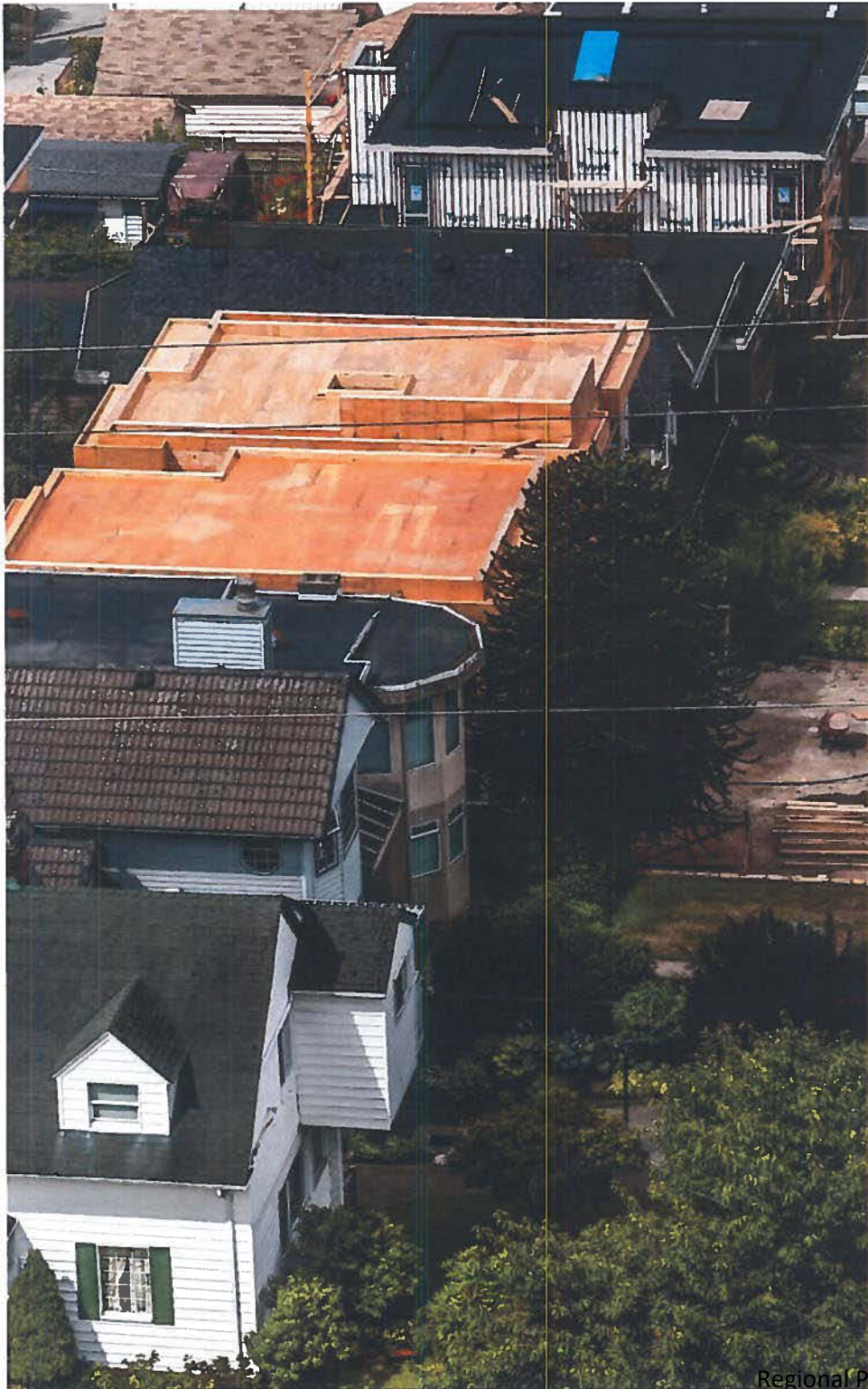
Where existing ecosystems are degraded or damaged, environmental DPAs can require measures to return the environmentally sensitive area to its natural state:

- **Planting of native trees and plants** to restore the native plant community
- **Removal of invasive species** to prevent competition with native species and spread into adjacent natural areas

Information requirements

Environmental DPA guidelines can require applicants to provide reports from qualified professionals such as:

- **Site conditions and monitoring** from a qualified environmental professional (i.e., a person in good standing with a legislated self-regulating association in British Columbia who is acting within their area of expertise, such as a professional Biologist, Agrologist, Arborist, Forester, Geoscientist, Engineer, Architect, or Landscape Architect)
- **Riparian assessment to identify the Streamside Protection and Enhancement Area** per Provincial methods defined in the Riparian Areas Regulation
- **Stand prescriptions to reduce the likelihood of windthrow** along new exposed forest edges
- **The identification of hazardous trees** by an ISA Certified Arborist who holds the Tree Risk Assessment Qualification (TRAQ)



6.1.3 Other Types of Development Permit Areas

6.1.3.1 Hazardous Condition DPAs

Tree retention is often regulated within hazard DPAs such as steep slopes DPAs to be helpful for tree retention. However, wildfire DPAs may conflict with tree preservation or replacement goals where trees pose a wildfire risk to structures. Where wildfire DPAs apply, it is important to ensure that the wildfire DPA and the tree bylaw are aligned to enable consistency with wildland urban interface management objectives. Alignment could involve permitting removals for wildfire risk reduction in the bylaw and ensuring that replacement trees and landscapes conform with FireSmart guidelines.

6.1.3.2 Energy Conservation, Water Conservation & Greenhouse Gas Emissions Reduction DPAs

Under energy conservation, water conservation and greenhouse gas emissions reduction DPAs, there are guidelines that can contribute to preserving trees and growing tree canopy while increasing carbon storage and meeting goals for climate action. These components include landscaping strategies such as planting trees for passive solar gain and cooling to reduce energy consumption (British Columbia Ministry of Community, Sport and Cultural Development, 2011). Trees should be located to serve as a windbreak and shade trees should be planted to cool impervious surfaces where possible. Tree species that require less watering should be selected to minimize irrigation needs.

6.2 COVENANTS

Covenants are a tool local governments use to regulate trees on individual land parcels, usually with rezoning, subdivision, or development permits. The Province of British Columbia's Land Title Act, section 219 allows covenants (sometimes also called conservation covenants) to be registered on title. This toolkit section offers a brief description of the use of covenants to preserve trees and grow tree canopy but is not a comprehensive discussion of the legal and technical requirements of covenants in British Columbia.

Covenants registered under section 219 of the Land Title Act are a voluntary agreement between a property owner and a designated organization (government body or land trust organization) registered on the property title. Section 219 covenants can be both positive (require actions) and negative (prohibit actions) in nature (WCEL, 2005; LTA of BC, 2014). They can be used to protect, conserve, maintain, enhance, restore or keep amenities such as natural, environmental, wildlife or plant value in its natural or existing state (LTA, s.219). Conservation covenants can 'run with the land', binding all future owners of the property for the full term of the agreement, which can be perpetual.

Section 219 covenants can protect trees or sensitive ecosystems on developing properties, impose maintenance or restoration requirements and restrict actions that could damage the protected features. For example, covenants can require documentation such as tree protection and replanting plans or risk assessments prior to undertaking the subdivision of land. Covenants usually include a baseline report documenting the state of the land at the time of registering the covenant (NATEP, 2018). The report can describe special features and serves as a benchmark for future monitoring. Covenants can help to provide clarity around what is protected on a site; both to the mu-



nicipality as the site moves through the development process, and to future owners so that they know what is protected on their property. Covenants can be amended or discharged and do not have to be perpetual agreements.

Working landscape covenants can also be developed to allow sustainable activities such as organic farming or sustainable forestry on land under a conservation covenant (WCEL, 2005). This type of conservation covenant is more complex than ones that protect land in its natural state. Working landscape covenants should clarify the priority for the management of the covenant area and require a management approach to be established in accordance with those priorities and the objectives of the covenant.

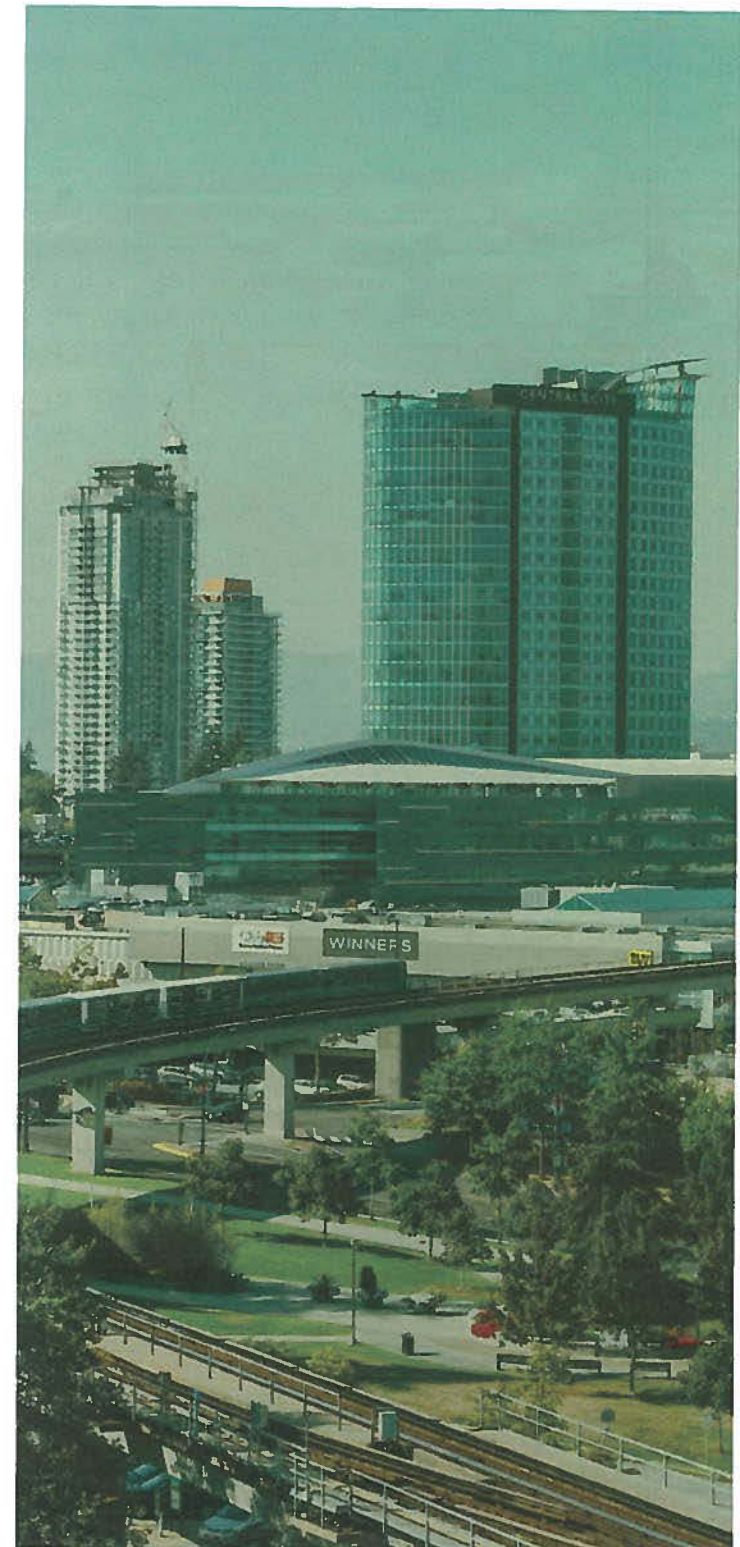
Statutory rights of way created under Section 218 of the *Land Title Act* are sometimes used to secure access to a property, such as for a public trail, in addition to a Section 219 covenant that specifies the positive (e.g., maintenance requirement) and negative (e.g., restricting tree removals) obligations of the owner granting the covenant.

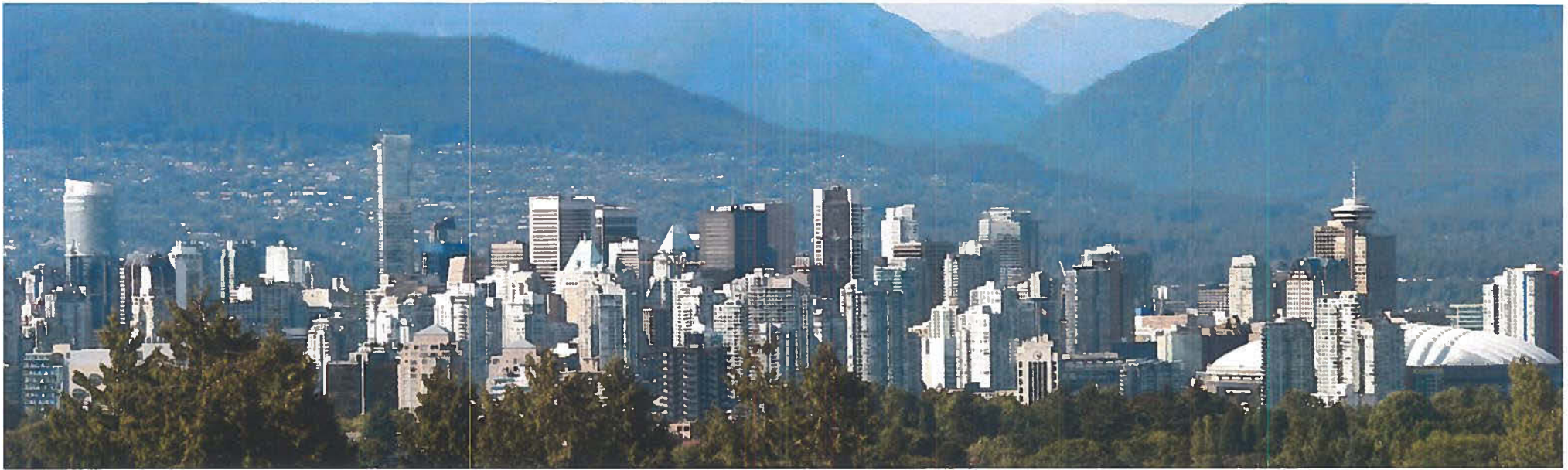


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6.3 TREE BYLAWS

The *Community Charter* enables Council to “regulate, prohibit or impose requirements in relation to [...] trees” (sections 8(3)(c), 50 and 52). Regional and local planning processes increasingly identify tree protection and replacement as important community values. While environmental DPAs often provide adequate protection for tree stands and ecosystems, tree bylaws serve to regulate the protection or replacement of individual trees or groups of trees found across the municipal landscape.

While there are established best practices for some bylaw components, others are less well-defined. The alternatives and options available should be selected after consideration of a municipality’s urban forest governance context.

The following sections are organized in typical bylaw sections or themes. Each section describes the key components that should be considered when developing tree bylaws and highlights when a best practice recommendation or an alternative option would be

relevant. Examples of communities that have used any of the approaches presented are not exhaustive but provide readers with further opportunities to explore and adapt the options that are most appropriate for their local context.

6.3.1 Bylaw Definitions

Bylaw definitions set a common understanding for terminology used throughout the bylaw. Many bylaw definitions refer to established technical standards and clarify how to interpret other sections of the bylaw.

6.3.1.1 Protected Tree

PURPOSE | To define what trees the bylaw applies to. Public or private trees (or both), tree size and species are common criteria discussed. The definition itself does not drive the protection or replacement outcomes; tree protection rather depends on the acceptable reasons for removal and the replacement requirements.

MUST HAVE: PROTECTED TREE SIZE

Tree bylaws need to identify the size of trees that the bylaw will apply to:

- * Option 1: Small trees
- * Option 2: Medium trees
- * Option 3: Large trees

OPTION 1: SMALL TREES (for example ≥ 6 cm DBH)

Communities may decide to regulate trees at a small size when the bylaw is less restrictive of tree removals and is using the permit system to track tree removals or is restrictive only under certain circumstances (e.g., limits removals in one year or when related to a subdivision). This could be used in conjunction with other categories of protected trees that have greater restrictions on their removal.

Context

This approach may be most relevant for municipalities interested in tracking tree removals and not placing too many restrictions on the removal of protected trees.

Found in Nanaimo, Anmore, Québec City (QC)

Pros

- Regulates most of the trees and canopy in a municipality
- Provides a good indication of the rate of tree removals
- Can identify and encourage retention of young trees that are more adaptable to development disturbances, with development

Cons

- Creates very high permit volume unless there are exemptions allowing removals in some circumstances (e.g., a certain number of trees being cut without a permit each year)
- May not be supported by the community without allowances to remove some trees
- Creates higher costs for development related applications to survey many trees and prepare management plans
- It is not usually practical to restrict removals or require replacements for small trees so often the bylaw functions more as a permit to track removals

This option may be best implemented with additional protected tree definition options, to restrict the removal of specific trees of importance.



In practice

The Village of Anmore requires a tree cutting permit for all trees 10 cm or larger in DBH if the number removed is greater than annual allowable cut and not in direct hazard or conflict with infrastructure.

Hedges, alder and cottonwood are exempt from the definition.

In practice

Brampton does not require permits for trees with a DBH less than 30 cm.



OPTION 2: MEDIUM TREES (for example ≥ 20 cm DBH)

The tree bylaw applies to medium-sized trees, which enables municipalities to regulate reasons for removal and replacement requirements for those trees.

Context

Medium-size protected trees are the most common in Lower Mainland tree bylaws. This size class may be most appropriate for communities that are fairly urban and where most properties have few trees. Alternatively, it may be appropriate in communities that have many trees and where the bylaw is not restricting tree removal but is using the permit system to track removals.

Most commonly 20 cm DBH found in Burnaby, Delta, Richmond, Port Coquitlam, Vancouver, New Westminster, Maple Ridge, Abbotsford, Courtenay, Squamish
30 cm DBH found in Surrey, White Rock, Victoria, Brampton (ON)

Pros

- Typically regulates more than half of the trees and canopy in a municipality
- Seems to be a practical size for the number of trees brought into regulation based on the large number of municipalities using either 20 cm or 30 cm DBH
- Results in more tree replacement in the landscape than a larger protected tree size, if tied to a replacement requirement

Cons

- Creates relatively high permit volume unless there are exemptions allowing removals in some circumstances (e.g., a certain number of trees being cut without a permit each year)
- Increases regulation on private property. Tree replacement requirements also tend to be higher, which is a cost to applicants and may not receive broad community support.

For communities using this protected tree size to monitor removals, this would be best implemented with other categories of protected tree that have greater restrictions on their removal. Municipalities choosing this protected tree size should also consider defining hedges and whether they are protected under the bylaw.

OPTION 3: LARGE TREES (for example ≥ 50 cm DBH)

The tree bylaw applies to large-sized trees, which enables municipalities to regulate reasons for removal and replacement requirements only for mature specimens of larger species.

Context

This approach may be most appropriate for communities with limited resources and low development pressure that want to prioritize protecting the largest, oldest trees.

Found in the District of North Vancouver, West Vancouver

Pros

- Typically regulates the large canopy trees in a municipality
- Associated with a low volume of permits, generally easy for the community to support because few trees are regulated

Cons

- Most of the urban forest is unregulated and can be cut without a permit
- Only regulates large trees that are relatively rare on properties, so may be perceived as a disincentive for having a larger tree on a property

In addition to defining the protected tree size, municipalities that require replacement trees as a bylaw requirement should protect replacement trees regardless of their size.

In practice

The District of North Vancouver defines large-diameter trees as 75 cm or greater.





In practice

Courtenay protects 6 species 0.5 m and taller in size.

ADDITIONAL OPTIONS | In addition to defining protected trees with a diameter size, several municipalities adopt tree protection or replacement requirements for other types of individual trees or tree stands of interest. These options become particularly relevant when a tree bylaw is permissive of removals because they offer a more targeted way to protect trees of special interest. Common categories of trees included in protected tree definitions are municipal trees, species of interest, trees on sensitive land, heritage or significant trees and hedges.

Municipal trees: Municipal trees must be protected and many communities choose to protect trees on public land through their tree bylaw, although they can also be protected under different bylaws. Regulating the protection of municipal trees in a tree bylaw can offer consistency and ease of access for information about tree protection on public and private land. However, some communities protect them in other bylaws such as a street and traffic bylaw or a parks and boulevard bylaw supported by a municipal tree policy.

Places where this approach is found: Surrey, White Rock, Saanich, Victoria, Courtenay and many others

Species of interest: Communities that want to maintain habitat value with

tree species important to the local ecology may decide to include smaller trees of specific species to their protected tree definition. In these cases, the potential impacts of climate change on these species should be considered so that regulations enable replacement with species suitable to the future climate when necessary.

Trees on sensitive land: Communities may choose to protect trees located on sensitive lands defined by a mapped boundary or descriptive criteria, such as lands that:

- Are susceptible to flooding or erosion, or have unstable slopes or poor drainage
- Have special significance for animal, bird or plant life, including wetlands, forests and nesting areas
- Have cultural or historical significance
- Foster connectivity and biodiversity for flora and fauna
- Are adjacent to waterways

Places where this approach is found: Saanich, Courtenay, Squamish, Mississauga (ON)

Heritage or Significant trees: A municipality might choose to protect a specific list of trees when:

- Heritage trees have been identified in the community and owners have allowed trees to be placed on a register
- Specific qualities have been defined for trees (e.g., size, health, age, heritage, endangered, uniqueness) that will require a higher standard to be met to remove the tree – a set of criteria, nomination process and community board would typically be required to assess whether trees are significant

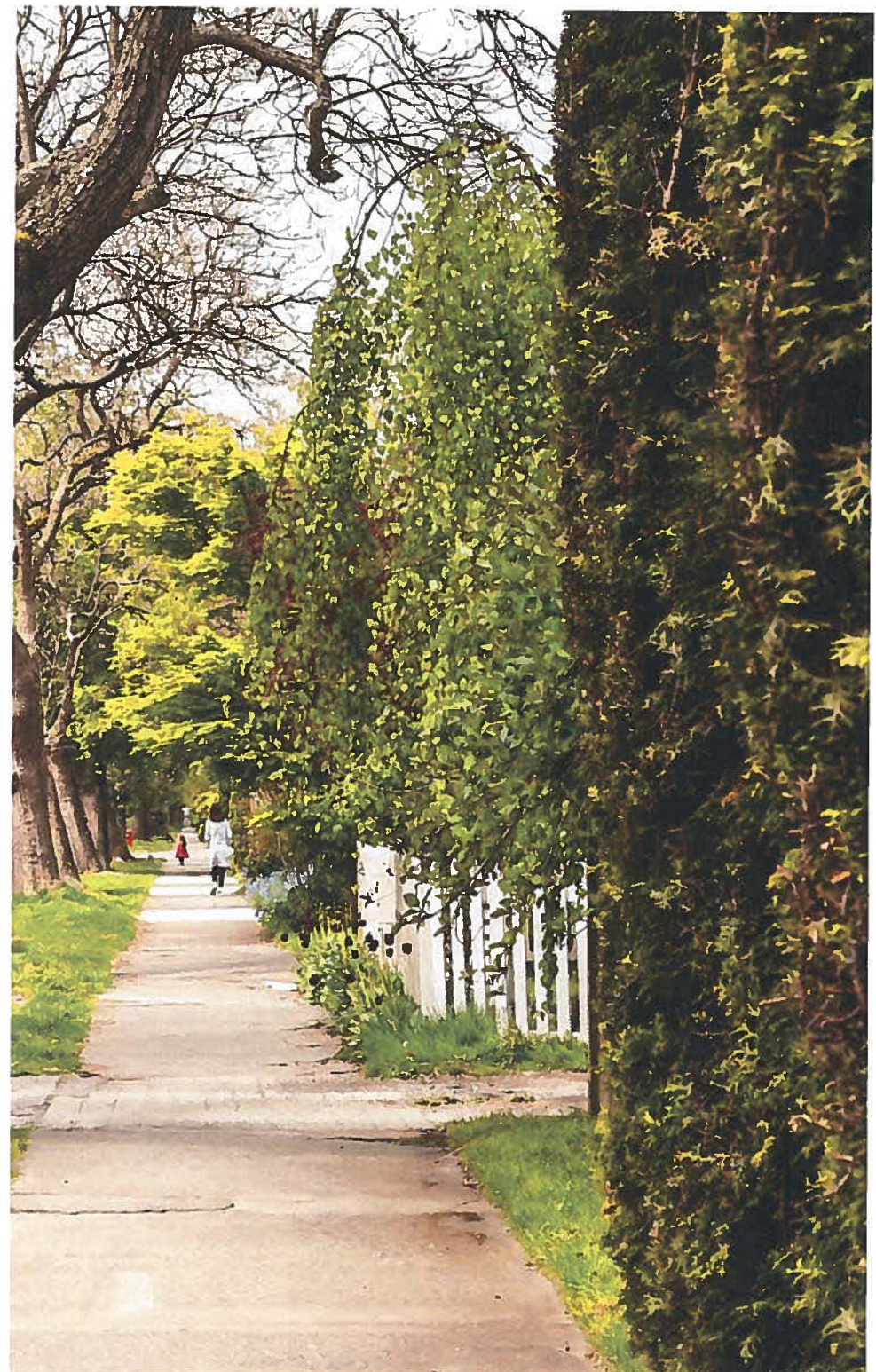
Places where this approach is found: *Maple Ridge, New Westminster, Surrey, Mississauga (ON)*

Hedges: Hedges can be challenging to regulate when they contain trees that meet the protected tree size definition because:

- All trees in a hedge grow up together and it may be appropriate to retain them or remove them as a group even if only one or some of the trees meet acceptable reasons for removal
- Hedges can contain many protected trees that, if approved for removal under a bylaw with a high replacement ratio, would have unreasonably high tree replacement requirements
- Hedges are often sheared and pruned in a way that would be considered damaging to a regular tree and so it can be necessary to distinguish regular maintenance of hedges from tree damaging activities that would be a violation of a bylaw

Once a hedge is defined, it can either be protected or exempted under the bylaw as a hedge, rather than as individual protected trees.

Places where this approach is found: *New Westminster*





6.3.1.2. Diameter at Breast Height

PURPOSE A diameter at breast height (DBH) definition is typically used to indicate how to measure a tree and determine if it is a protected tree, to calculate the tree protection zone (see below) and sometimes to calculate replacement requirements.

MUST HAVE: Diameter at Breast Height Measurement

A measurable definition is a must have to consistently determine the DBH of a tree.

BEST PRACTICES FOR MEASURING DBH

The International Society of Arboriculture defines best practices for measuring DBH (Bond, 2013):

- For a 'typical' single trunk, DBH is found by measuring the diameter at 1.4 m above the ground²
- For a tree that branches out at or below 1.4 m, so that the diameter is smaller below 1.4 m, then the diameter is measured at the smallest point below the branching point
- For a multi-stemmed tree that branches between 1 and 1.5 metres, measure either:
 - The smallest point below the fork (Magarik, Roman, & Henning, 2020) or
 - Measure each stem 30 cm above the branching point and sum the result

Recent research recommends measuring multi-stemmed urban trees by taking the diameter measurement at 30 cm, or below the fork (Magarik, Roman, & Henning, 2020). The research found no significant differences between these and other multi-stemmed measurement methods, and that this approach was an improvement over other methods because of the ease of measurement, simplicity and repeatability.

² It is standard practice in forestry to measure DBH at 1.3 m (Husch, Beers, & Kershaw, 2003; Avery & Burkhart, 2002) and some bylaws use this height as the standard for measuring DBH.

6.3.1.3 Tree Protection Zone

PURPOSE | To define the area around a tree that must be protected to prevent damage to roots so that the tree can be successfully retained during construction, or to determine when a tree cannot be retained successfully.



MUST HAVE Tree Protection Zone

A measurable definition is a must have to consistently determine the tree protection zone.

The International Society of Arboriculture's (ISA) best management practices for Managing Trees During Construction (Fite & Smiley, 2016) defines the tree protection zone as an arborist-defined area surrounding the trunk. It is intended to protect roots and soil within the critical root zone and beyond, to maximize future tree health and stability.

Typically, the tree protection zone is calculated using either a trunk diameter method or a dripline method. The ISA's best management practices and the American National Standards Institute A300 (Part 5) Standards refer to tree protection zone multiplication factors of between 6 x and 18 x DBH dependent on relative tree age and tolerance (based on Matheny and Clark, 1998, and the British Standards Institute) (Fite & Smiley, 2016). The American National Standards Institute A300 (Part 5) Standards state that the tree protection zone should not be less than 6 x DBH without mitigation measures. Australian and British Standards use a multiplier of 12 x DBH as standard. Best management practices for the Pacific Northwest recommend using both 12 x DBH and dripline plus 1 m and selecting whichever is larger to define the tree protection zone (Oregon State University, 2009).

Based on the available best management practices guidance, it is recommended that municipalities consider defining the tree protection zone as:

- The area, on an approved plan prepared by an arborist, that shows the land surrounding the trunk of a protected tree expected to contain the bulk of the critical root zone of the tree, or
- In the absence of an approved plan, the area of land surrounding the trunk of a protected tree contained within a circle having a radius calculated by multiplying the diameter at breast height of the tree by 12 or dripline plus 1 m, whichever is larger



TREE PROTECTION ZONE VS. CRITICAL ROOT ZONE

The International Society of Arboriculture (ISA) defines the tree protection zone as an arborist-defined area intended to protect roots and soil within the critical root zone and beyond, whereas the critical root zone is the area immediately adjacent to the trunk where roots essential for tree health and stability are located.

The tree protection zone is used to inform the area around the tree that should be fenced during construction and should always be larger than the critical root zone; however, final fencing location is informed by professional judgment, species tolerances and site constraints that reflect where most of the roots are believed to be located on a site. For example, fencing would not block a sidewalk, or if a building existed within the tree protection zone, then the roots are less likely to be growing under the foundation and the fencing would be adjusted accordingly. If the tree protection zone is reduced on one or more sides, then increasing the tree protection zone on the opposite side may be appropriate (Fite & Smiley, 2016).

The ISA's best management practices for Managing Trees During Construction (Fite & Smiley, 2016) note that the critical root zone is subjective, they also note that regulations may choose to define it (e.g., the City of New Westminster defines the critical root zone as $6 \times \text{DBH}$). In the event that the tree protection zone needs to be temporarily reduced for a construction activity, the ISA best management practices note that the tree protection zone should not be reduced to an area smaller than the critical root zone.

While cutting roots within the critical root zone should always be avoided, there are instances when cuts may be required (e.g., sidewalk or utility repair). The ISA BMPs note that stability is compromised for some species when roots are cut at a distance of $3 \times \text{DBH}$ (Fite & Smiley, 2016). However, an arborist must judge the proximity of cuts that can be tolerated and still allow the tree to remain stable.

6.3.1.4 Applicant or Application Type

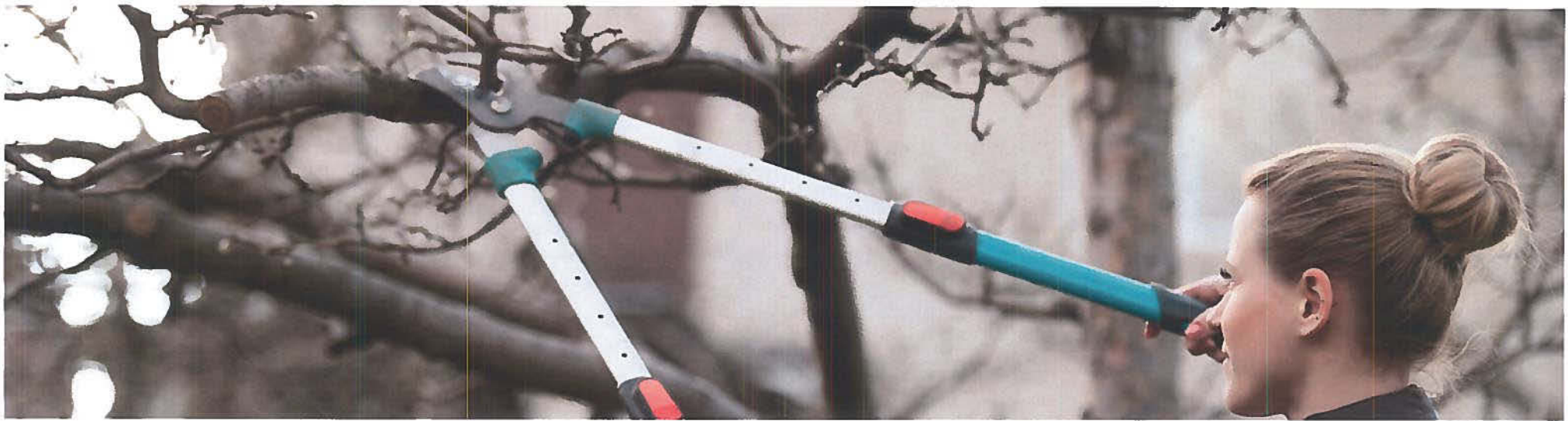
PURPOSE | A definition of different types of applicants or applications is used when the requirements of the bylaw need to be differentiated.

RECOMMENDATION | Application types can be differentiated if a community wants to vary requirements such as the information required to assess the permit application (e.g., arborist report, tree survey, replacement plan, etc.), permit fees, replacement requirements, securities or cash-in-lieu according to the scale and complexity of the permit type.

DEVELOPMENT REQUIREMENTS IN LAND USE REGULATIONS AND DPAS

Requirements specific to development can instead be addressed separately in land use regulations or development permit area guidelines, in which case a tree bylaw would typically exempt tree cutting and removal approved under subdivision or development permits. It should be noted that regulating trees under multiple bylaws creates parallel processes that are usually administered by different departments; this approach requires careful coordination to ensure that the outcomes of each regulation are consistent with municipal objectives for the preservation of trees and growth of tree canopy.





6.3.1.5 Pruning

PURPOSE | To define acceptable pruning that can be carried out on a protected tree with or without a permit.

MUST HAVE: Acceptable Pruning

Describing acceptable pruning clarifies both enforcement and the public's understanding of what type of pruning is acceptable. The pruning definition should be in accordance with the most current version of the American National Standards Institute Publication "American National Standard for Tree Care Operations – Tree, Shrub, and Other Woody Plant Management – Standard Practices" and the companion "Best Management Practices" Series of the International Society of Arboriculture. Explicitly defining tree damaging activities, such as topping and excessive crown reduction, helps to clarify what is not acceptable pruning.

Bylaws do not always require a permit for acceptable pruning; however, if pruning is being regulated, then the pruning definition should define the size of limb requiring a tree permit, and only require that permit for protected trees.

PRUNING BEST MANAGEMENT PRACTICES

The ISA's Best Management Practices for Pruning (Lilley, Gillman, & Smiley, 2002) note that pruning dose is guided by the objectives of the pruning, and the tolerance of tree to loss of foliage. Objectives listed in the Best Management Practices include:

- Improving structure
- Risk mitigation
- Clearance
- Maintaining health
- Restoration
- Size management
- Improving a view
- Improving aesthetics
- Managing wildlife habitat
- Reduce density

Pruning systems described in the best management practices include natural, pollard, topiary, hedge, espalier, pleach and fruit (Lilley, Gillman, & Smiley, 2002).

6.3.1.6 Other Best Practices Definitions

Other definitions that may be useful to include are:

- **Arborist:** means a person holding a current certification of ISA Certified Arborist issued by the International Society of Arboriculture
- **Tree risk assessor:** means a person who holds the International Society of Arboriculture's Tree Risk Assessment Qualification (TRAQ)
- **Arboricultural best practices:** means practices in accordance with the most current version of the American National Standards Institute Publication, "American National Standard for Tree Care Operations - Tree, Shrub, and Other Woody Plant Management - Standard Practices" and the companion "Best Management Practices" Series of the International Society of Arboriculture
- **High or extreme risk tree:** means a tree that has, in the opinion of a Tree Risk Assessor, a high or extreme TRAQ risk rating
- **Qualified Environmental Professional:** means a person in good standing with a legislated self-regulating association in British Columbia who is acting within the individual's area of expertise and includes a professional Biologist, Agrologist, Arborist, Forester, Geoscientist, Engineer or Technologist



6.3.2 Exemptions

PURPOSE | Exemptions are used to enable certain groups or activities to proceed without a tree permit. Exemptions are needed when it would be impractical for a group to apply for tree permits given the frequency or volume of their work, or when other statutes give them the power to cut or remove trees. Exemption may include tree cutting or removal:

- For farming use
- Pursuant to the Hydro and Power Authority Act
- For Survey lines work pursuant to the Land Surveyors Act
- By the Government of Canada, the Province of British Columbia or Regional Government on their own properties
- By a public utility for the purpose of safety, maintenance or operation of the utility's service or infrastructure on their own properties
- By the municipality for works undertaken by the municipality on its own property

Some municipalities exempt their operations from the tree bylaw to enable a more efficient and adapted process to take place internally. Municipalities that exempt their operations from the bylaw should develop an internal policy that details the process to be followed by staff. This process should meet or exceed bylaw requirements. Research has shown that for local governments to be successful in preserving trees and growing canopy cover, they need to address those issues with good interdepartmental coordination (Ordonez & Livesley, 2020).

6.3.3 Prohibitions

PURPOSE | Prohibitions describe what is prohibited except when permitted in the bylaw and in accordance with the terms of a tree permit. Prohibitions typically include cutting, removal and damage, and often address requirements for compliance and accurate information.



RECOMMENDED: Damaging activities

Describing tree damaging activities provides clarity both for enforcement and for the public to understand what activities constitute damage. Just as with cutting or removal, there may be circumstances when tree damage is permitted in accordance with the bylaw and a tree permit. For example, cutting tree roots and altering the grade within a tree protection zone does damage the tree but may be required to accommodate a pathway. If the tree can tolerate the damage and still be safe to retain, then that damage could be allowed with a tree permit.

The definition of damage should be broad (e.g., any action that is likely to cause negative impacts to the health or structural integrity of a tree), but prohibitions, while not limiting that definition, can elaborate to include actions that could cause a tree to die or become hazardous such as:

- Pruning in a manner not in accordance with arboricultural best practice, including:
 - removal of more than 25% of the tree's total live foliage or bud bearing branches or limbs in any 12 month period
 - lift pruning where the lower branches of the live crown (green branches) of the tree are removed to reduce the live crown to less than 50 percent of the total tree height
 - topping, unless the tree in question has been previously topped and regenerative growth has a high likelihood of failure due to weak branch attachment, excessive branch elongation and end weight, or the formation of extensive decay or cavities that cannot be mitigated other than by re-topping the tree

- Poisoning or burning a tree
- Raising or lowering the grade within the tree protection zone
- Shearing, harming or undermining the roots of the tree growing within the tree protection zone
- Placing fill, building materials, asphalt, a building or structure or storing or stockpiling of material within a tree protection zone
- Operating, staging or parking trucks, backhoes, excavators, mini-excavators, hydro-excavators, mechanical trenchers or other heavy equipment within a tree protection zone
- Denting, gouging, drilling, harming or affixing anything to the branches or the trunk of a tree
- Removing bark from a tree
- Depositing concrete, washout or other liquid or chemical substances harmful to the health of a tree in a tree protection zone
- Removing soil from a tree protection zone
- Conducting blasting operations within a tree protection zone
- Conducting blasting or excavating operations outside of a protected root zone that would harm roots or disturb soil inside a tree protection zone

Describing tree damaging activities can improve enforcement by defining specific actions that would be considered a bylaw violation unless permitted in the terms of an approved tree permit.

6.3.4 Permitted Removal Reasons

PURPOSE | To define why a permit will or will not be issued to remove a tree. Describing the acceptable reasons for removal enables transparent and consistent decision-making by staff issuing tree permits. These reasons listed determine the strength of the bylaw in terms of protecting trees from removal.

6.3.4.1. Risk, dead and dying trees

PURPOSE | To define why a permit will or will not be issued to remove a tree. Describing the acceptable reasons for removal enables transparent and consistent decision-making by staff issuing tree permits. These reasons listed determine the strength of the bylaw in terms of protecting trees from removal.

MUST HAVE: Dead, dying or high or extreme risk trees

The following reasons for removal must be enabled:

- Tree is high or extreme risk or has an imminent likelihood of failure and the risk or failure cannot be mitigated other than by cutting or removing the tree
- Tree is dead, or more than 50% of its crown is dead (or an alternative threshold that indicates when a tree would be accepted to be dying)



6.3.4.2. Conflict with Buildings or Structures

PURPOSE | To avoid conflicts that would sterilize development rights.

MUST HAVE: Conflict with principal or accessory buildings, off-street parking and utilities

A tree bylaw cannot sterilize development rights by preventing development to permitted use or density according to zoning. However, the extent to which applicants must modify designs or construction to retain trees can be controlled by reasons to permit removal. There are two ways in which communities choose to allow removals to enable permitted use.

- Option 1: **Tree can be removed to accommodate design**
- Option 2: **Design must be changed to accommodate trees if possible**

Option 1: Tree can be removed to accommodate design

Tree removal is permitted whenever protected trees are in conflict with buildings, parking or utilities proposed.

Context

This approach may be most suitable for municipalities with undeveloped/rural land within the Urban Containment Boundary where heavily treed lots are being subdivided in the wildland urban interface.

Pros

- Enables communities to focus on planting replacement trees in appropriate locations following development
- Reduces the potential impacts on development
- Is less resource intensive to implement than the alternative

Cons

- Will not often require trees to be retained during development

Option 2: Design must be changed to accommodate trees if possible

Tree removal is permitted only if it is not possible to retain the tree. Applicants may be required to make changes to their design to accommodate the retention of protected trees while still building to the current zoning.

Context

This approach may be most suitable for already developed and densifying municipalities and where the community places a high value on the preservation of protected trees. Communities using this approach should provide staff with additional guidance on what trees this would apply to and how to determine when it is not possible to retain the tree. This guidance may include criteria related to tree health and condition or safe useful life expectancy in the new site conditions.

Pros

- More often requires the retention of existing trees

Cons

- Results in greater impacts to development projects to accommodate tree retention
- Is more resource intensive for the municipality (longer applications review and interactions with applicants expected)

Note

Bylaws may distinguish between principal buildings and accessory buildings, off-street parking and utilities to require design changes only for some of those items.



TREE REMOVALS ON AGRICULTURAL LANDS

Municipalities in British Columbia cannot regulate tree removals that take place for farming use. However, some municipalities require affidavits from landowners to attest that the removals are for the purpose of farming. A tree bylaw can still apply to agricultural land when trees are being removed for non-farming uses, such as development.

Given the limitations for municipalities to regulate trees on agricultural land, communities with large proportions of agricultural land may instead consider implementing or promoting incentive and stewardship programs.

ADDITIONAL OPTIONS | Other common reasons to permit tree removals include wildfire risk, invasive species, yearly removal allowances, proximity to building foundations, infrastructure damage, construction access and trees on structures that require upgrades or replacement.

- **Wildfire:** Communities within the wildland-urban interface that manage wildfire risk through a Development Permit Area should ensure that the tree bylaw is consistent with FireSmart requirements, as detailed in their wildfire DPA. To ensure that wildfire risk management measures are appropriate, they should be guided by a Community Wildfire Protection Plan that defines high-risk areas, and a DPA that provides development guidelines for reducing risk in those areas. Measures to reduce risk may include conifer tree removal or pruning and FireSmart landscaping requirements.
- **Invasive species:** Communities may wish to enable the removal of invasive tree species that would otherwise be protected by their tree bylaw. Enabling the removal of invasive tree species may provide more consistency in municipalities that regulate or have policy related to invasive species. It should refer to specific lists or species from credible sources, such as the province of British Columbia or the Invasive Species Council.
- **Construction access:** Communities may consider allowing tree removals for trees located within the required construction access path, if the construction access cannot be modified to retain or avoid cutting the protected tree(s).
- **Proximity to building foundation:** Some communities choose to enable the removal of trees near building foundations. Enabling this can allow for poorly located trees to be removed and replaced by an appropriate species planted in a more suitable location. However, it could also lead to the removal of healthy trees that are not causing issues in some cases.
- **Infrastructure damage:** Some communities choose to enable the removal of trees that are causing or will imminently cause structure or infrastructure damage that cannot be mitigated other than by cutting or removing the protected tree. Implementing this option can allow for trees causing damage to be removed and replaced by an appropriate species planted in a more suitable location. However, staff will need additional guidance on determining when damage cannot be mitigated and the

bylaw should enable the option to require a qualified environmental professional (e.g., professional engineer) or arborist provide an opinion on whether or not the damage can be mitigated other than by cutting or removing the tree.

- **Yearly removal allowance:** Communities sometimes elect to include an annual allowance of trees that can be removed for any reason. If considering such an allowance, it should be limited by factors such as tree density, tree size, zoning, lot size or a combination of them; those limits would prevent progressive clear cutting while providing flexibility to manage numerous trees on forested lots.
- **Trees on structures:** Communities that have trees planted on structures (i.e., above parkades or on roof-tops) may consider enabling the removal of trees for repairs to the structure.




6.3.5 Permit Application Information Requirements

PURPOSE | To enable staff to determine whether a permit application meets the bylaw requirements to issue a tree permit.

MUST HAVES | At a minimum, basic information should be required with every permit application.

BASIC PERMIT INFORMATION REQUIREMENTS



All permit applications must be accompanied by:

- The address and legal description of the lot/s
- Proof that the owner, or an authorized owner's agent, is submitting the application
- Written consent from the adjacent property owner that they support the application, where a tree shared between two properties is proposed for removal
- Reasons why the applicant is applying to cut or remove a protected tree
- A description and map/plan drawing of the protected trees included in the application

RECOMMENDED FOR DEVELOPMENT: Information requirements for all applications related to development*

Tree bylaws should provide clear information requirements, particularly for applications related to development. They should require sufficient and consistent information to enable staff to review permit applications efficiently.

Development-related applications are complex. Accurate information about trees is needed to understand which trees can be safely and effectively retained, and which trees need to be removed. Non-development-related permit applications can also sometimes require more information, for example, when a tree is proposed for removal because of risk and a tree risk assessor's opinion is needed. For these reasons, it is recommended that the bylaw enable staff to request when needed:

- A legal survey identifying the location of existing trees accurately.
- An arborist report and inventory detailing the location and condition of protected trees and trees proposed for removal.
- A risk assessment report from a tree risk assessor confirming that a tree is high risk if the application entails removal or cutting of a high risk tree.
- A tree management plan mapping the location of protected trees, their tree protection zones, recommended protection measures, location of tree protection fencing and trees proposed for removal.
- A replacement tree plan mapping the location and species of replacement trees to be planted. Build in the need to have these reflected in all landscape plans or at least cross referenced in the landscape plans.
- Additional information from qualified environmental professionals when sensitive lands are involved, for example, to assess impacts of removing trees in riparian areas or steep slope areas.
- A tree fencing confirmation letter from an arborist confirming that protective fencing has been installed per an approved tree management plan.
- A letter of assurance from an arborist, signed by the owner, to specify construction activities requiring arborist supervision to prevent and mitigate damage.

Terms of reference for these information requirements can be included in schedules or standard operating procedures.

***Tree bylaws should also enable staff to require or relax some of these additional requirements on an as needed basis.**

Municipalities can ask for a confirmation that a permit application is consistent with provincial and federal laws, for example require a Bird Nesting Survey for tree removals proposed during the nesting season.



Regional Planning Committee

6.3.6 Requirements and Incentives for Tree Retention and Replacement

Replacement requirements determine how protected trees are replaced when they are removed. There are numerous approaches to tree replacement. The appropriate choice should be tied to meeting the community's goals for tree preservation and growth.

6.3.6.1. Replacement Requirements – Achieving Successional Replacement

PURPOSE | To achieve successional replacement by defining the number of replacement trees required for every protected tree removed. Ratios are not generally effective for increasing the number of trees and growing tree canopy in low-canopy areas because they only require planting on properties that already have trees.



MUST HAVE: Replacement ratio

A replacement ratio can be consistently applied to require that each tree removed is replaced. This approach would require applicants to replace every protected tree removed with one or more replacement trees.

- Option 1: **1:1 or 2:1 replacement ratio**
- Option 2: **1:many replacement ratios based on diameter of tree removed**

Option 1: 1:1 replacement ratio with large trees (2:1 if small trees)

Context

A municipality might choose 1:1 or 2:1 replacement ratio when:

- Properties have limited space for additional trees and a higher replacement ratio would typically result in over-crowding
- The bylaw incorporates requirements to meet soil volume and spacing standards that will maximize the survival and growth of replacement trees
- The bylaw prioritizes replacement with a large tree species but provides flexibility to replace with smaller trees if the site is constrained
- It is coupled with other approaches to encourage or require canopy growth

Found in: Vancouver, Victoria

Pros

- Encourages large tree species replacement and healthy growing environments
- Enables most properties to replace a tree in the space created by the tree removed
- Does not penalize properties that already have trees by requiring even more trees as replacements when a tree is removed

Cons

- Does not replace tree canopy removed as quickly as a higher replacement ratio.
- Does not increase the number of trees or grow tree canopy in low-canopy areas. It cannot be used to meet canopy cover targets.

Option 2: 1:many replacement ratios based on diameter of tree removed

This approach would require applicants to replace every protected tree removed with multiple replacement trees.

Context

The 1:many replacement ratio would be most appropriate for communities that have lots of space for more tree planting.

Found in: White Rock (ranges from 2:1 to 6:1), Courtenay (3:1 if below density target), Saanich (2:1 or 3:1 removals for roads/services), Squamish (2:1 to 6:1 for significant trees, up to density target), Abbotsford (2:1 or 3:1), Oakville (1:1 to 1:12 based on size of tree removed)

Pros

- Enables instant replacement of more of the tree canopy removed

Cons

- To properly compensate for the canopy removed, many more trees may be required than would be practical or reasonable to require as a replacement ratio (Nowak & Aevermann, 2019).
- Urban properties are often unable to fit multiple replacement trees without overcrowding and poor planting location choices, likely leading to more failures and removals in the future.
- Creates an incentive for people to plant small trees or hedges to try and fit replacements on their property, which is at odds with canopy cover goals.
- Penalizes properties that have more trees by requiring them to replace even more trees on their properties, while having few requirements for properties with few or no trees.
- Does not increase the number of trees and grow canopy in low-canopy areas. It cannot be used to meet canopy cover targets.



USING 1:MANY REPLACEMENT RATIOS TO ACHIEVE CANOPY GROWTH

While tree bylaws may attempt to achieve canopy growth through the implementation of higher replacement ratios, this practice is not recommended. When replacement ratios are high, either the trees are disadvantaged by being crowded into inadequate growing space and never reaching healthy maturity, or the applicant is disadvantaged by paying a large sum in cash-in-lieu. Another unintended consequence of high replacement ratios is that they penalize properties with more trees by requiring high replacement or cash-in-lieu and reward properties with few or no trees by imposing few requirements when they re-develop.

6.3.6.2 Replacement Requirements – Achieving Canopy Growth

PURPOSE | To require that every property meets a minimum tree or canopy cover target.

MUST HAVE: Minimum Target
<p>A target can be measured and consistently applied to each property. There are two main approaches to growing tree canopy using tree bylaws in Canada and tree ordinances in the United States:</p> <ul style="list-style-type: none"> Option 1: Tree density target Option 2: Canopy cover target
Option 1: Tree density target
<p>The tree density target approach establishes a target number of trees per unit area that applicants are required to achieve after the tree removal takes place.</p> <p>Context</p> <p>A municipality might choose tree density target when:</p> <ul style="list-style-type: none"> The density of trees is targeted towards meeting a canopy cover goal that has been established for the community The municipality wants to increase canopy in low canopy locations by requiring properties with few or no trees to meet the density target with development The municipality is rural and is allowing some tree removals but wants to limit the extent of removals permitted per property (e.g., under an annual removal allowance) <p><i>Found in: Maple Ridge, Courtenay, Gatineau (QC)</i></p> <p>Pros</p> <ul style="list-style-type: none"> Effectively increases the rate of tree planting across the community, even on properties that have few or no trees Evens out the requirements across the community so that all properties have to contribute to meeting the target Neutralizes the perception of a penalty for having trees on a property that occurs when tree bylaws only include replacement ratios for tree removed. Can establish a relationship between tree density and canopy using tree canopy data <p>Cons</p> <ul style="list-style-type: none"> Adds another replacement requirement to calculate on top of a ratio Must be calculated, which is simple when an arborist report is required with development, but staff may otherwise have to assist applicants when non-development applications allow tree removals down to a minimum tree density <p>Best implemented with differentiation for meeting the requirements during development versus non-development contexts. If an annual removal allowance is in place, it may be necessary to protect trees that are of particular importance to the community such as species of special interest, significant or specimen trees to prevent their removal under the allowance.</p>

Option 2: Canopy cover target

The canopy cover approach establishes a canopy cover target that applicants must achieve on the lot after the tree removal takes place. The canopy area retained on site is measured and if the canopy target is not met then the shortfall is met by planting replacement trees. A replacement tree list defines a canopy area credit for small/medium/large tree species. Applicants plant the number of replacement trees that add up to the canopy area required to meet the target on site. The canopy cover target approach is used in Oak Bay and in several tree ordinances in the US to calculate replacement requirements.

Context

A municipality might choose a minimum tree canopy cover target when:

- The canopy cover target(s) set in the tree bylaw can work towards meeting a canopy cover goal that has been established for the community
- The municipality wants to increase canopy in low canopy locations by requiring properties with few or no trees to meet the canopy target with development
- The municipality is rural and is allowing some tree removals but wants to limit the extent of removals permitted per property (e.g., under an annual removal allowance)
- The community has many existing large canopy trees that overhang properties and wants provide incentives to protect and maintain offsite trees

Found in: Oak Bay, Anmore, various US municipalities (e.g., Baltimore MD, Lake Forest Park WA, Fort Worth TX)

Pros

- Effectively increases the rate of tree planting across the community, even on properties that have few or no trees
- Evens out the requirements across the community so that all properties have to contribute to meeting the target
- Neutralizes the perception of a penalty for having trees on a property that occurs when tree bylaws only include replacement ratios for tree removed.
- Relates directly to meeting canopy cover goals
- Reduces properties replacement requirements when canopy overhangs their property, which provides incentives to retain and protect offsite trees during development

Cons

- Adds another replacement requirement on top of a ratio
- Must be calculated and is more complex to calculate than tree density
- Must assume a relationship between species and typical canopy outcomes to simplify calculations for replacement requirements, so that replacement species can be credited for a certain amount of tree canopy at maturity

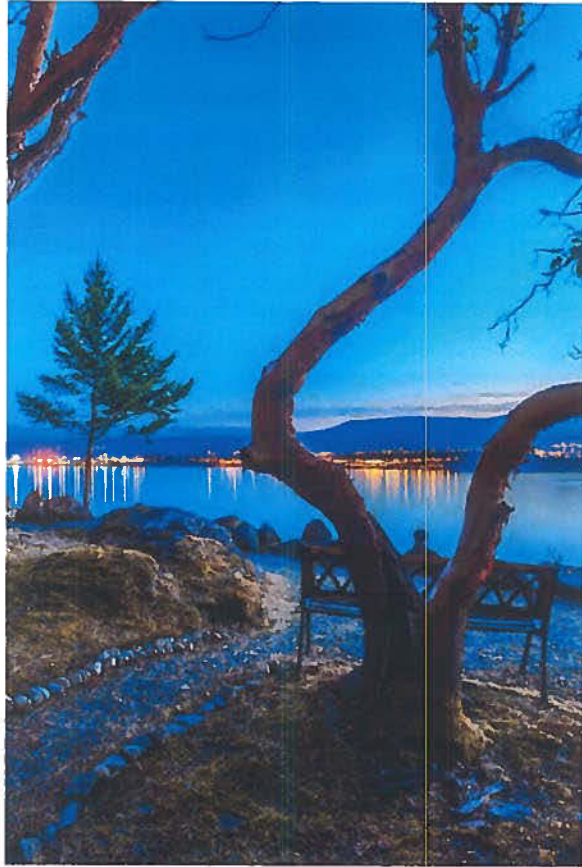
Best implemented with differentiation for meeting the requirements during development versus non-development contexts. If an annual removal allowance is in place, it may be necessary to protect trees that are of particular importance to the community such as species of special interest, significant or specimen trees to prevent their removal under the allowance.

In practice

The City of Courtenay implements a tree density target of 50 trees per net developable hectare. This means most single-family properties require 3-4 trees.

In practice

The District of Oak Bay uses a canopy cover target approach when the owner of a parcel applies for a building permit. The canopy target varies by zone and ranges from 50% for Community Institutional Zoning to 20% for Multi Unit Residential.



In practice

In Nanaimo, cash-in-lieu is capped at a maximum per hectare value.

6.3.6.3 Cash-in-lieu

PURPOSE | To fund tree planting elsewhere on public or private property.

MUST HAVE: Cash-in-lieu

A dollar amount that applies consistently and is adequate to cover the cost of planting and establishing trees.

Cash-in-lieu enables municipalities to collect funding to plant replacement trees. To be effective, cash-in-lieu should cover the cost of replacing the trees.

Context

A municipality might choose to have a cash-in-lieu option when:

- Properties have limited space for replacement trees
- Infill development or higher site coverage development is limiting opportunities for tree planting on site post development
- If coupled with a minimum tree density or canopy target, it is used as a means of every property contributing to a canopy cover goal either by planting tree on site or by funding planting elsewhere

Commonly Found in: *Bylaws that implement replacement requirements, for example in White Rock, Surrey, Vancouver, Township of Langley, Nanaimo, Oakville (ON)*

Pros

- Funds tree planting or enhancement towards growing canopy cover in the municipality
- Can fund stewardship efforts to encourage private land planting and tree maintenance

Cons

- Can become very costly if a 1:many replacement ratio is in place and effectively penalize properties with more existing trees
- If set too low, or enabled as a choice, then people may opt for cash-in-lieu instead of replacing trees

ADDITIONAL OPTIONS | Municipalities may wish to consider the additional options for managing replacement requirements that are species- or location-based, for dead or high or extreme risk trees, or credits to reduce the requirements.

Species based replacement*

A municipality might choose to add species-specific replacement requirements to:

- Require specific species of trees for the replacements of species of interest or native species in sensitive areas (e.g., like for like replacement)
- Reduce replacement requirements for fast growing species that tend to volunteer (e.g., alder or cottonwood) when a 1:Many ratio applies otherwise

*Future species suitability as a result of climate change should be considered when setting species-specific replacement requirements.

Location based replacement

A municipality might choose to define location based replacement requirements to:

- Require specific species of trees or replacement ratios for sensitive lands
- Require different replacement requirements for municipal trees

Exclusion of dead or high or extreme risk trees

- A municipality might choose to exclude dead or high or extreme risk trees to avoid discouraging owners from applying for a removal permit

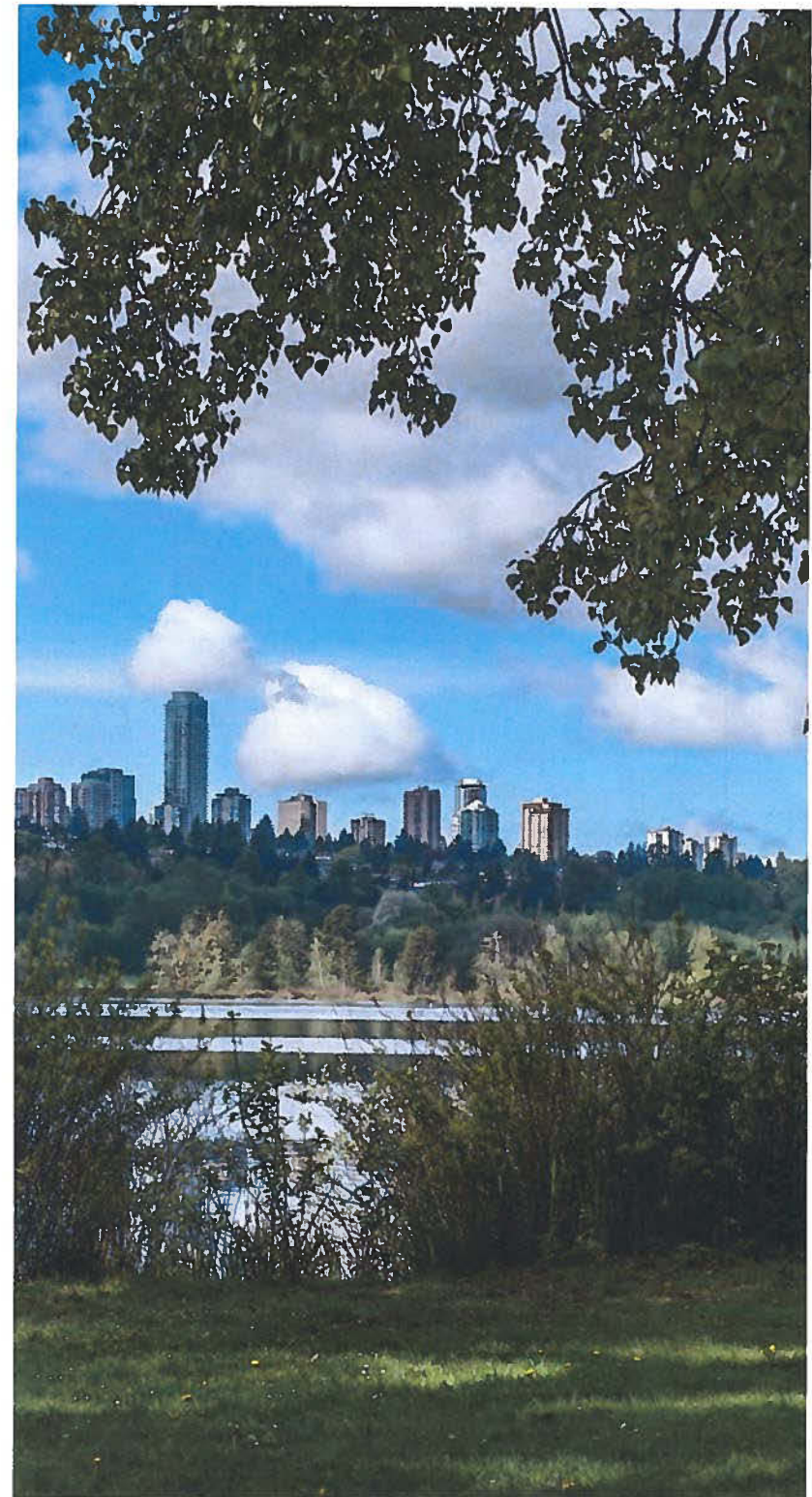
Incentives for tree retention

A municipality might choose to reduce an applicant's replacement requirements if they retain certain trees on site (e.g., large, healthy trees). Credits can function as an incentive for tree retention when they meaningfully reduce the number of additional trees that must be planted on site. Some bylaws allow non-protected trees to be counted as replacement trees.

Other incentives such as a reduction in permit fees could help incentivize tree retention, or a reduction in securities could help incentivize redesign or implementing protection measures around retained trees.

In practice

The City of New Westminster reduces the retained tree securities by 50% for applicants that agree to modify a design to retain protected trees.



STEWARDSHIP AND INCENTIVES

In addition to or as an alternative to replacement tree planting for successional replacement or canopy growth, communities should consider stewardship and incentive programs to encourage tree planting and stewardship on private land.

- **Subsidised tree sales:** many municipalities in the region hold subsidised tree sales for their residents to encourage tree planting.
- **Adopt-a-tree programs:** some municipalities implement programs where residents are invited to water new street trees.
- **Citizen science programs:** such programs can support data collection for urban forest management. For example, the City of Melbourne's Citizen Forester Program recruits volunteer community members to help collect data on many urban forest components. The City has also led a genetic sampling program to learn about the genetic diversity of elm populations in the city, collect observations on pollinator species or carry out habitat planting.
- **Stormwater utility:** The City of Victoria charges a stormwater utility to property owners that offers incentives for properties that manage a stormwater more sustainably. The utility's rainwater rewards program credits on-site rainwater management installations that enable rainwater storage or infiltration.

6.3.7 Replacement Tree Planting Standards

Planting standards serve to guide applicants in the planting of replacement trees to maximize the establishment success of those trees.

6.3.7.1 Species list

PURPOSE | A species list can be used to encourage climate and site appropriate species choices.

RECOMMENDED: Species List

Species lists should:

- Be a list of approved species that is a schedule of the bylaw, or a list published online, but that allows flexibility for updates and for professionals to submit an alternative for approval
- Be large enough to support meeting diversity targets for urban tree species
- Include proven species (native and non-native) that are suitable for current and future climate

6.3.7.2 Spacing and soil volume

PURPOSE | Prescribing minimum spacing and soil volume requirements will ensure that trees have adequate space to grow.

RECOMMENDED: Spacing and soil volume

Requirements should include:

- Replacement trees should be planted at least 2 m away from a building foundation wall (or more for larger tree species), at least 1 m away from any property line of a lot, above and at least 1 m away from an underground utility, driveway or other paved surface, and in an approved location
- Minimum spacing from existing trees and other replacement trees should be set at 2 m for small trees, 4 m for medium trees and 6 m for large trees
- Soil volume required for replacement trees should be estimated based on canopy size at maturity

BEST PRACTICE TO CALCULATE SOIL VOLUME

TREE SIZE	Min soil volume (m ³) ^a	Shared or irrigated soil volume (m ³)
Small tree canopy spread is up to 6 m	8	6
Medium tree canopy - spread is up to 10.0 m	20	15
Large tree canopy - spread is greater than 10.0 m	35	30

Credit soil volume according to actual content of soil:

- Soil: Volume of soil (Length x Width x Depth)
- Soil cells: Volume of soil cell installation (Length x Width x Depth) x 0.92
- Structural soil: Volume of structural soil (Length x Width x Depth) x 0.2

^a0.3 m³ minimum soil per 1 m² of crown projection based on Lindsey and Bassuk (1990).





6.3.7.3 Stock and planting standards

PURPOSE | Stock and planting standards are meant to maximize the chance of survival of replacement trees to maturity.

RECOMMENDED: Stock and planting standards

Requirements should include:

- Replacement trees must meet requirements set out in the latest edition the Canadian Nursery Trades Association "Canadian Standards for Nursery Stock"
- Define the size of planting stock that is acceptable (often 6 cm caliper for deciduous and 2 m height for conifer) but may be smaller for non-development tree permit applicants
- Define the acceptable timing of planting based on local planting season

6.3.8 Actions on Site

Actions on site are steps that applicants must take as a condition of a tree permit.

6.3.8.1 Tree protection measures

PURPOSE | To prevent damage when a tree permit is being issued with a development related permit where trees being retained.

RECOMMENDED: Fencing measures

Fencing requirements should include:

- A standard tree protecting fencing detail as a schedule in the bylaw.
- Signage indicating that the fencing is for tree protection. Signage could include contact information for the project arborist and a dollar value associated with the tree to indicate the cost of damage.
- Fencing should remain in place for the duration of the construction work.
- Removing fencing should be a violation of the bylaw except when part of an activity approved by the tree permit and under the supervision of an arborist.

RECOMMENDED: Supervision measures

If activities are occurring close to trees such that fencing needs to be removed or absent, then arborist supervision of the activities is an alternative method to prevent or minimize damage. Supervision requirements should include:

- A letter of assurance from the owner and arborist to define activities that will be supervised by an arborist, and supervision should be documented
- Documented supervision by the arborist of any planned works within the tree protection zone, pre-construction tree pruning, post-construction assessment or any other activities defined as requiring supervision

RECOMMENDED: Alternative measures

When tree protection fencing cannot be installed or maintained at the recommended distance, alternative tree protection measures (Fite and Smiley, 2016) may include:

- Mulching (15–30 cm)
- Laying minimum ¾ inch (2 cm) plywood, beams, commercial logging or road mats, on ground or over a 10 cm layer of mulch (on fabric to enable easier removal)
- Applying 10 – 15 cm of gravel over a taut, staked, geotextile fabric
- Protecting the trunk with wood planks on a closed-cell foam pad bound with straps or wire (no fasteners into the tree)
- Irrigation
- Any other measures defined to protect trees on site

6.3.8.2 Notification and marking

PURPOSE | Posting a notice of impending tree removals and marking trees to be removed lets the public know that an approved tree removal is taking place.

RECOMMENDED: Notification and marking

Requirements should include:

- A notice to post, similar other permits types (e.g., building permits), provided with the approved permit
- Trees to be removed be marked with flagging tape or survey paint

6.3.9 Securities

Securities are used as refundable deposits to guarantee that an applicant will follow through with actions required by a tree permit.

6.3.9.1 Securities for tree retention

PURPOSE | To guarantee that an applicant will follow through with tree protection measures that are conditions of the tree permit related to a development application.

RECOMMENDED: Tree retention securities

Securities must be determined using a method that can consistently calculate the security amount and be of a sufficient amount to deter bylaw infractions while still being affordable in the context of the project being undertaken.

It is recommended that securities:

- Be a set value for trees or categories of trees (e.g., value by diameter class)
- Be capped at a maximum value to avoid securities being unaffordable
- Incorporate flexibility to waive the security for on site trees that are not at risk of damage
- If applied to municipal trees, incorporate flexibility to be valued according to the Council of Tree and Landscape Appraisal Formula in addition to the cost of removal and planting
- Be returned upon final completion and confirmation by an arborist that the tree was protected as required in the permit, and supported by documentation of arborist supervision of any activities described in a letter of assurance
- Be transferred to a dedicated reserve fund for tree planting if forfeited, as opposed to general revenues

Context

Any community requiring tree protection measures may benefit from retention securities. However, municipalities will require sufficient staffing to manage securities.

Found in: *Surrey, New Westminster, White Rock, Courtenay (at Director's discretion)*

Pros

- Functions to guarantee the applicant and arborist follow through on protection and supervision measures for retained trees
- Requires evidence of compliance from the project arborist to reduce staff enforcement
- Provides another compliance tool in addition to penalties

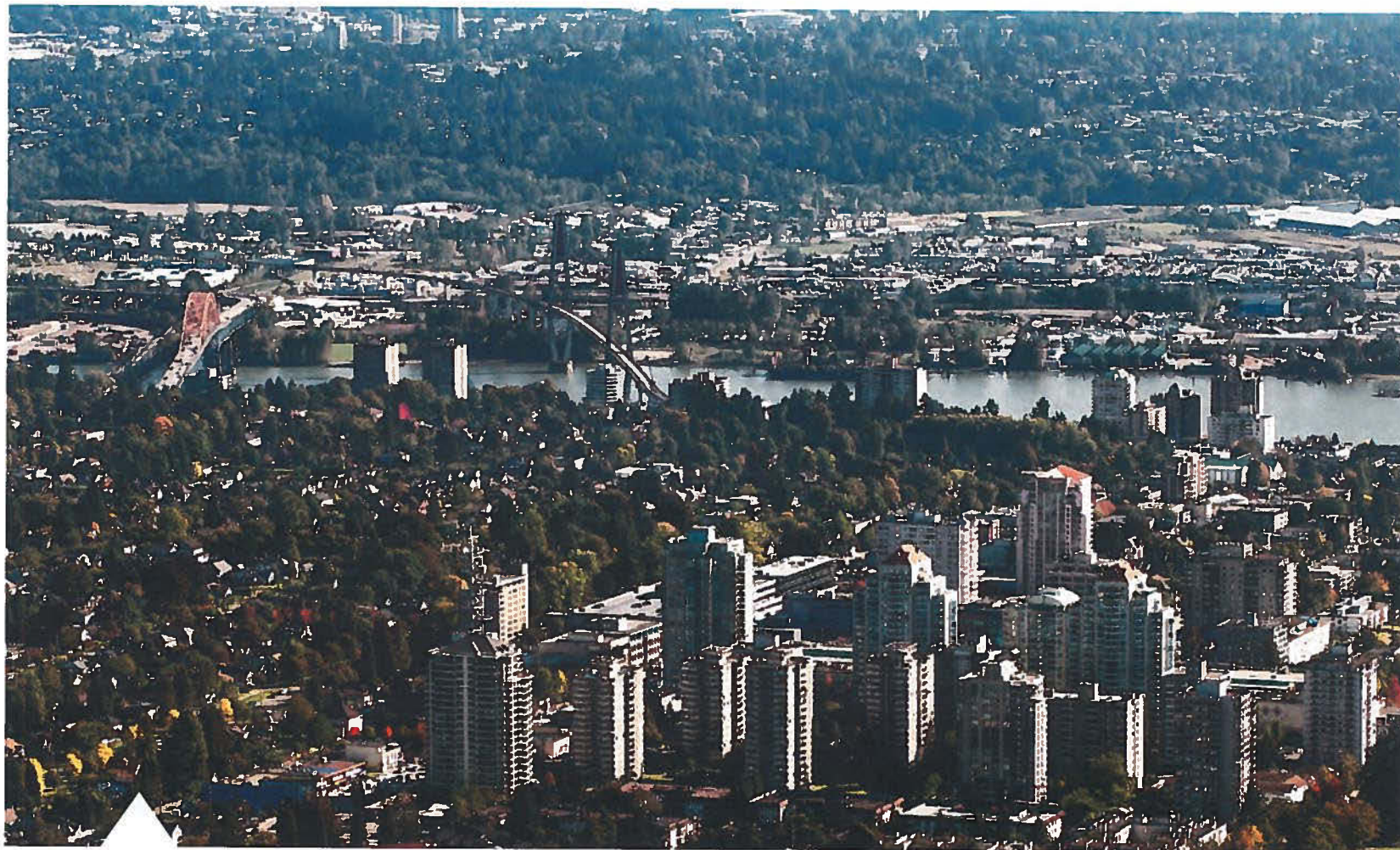
Cons

- Increases the administration requirements of tree bylaws, with securities having to be calculated, held and then returned pending approval of documentation provided
- Requires applicants to provide cash or a letter of credit for the duration of the project

Variation

- **Amenity value-based** replacement securities, where trees are valued according to the Council of Tree and Landscape Appraisal Formula
- **Applicant/application type-based** tree retention securities typically require large sums to be held for larger development contexts in order to encourage compliance while avoiding burdening applicants for smaller works permits

Securities are best implemented with a requirement for arborist supervision and letters of assurance that can provide staff with evidence that work was carried out according to the requirements.



In practice

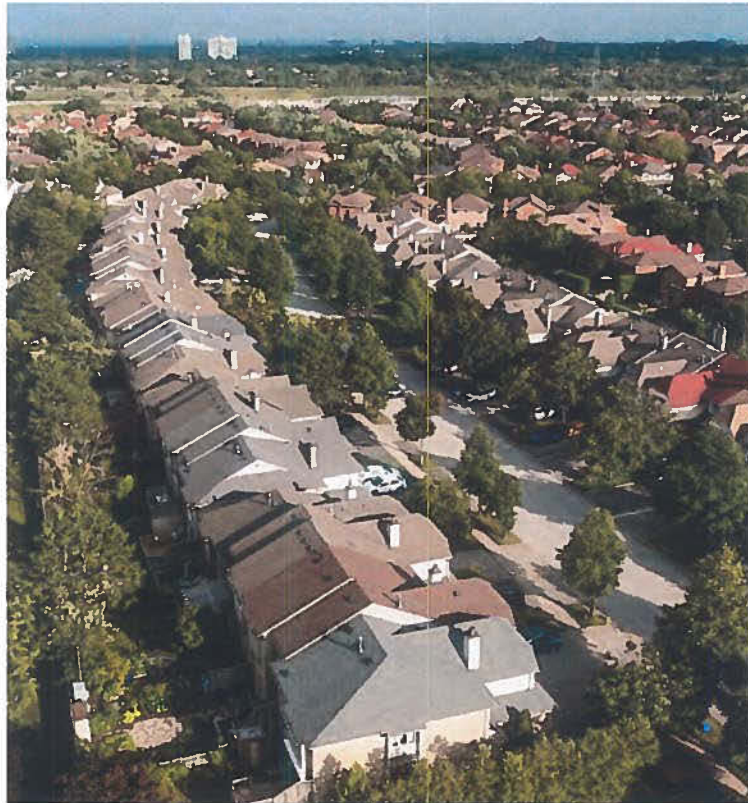
New Westminster's retained tree securities vary by size; the security for a protected tree is \$2500 and greatly increases for a retained specimen tree, which is set at \$10,000.

6.3.9.2 Securities for tree replacement

PURPOSE | To guarantee that an applicant plants and maintains replacement trees that are conditions of the tree permit.

In practice

In Mississauga, a tree replacement security deposit is determined on a case-by-case basis by the City.



RECOMMENDED: Replacement securities

Securities must be determined using a method that can consistently calculate the security amount and be of sufficient value to incentivize the planting of replacement trees.

It is recommended that securities:

- Be set at an amount that covers the cost of replacing a tree and maintaining it to establishment
- If cash-in-lieu is enabled, be set at an equivalent value for applications related to development
- Despite the previous points, if there is a 1:many replacement ratio or the cash-in-lieu amount is high, replacement securities can be modified to a type of applicant or application to avoid burdening non-development applicants
- Be returned once a tree has been planted and has survived for a set period of time

Context

Any community requiring tree protection measures may benefit from retention securities. However, municipalities will require sufficient staffing to administer securities.

Found in: Delta, Surrey, Vancouver, Abbotsford, Victoria, Mississauga (ON)

Pros

- Incentivizes the applicant to follow through with planting and maintaining replacement trees
- Provides another compliance tool in addition to penalties

Cons

- Increases the administration requirements of tree bylaws, with money having to be calculated, held and then returned pending approval of documentation provided
- May require an additional inspection point at the end of the security period

Cash-in-lieu and replacement securities should be equivalent amounts to simplify enforcement by enabling the municipality to retain securities without having to fine applicants to recover the balance amount for cash-in-lieu.



COMPLIANCE WITH REPLACEMENT TREE PLANTING

A recent report from the University of Toronto (Conway, Khatib, Tetreault, & Almas, 2021) reviewed the level of compliance for replacement tree planting requirements in the City of Toronto. A survey sent to homeowners who received a tree removal permit found that 70% of respondents had complied with their permit's replacement tree planting requirement. The researchers conducted site visits and found a very high short-term survival rate for trees planted. The highest survival rate was for trees planted by professionals. The species planted were not all adequate for the local climate and were occasionally misreported to the City. Researchers concluded that an inspection would increase compliance and improve documentation on the replacement trees planted. They also suggested that species guidance and professional tree planting would improve the replacement planting outcomes. Authors also noted the importance of tracking and record keeping systems at the municipal level to enable adequate follow-up and the promotion of compliance.

ADDITIONAL OPTIONS | In order to ensure that replacement plantings take place, municipalities may wish to consider additional options to encourage tree replacement:

1. Enforcement is used as an alternative to securities in some municipalities such as Richmond in order to ensure that replacement planting is carried out as intended. To be as effective as securities, enforcement requires sufficient resources to carry out proactive inspections.
2. Stewardship measures can be used to encourage the planting of replacement trees, such as the municipality providing a free or low-cost replacement tree. Stewardship measures are usually perceived in a more positive light by the public and make replacement tree planting more accessible to applicants with lower incomes. However, such measures come at a cost to the municipality and should be supported by adequate budgets.

Note: bylaw fees, cash-in-lieu or transferred securities collected in a reserve fund could be set up to support residents with tree care and planting on private land.

6.3.10 Penalties

PURPOSE | Penalties seek to deter bylaw infractions and require remedial measures.

MUST HAVES: Long form prosecution

Tree bylaws should enable municipalities to make use of the Offence Act and fines to penalize bylaw infractions.

Municipalities can enforce their tree bylaws with the long form information process under the provincial Offence Act. The Act provides municipalities with the ability to enforce penalties up to \$50,000 if they do not have established penalties (as described under municipal ticketing) or for enforcing major bylaw contraventions.

MUST HAVES: Municipal ticketing

Municipalities can set up fines for tree bylaw infractions for specific minor to medium contraventions. **The Municipal Ticket Information system** enables municipalities to enforce and prosecute contraventions to tree bylaws through infractions listed in a Municipal Ticketing Bylaw. Penalties cannot exceed \$1,000 but multiple fines can be issued for damaging a single tree if multiple infractions apply. Tickets that are disputed go to provincial court.

The Bylaw Notice Adjudication System enables municipalities to establish an administrative system as an alternative to the provincial court for resolving minor local government bylaw contraventions. Local governments may join together to administer a bylaw notice system jointly to cover a broader geographic area more cost-effectively. Penalties cannot exceed \$500.

ADDITIONAL OPTIONS | In addition to enabling the use of available enforcement mechanisms, municipalities may wish to consider additional measures to provide themselves with further options to enforce their tree bylaw, including stop work orders, securities transfer and replacement tree requirements.

Stop work orders

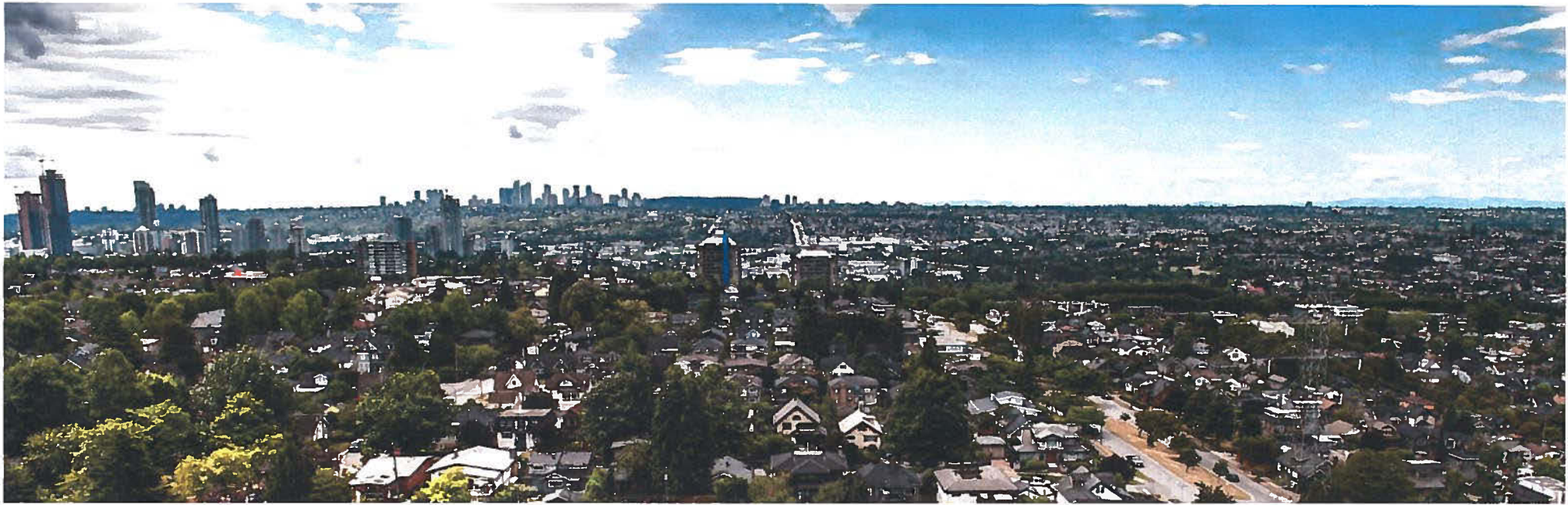
Municipalities can use stop work orders to interrupt work that is causing damage to retained trees until remediation measures are taken. This measure should only be used in situations where irremediable damage is being caused, where it may offer an effective solution to stop such damage when it is occurring.

Securities transfer

Municipalities could consider including provisions within their tree bylaws to automatically transfer unclaimed securities to their reserve funds after a set period of time. Including such a provision may offer more clarity and transparency to staff and applicants as to the expected process and timeline to comply to permit conditions before securities are transferred.

Requiring replacement trees

Some municipalities require people found to be in violation of the bylaw to plant replacement trees as a means of enforcement. This approach may be helpful in cases where applicants removed trees without knowledge or understanding of the tree bylaw requirements. It may however prove challenging to enforce in cases where applicants were purposefully trying to evade the bylaw and are not interested in planting trees on their properties. In such cases, fines may be a better way to recover funds to plant elsewhere in the municipality.

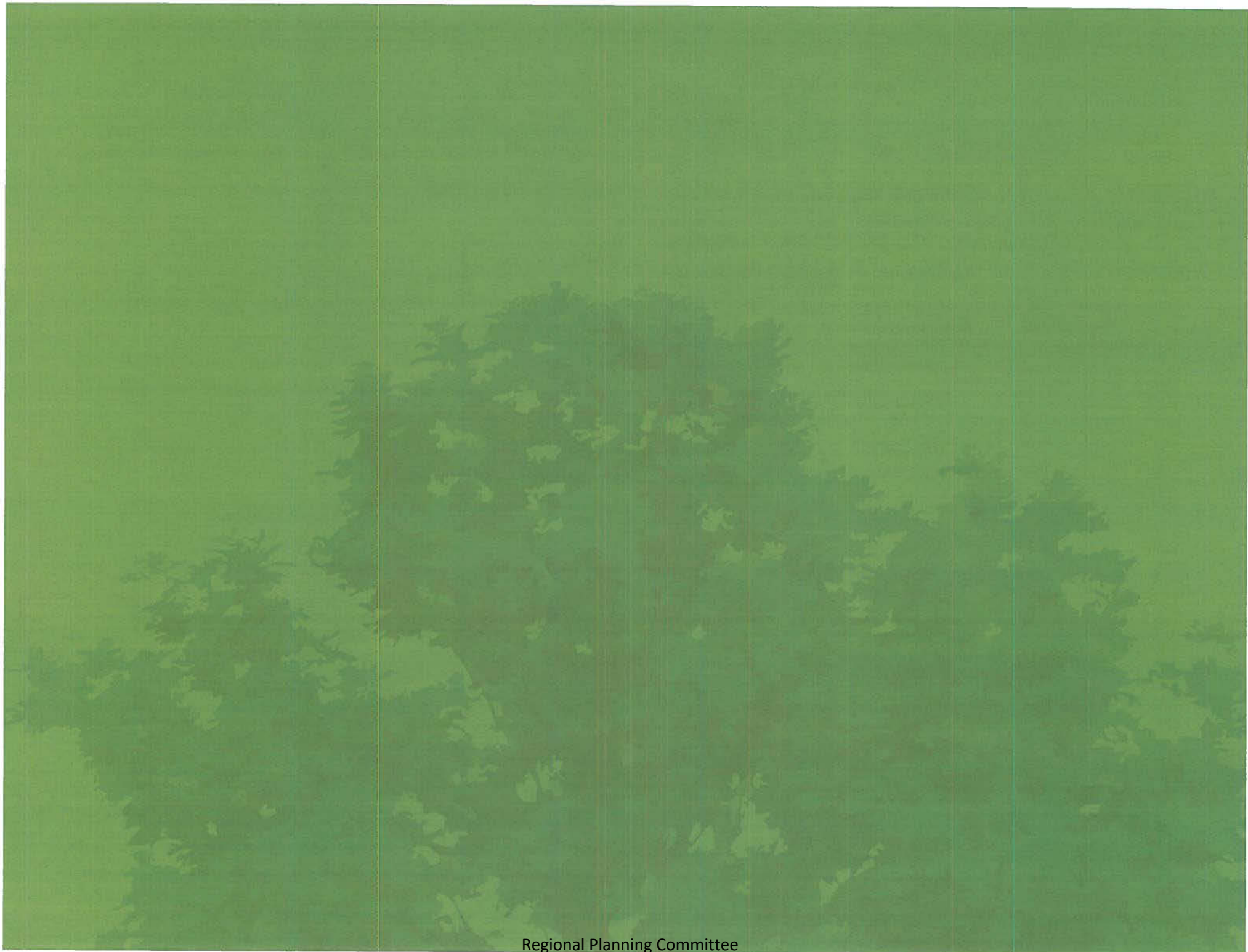


6.3.11 Tree Bylaw implementation

Practitioners surveyed for this project in the fall of 2020 highlighted the importance of the implementation process for creating an effective regulatory environment that balance canopy preservation and growth with competing priorities. Findings of the literature review further emphasize the importance of several factors beyond the bylaw content that will significantly impact urban forest outcomes.

Bernhardt and Nichols propose seven implementation criteria for effective tree ordinances (Bernhardt & Swiecki, 2001; Nichols, 2007). These criteria are discussed in detail in the literature review and align closely to many of the comments compiled in the practitioner survey. The criteria include:

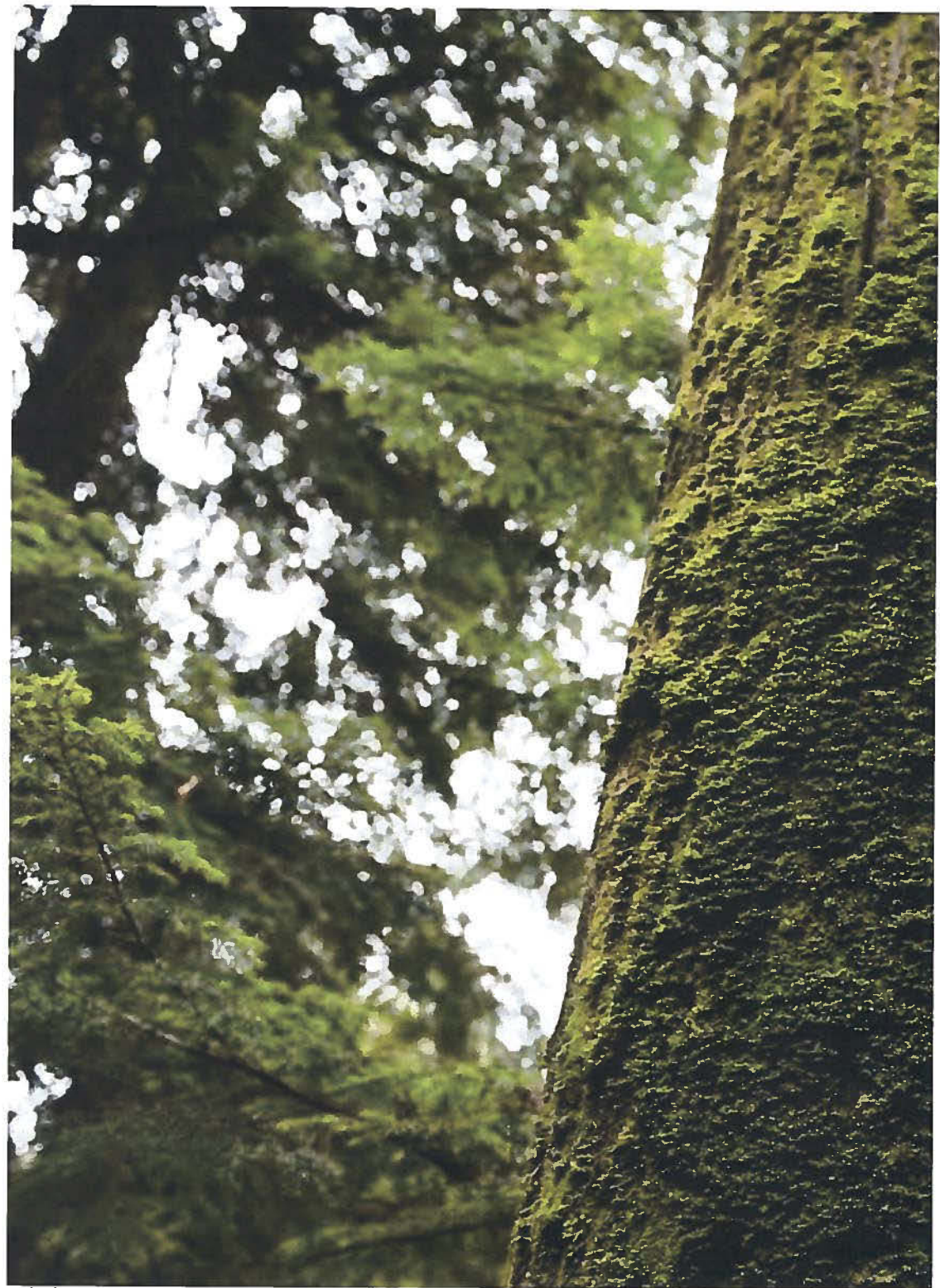
- **Clearly stated goals:** Describe the capacity of the bylaw to achieve certain goals with clear connection to any wider management strategies. Goals are essential to interpret the bylaw and evaluate its effectiveness.
- **Designated responsibility:** Assign authority of a single person responsible for bylaw implementation.
- **Basic performance standards:** Designate best management practices and standards to guide the bylaw whenever possible.
- **Flexibility:** Allow for site-specific decisions to be made by arborists and qualified environmental professionals on a case-by-case basis when appropriate. An appeal process is recommended to ensure decision-making is based on the technical merit of applications.
- **Enforcement:** Employ a variety of penalties consistently.
- **Comprehensive management strategy:** Develop a comprehensive management strategy alongside the bylaw to align goals and integrate them throughout community resources.
- **Developed with community support:** Align with community values and priorities that citizens are willing to comply with, and support.

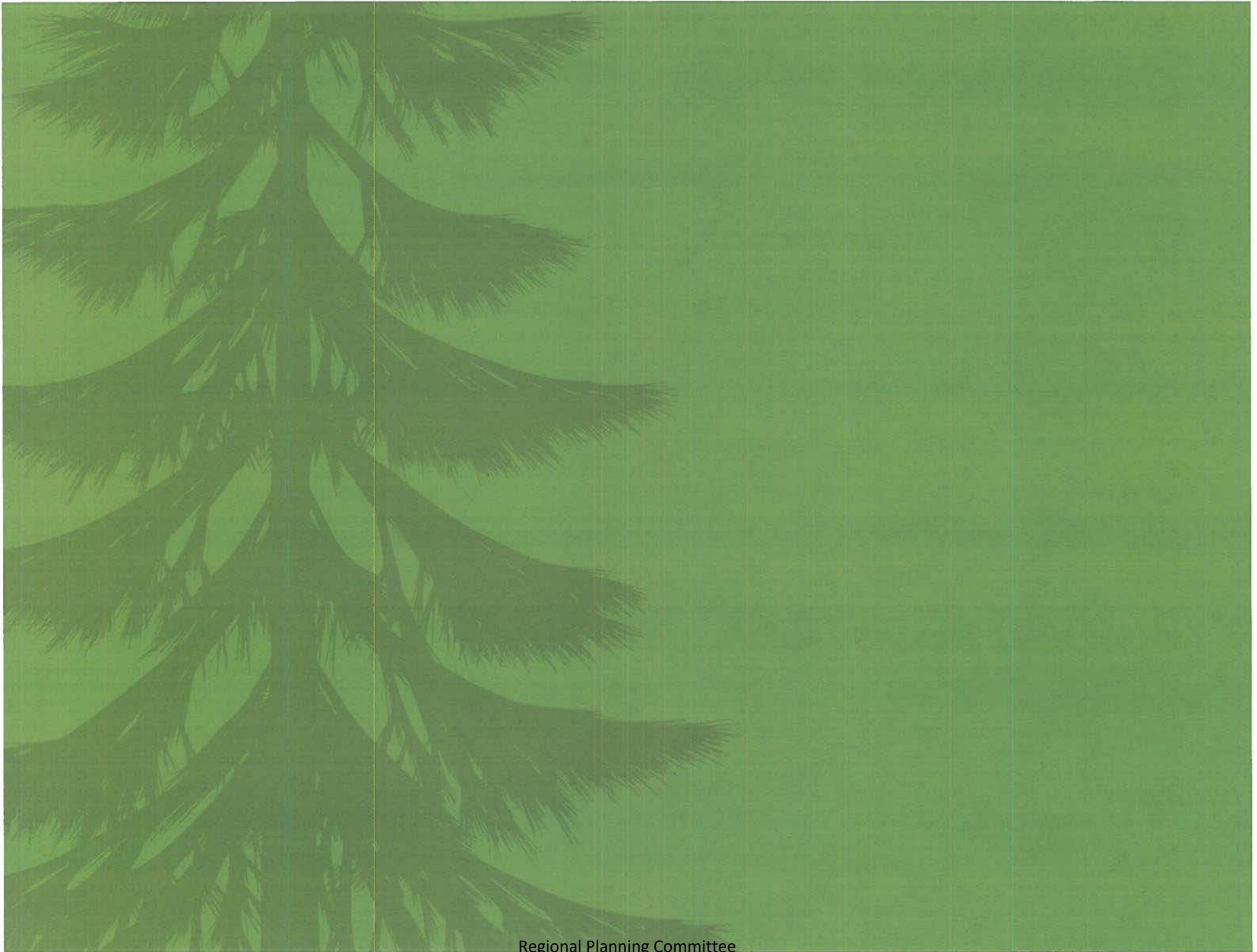


7.0 Conclusion

The benefits of trees are widely recognised and valued by communities across Metro Vancouver and around the world, particularly in the context of climate change adaptation. Local governments are showing an increasing interest in developing or improving regulations to preserve trees and grow tree canopy. Yet, a limited number of resources exist to inform the design and implementation of regulatory tools for this purpose.

The *Metro Vancouver Tree Regulations Toolkit* provides readers with practical information about how they can develop comprehensive policy and regulations to preserve trees and grow tree canopy within British Columbia's current legislative framework. It is intended to offer information about the options available and important components to consider for each regulatory tool to allow readers to make decisions about the most appropriate options for their local context. This document will need to be periodically reviewed and updated as legislation and best practices in the region evolve.





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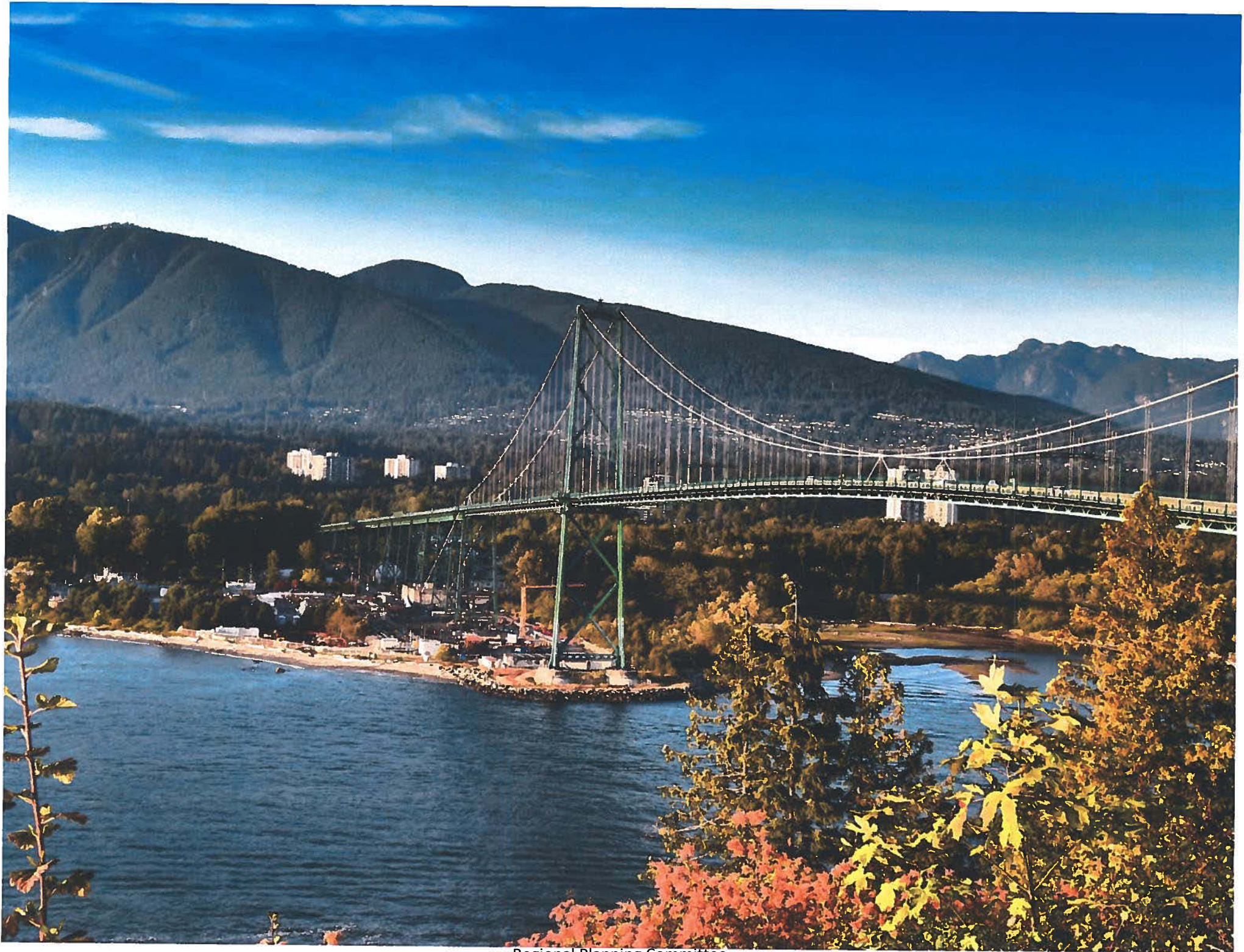
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To: Regional Planning Committee

From: Heather, McNell, General Manager, Regional Planning and Housing Services

Date: May 20, 2021

Meeting Date: June 9, 2021

Subject: **Manager's Report**

RECOMMENDATION

That the Regional Planning Committee receive for information the report dated May 20, 2021, titled "Manager's Report".

REGIONAL PLANNING COMMITTEE 2021 WORK PLAN

The Regional Planning Committee's Work Plan for 2021 is attached to this report (Attachment). The status of work program elements is indicated as pending, in progress, ongoing or complete. The listing is updated as needed to include new issues that arise, items requested by the Committee, and changes to the schedule.

Attachment

Regional Planning Committee 2021 Work Plan

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5.6 ATTACHMENT

Regional Planning Committee 2021 Work Plan

Report Date: May 20, 2021

Priorities

1 st Quarter	Status
Metro 2050 Implementation Policy Recommendations	Complete
Metro 2050 Climate Change Policy Review Recommendations	Complete
Hey Neighbour Discussion Paper	Complete
Social Equity in Regional Planning – Phase II	Complete
Metro 2050 draft policies – Goal 1	Complete
Metro 2050 draft policies – Goal 2	Complete
Metro 2050 draft policies – Implementation Section	Complete
Housing and Transportation Cost Burden Study – Scope	Pending
Regional Agricultural Land Use Inventory - Scope	In progress
2 nd Quarter	
Projections for Population, Housing and Employment (Data Projections)	Complete
Metro 2050 draft policies – Goal 3 (Includes Climate Research and SEI)	Complete
Metro 2050 draft policies – Goal 4	Complete
Metro 2050 draft policies – Goal 5	Complete
Regional Industrial Lands 2020 Inventory	Complete
Regional Industrial Land Implementation Tools - Scope	In progress
Draft Metro 2050 Refer for Comment	In progress
Ecosystem Services from Agricultural Land – Scope	Pending
Regional Land Use Assessment – Implementation Tools – Scope	In progress
3 rd Quarter	
Where Matters Phase II - Update	Pending
Land Use Model Preparation – Land Use Component – Report Out	Pending
Data/Projections Validation – Report Out	Pending
Land Use Model - Scope	Pending
Regional Agricultural Land Use Inventory – Update	Pending
4 th Quarter	
Ecosystem Services from Agricultural Land – Report Out	Pending
Housing and Transportation Cost Burden Study - Report Out	Pending
Regional Land Use Assessment –Update	Pending
Regional Agricultural Land Use Inventory – Report Out	Pending
Land Use Model – Report Out	Pending
Regional Industrial Land Implementation Tools – Update and Report Out	Pending
Metro 2050 – Update on Comment Period	Pending

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