METRO VANCOUVER REGIONAL DISTRICT (MVRD)
BOARD OF DIRECTORS

REGULAR BOARD MEETING
Friday, June 25, 2021
9:00 A.M.
28th Floor Boardroom, 4730 Kingsway, Burnaby, British Columbia

Membership and Votes

A G E N D A[1]

A. ADOPTION OF THE AGENDA

1. June 25, 2021 Regular Meeting Agenda
That the MVRD Board adopt the agenda for its regular meeting scheduled for June 25, 2021 as circulated.

B. ADOPTION OF THE MINUTES

1. May 28, 2021 Regular Meeting Minutes *pg. 6*
That the MVRD Board adopt the minutes for its regular meeting held May 28, 2021 as circulated.

C. DELEGATIONS

D. INVITED PRESENTATIONS

E. CONSENT AGENDA
Note: Directors may adopt in one motion all recommendations appearing on the Consent Agenda or, prior to the vote, request an item be removed from the Consent Agenda for debate or discussion, voting in opposition to a recommendation, or declaring a conflict of interest with an item.

1. REGIONAL ECONOMIC PROSPERITY MANAGEMENT COMMITTEE REPORTS

1.1 Technical Paper – Preparing Metro Vancouver for the Digital Economy *pg. 14*
That the MVRD Board receive for information the report dated May 11, 2021, titled "Technical Paper – Preparing Metro Vancouver for the Digital Economy".

[1] *Note: Recommendation is shown under each item, where applicable. All Directors vote unless otherwise noted.*

1.2 REPS Industry Cluster Selection Criteria *pg. 38*

That the MVRD Board receive for information the report dated May 5, 2021, titled "REPS Industry Cluster Selection Criteria".

1.3 Clean Transportation Sector Profile *pg. 42*

That the MVRD Board receive for information the report dated May 7, 2021, titled "Clean Transportation Sector Profile".

2. ELECTORAL AREA COMMITTEE REPORTS

2.1 Howe Sound Fire Protection Services Feasibility Study *pg. 48*

That the MVRD Board receive for information the report dated May 11, 2021, titled "Howe Sound Fire Protection Services Feasibility Study".

2.2 Barnston Island Flood Construction Level Study – Engagement Update *pg. 111*

That the MVRD Board receive for information the report dated May 11, 2021, titled "Barnston Island Flood Construction Level Study – Engagement Update".

2.3 Community Works Fund – Barnston Island *pg. 117*

That the MVRD Board approve funding from the Electoral Area A Community Works Fund up to $12,100 for Barnston Island pump house and flood box gate improvements, as described in the report dated May 11, 2021, titled "Community Works Fund – Barnston Island".

3. REGIONAL PLANNING COMMITTEE REPORTS

3.1 Draft Metro 2050: Referral for Comment *pg.120*

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.

pg. 254

3.2 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.

pg.260

3.3 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".

pg. 333

3.4 Metro Vancouver Tree Regulations Toolkit

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

4. CLIMATE ACTION COMMITTEE REPORTS

pg. 416

4.1 Cancellation of Provincial Climate Action Revenue Incentive Program (CARIP)

That the MVRD Board authorize the Board Chair to write a letter to the Provincial Minister of Municipal Affairs, Minister of Environment and Climate Change Strategy, and Minister of Finance, regarding the cancellation of the Climate Action Revenue Incentive Program, providing details on key elements to be retained in a replacement program and suggested improvements, based on the analysis in the report dated May 27, 2021, titled "Cancellation of Provincial Climate Action Revenue Incentive Program (CARIP)".

4.2 Next Phase of Engagement on an Open-Air Burning Emission Regulation *pg. 423*

That the MVRD Board:

a) receive for information a summary of the initial engagement on a potential emission regulation for open-air burning of vegetative debris in Metro Vancouver, as described in the report titled "Next Phase of Engagement on an Open-Air Burning Emission Regulation", dated May 18, 2021; and

b) authorize staff to proceed with additional engagement on a potential emission regulation for open-air burning of vegetative debris in Metro Vancouver, based on the draft discussion paper and updated engagement plan presented in the report titled "Next Phase of Engagement on an Open-Air Burning Emission Regulation", dated May 18, 2021.

4.3 Air Quality and Climate Action Initiatives in Caring for the Air 2021 *pg. 515*

That the MVRD Board receive for information the report dated May 10, 2021, titled "Air Quality and Climate Action Initiatives in *Caring for the Air 2021*".

5. FINANCE AND INTERGOVERNMENT COMMITTEE REPORTS

5.1 Greater Vancouver Regional Fund – 2020 Annual Report *pg. 543*

That the MVRD Board receive for information the report dated June 2, 2021, titled "Greater Vancouver Regional Fund – 2020 Annual Report."

F. ITEMS REMOVED FROM THE CONSENT AGENDA

G. REPORTS NOT INCLUDED IN CONSENT AGENDA

1. FINANCE AND INTERGOVERNMENT COMMITTEE REPORTS

1.1 MVRD Procedure Amending Bylaw No. 1322, 2021 *pg. 577*

[Recommendation a): simple weighted majority vote.] and
[Recommendation b): 2/3 weighted majority vote.]

That the MVRD Board:

a) give first, second and third reading to *Metro Vancouver Regional District Procedure Amending Bylaw Number 1322, 2021*; and

b) pass and finally adopt *Metro Vancouver Regional District Procedure Amending Bylaw Number 1322, 2021*.

H. MOTIONS FOR WHICH NOTICE HAS BEEN GIVEN

I. OTHER BUSINESS

1. MVRD Board Committee Information Items and Delegation Summaries *pg. 581*

J. BUSINESS ARISING FROM DELEGATIONS

K. RESOLUTION TO CLOSE MEETING

Note: The Board 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.

That the MVRD Board close its regular meeting scheduled for June 25, 2021 pursuant to the *Community Charter* provisions, Section 90 (1) (e), (g) and 90 (2) (b) as follows:

"90 (1) A part of a board meeting may be closed to the public if the subject matter being considered relates to or is one or more of the following:

(e) the acquisition, disposition or expropriation of land or improvements, if the board or committee considers that disclosure could reasonably be expected to harm the interests of the regional district;

(g) litigation or potential litigation affecting the regional district; and

90 (2) A part of a meeting must be closed to the public if the subject matter being considered relates to one or more of the following:

(b) the consideration of information received and held in confidence relating to negotiations between the regional district and a provincial government or the federal government or both, or between a provincial government or the federal government or both and a third party."

L. RISE AND REPORT (Items Released from Closed Meeting)

M. ADJOURNMENT/CONCLUSION

That the MVRD Board adjourn/conclude its regular meeting of June 25, 2021.

METRO VANCOUVER REGIONAL DISTRICT
BOARD OF DIRECTORS

Minutes of the Regular Meeting of the Metro Vancouver Regional District (MVRD) Board of Directors held at 9:02 a.m. on Friday, May 28, 2021 in the 28th Floor Boardroom, 4730 Kingsway, Burnaby, British Columbia.

MEMBERS PRESENT:

Burnaby, Chair, Director Sav Dhaliwal
North Vancouver City, Vice Chair Director Linda Buchanan*
Anmore, Director John McEwen*
Belcarra, Director Jamie Ross*
Bowen Island, Director David Hocking*
Burnaby, Director Pietro Calendino*
Burnaby, Director Mike Hurley*
Coquitlam, Director Craig Hodge*
Coquitlam, Director Richard Stewart*
Delta, Director Dylan Kruger*
Delta, Alternate Director Bruce McDonald* for George Harvie
Electoral Area A, Director Jen McCutcheon*
Langley City, Director Gayle Martin*
Langley Township, Director Jack Froese*
Langley Township, Director Kim Richter*
Lions Bay, Director Ron McLaughlin*
Maple Ridge, Director Mike Morden*
New Westminster, Director Jonathan Coté*
North Vancouver District, Director Lisa Muri*
Pitt Meadows, Director Bill Dingwall*
Port Moody, Director Rob Vagramov*
Richmond, Director Malcolm Brodie*
Richmond, Director Harold Steves*
Surrey, Director Linda Annis*
Surrey, Director Doug Elford*
Surrey, Director Laurie Guerra*
Surrey, Director Doug McCallum*
Surrey, Director Mandeep Nagra*
Surrey, Director Allison Patton*
Tsawwassen, Director Ken Baird*
Vancouver, Director Christine Boyle*
Vancouver, Director Adriane Carr*
Vancouver, Director Melissa De Genova*
Vancouver, Director Lisa Dominato*
Vancouver, Alternate Director Pete Fry* for Kennedy Stewart
Vancouver, Director Colleen Hardwick*
Vancouver, Director Michael Wiebe*
West Vancouver, Director Mary-Ann Booth*
White Rock, Director Darryl Walker*

MEMBERS ABSENT:

Port Coquitlam, Director Brad West

STAFF PRESENT:

Jerry W. Dobrovolny, Chief Administrative Officer
Lauren Cichon, Legislative Services Coordinator, Board and Information Services
Chris Plagnol, Corporate Officer

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

A. ADOPTION OF THE AGENDA

1. May 28, 2021 Regular Meeting Agenda

It was MOVED and SECONDED
That the MVRD Board:

a) amend the agenda for its regular meeting scheduled for May 28, 2021 by adding on-table Item G1 Cancellation of Provincial Climate Action Revenue Incentive Program; and
b) adopt the agenda as amended.

CARRIED

B. ADOPTION OF THE MINUTES

1. April 30, 2021 Regular Meeting Minutes

It was MOVED and SECONDED
That the MVRD Board adopt the minutes for its regular meeting held April 30, 2021 as circulated.

CARRIED

C. DELEGATIONS

No items presented.

D. INVITED PRESENTATIONS

No items presented.

E. CONSENT AGENDA

At the request of Directors, the following items were removed from the Consent Agenda, for consideration under Section F. Items Removed from the Consent Agenda:

1.3 Metro 2050 Regional Resilience Framework
1.1 Metro 2050 Draft Policy Language: Goal 4 – Provide Diverse and Affordable Housing Choices and Goal 5 – Support Sustainable Transportation Choices

It was MOVED and SECONDED
That the MVRD Board adopt the recommendations presented in the following items as presented in the May 28, 2021 MVRD Board Consent Agenda:

1.2 Metro Vancouver Industrial Lands Intensification Analysis Study
2.1 Regional Parks 2020 Annual Report
3.1 Update to the 2019-2022 Board Strategic Plan
3.2 2020 Statement of Financial Information
3.3 Project Delivery Best Practice Response – Capital Project Governance and Stage Gate Framework
4.1 Metro Vancouver External Agency Activities Status Report – May 2021

CARRIED

The items and recommendations referred to above are as follows:

1.2 Metro Vancouver Industrial Lands Intensification Analysis Study

Report dated April 12, 2021, from Eric Aderneck, Senior Planner, Regional Planning and Housing Services, providing the MVRD Board the Industrial Lands Intensification Analysis Study for information.

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

Adopted on Consent

2.1 Regional Parks 2020 Annual Report

Report dated April 7, 2021, from Jamie Vala, Division Manager, Planning and Resource Management, Regional Parks, providing the *Regional Parks 2020 Annual Report* for the MVRD Board's information.

Recommendation:
That the MVRD Board receive for information the report dated April 7, 2021, titled "Regional Parks 2020 Annual Report".

Adopted on Consent

3.1 Update to the 2019-2022 Board Strategic Plan

Report dated April 26, 2021, from Heather Schoemaker, General Manager, Ann Rowan, Division Manager, Collaboration and Engagement, Tess Kitchen, Senior Policy Advisor, External Relations and Megan Gerryts, Policy Advisor, Regional Economic Prosperity Service, seeking MVRD Board approval of the updated *2019- 2022 Board Strategic Plan* based on discussions at the February 26-27, 2021 Board Strategic Planning Workshop.

Recommendation:
That the MVRD Board approve the updated *2019-2022 Board Strategic Plan* as presented in the report dated April 26, 2021, titled "Update to the 2019-2022 Board Strategic Plan."

Adopted on Consent

3.2 2020 Statement of Financial Information

Report dated April 26, 2021, from Dean Rear, Chief Financial Officer/General Manager, Financial Services, seeking MVRD Board approval of the 2020 Statement of Financial Information (SOFI) as part of the reporting requirements of the *Financial Information Act.*

Recommendation:
That the MVRD Board approve the Statement of Financial Information for the year ended December 31, 2020.

Adopted on Consent

3.3 Project Delivery Best Practice Response – Capital Project Governance and Stage Gate Framework

Report dated May 3, 2021, from Cheryl Nelms, General Manager, Project Delivery, providing a series of updates on implementation of best practices for capital projects for the MVRD Board's information.

Recommendation:

That the MVRD Board receive for information the report dated May 3, 2021, titled "Project Delivery Best Practice Response – Capital Project Governance and Stage Gate Framework."

Adopted on Consent

4.1 Metro Vancouver External Agency Activities Status Report – May 2021

Report dated May 17, 2021, from Katie Karn, Deputy Corporate Officer, Board and Information Services, updating the MVRD Board on the recent activities of external agencies to which representatives have been appointed.

Recommendation:

That the MVRD Board receive for information reports from Metro Vancouver representatives to the following external organizations:

a) Delta Heritage Airpark Management Committee;
b) Fraser Valley Regional District Indigenous Relations Committee;
c) Fraser Valley Regional Library Board (FVRL);
d) Katzie Treaty Negotiation Table;
e) Lower Mainland Flood Management Strategy Leadership Committee;
f) Lower Mainland Local Government Association (LMLGA);
g) Municipal Finance Authority of BC;
h) Ocean Watch Action Committee;
i) Pacific Parklands Foundation;
j) Sasamat Volunteer Fire Department Board of Trustees;
k) UBCM; and
l) Western Transportation Advisory Council,

as provided in the report dated May 17, 2021, titled "Metro Vancouver External Agency Activities Status Report – May 2021".

Adopted on Consent

F. ITEMS REMOVED FROM THE CONSENT AGENDA

Items removed from the Consent Agenda for consideration under Section F. were considered in numerical order.

1.1 Metro 2050 Regional Resilience Framework

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

It was MOVED and SECONDED
That the MVRD Board receive for information the report dated April 11, 2021, titled "*Metro 2050* Regional Resilience Framework".

CARRIED

1.3 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 for the MVRD Board's information to review and comment on the draft content of Goal 4 and Goal 5 of *Metro 2050*.

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

G. REPORTS NOT INCLUDED IN CONSENT AGENDA

1. Cancellation of Provincial Climate Action Revenue Incentive Program
On-table report dated May 26, 2021 from Mayors Committee, together with report dated May 18, 2021, from Jerry W. Dobrovolny, Commissioner/Chief Administrative Officer, providing information on the announced cancellation of the Provincial Climate Action Revenue Incentive Program (CARIP).

Main Motion
It was MOVED and SECONDED
That the MVRD Board:

a) authorize the Board Chair to write a letter to the Provincial Minister of Municipal Affairs regarding the cancellation of the provincial Climate Action Revenue Incentive Program ("CARIP"), including its financial implications, impacts of the cancellation of the program, and requesting an environmentally-sustainable replacement of the CARIP with an improved program with payments to start in 2022 without conditions; and
b) refer the matter of the cancellation of the CARIP program to the Climate Action Committee and direct staff to prepare an additional response that provides details on suggested improvements to the program.

Members also considered writing letters to the Provincial Minister of Finance and Provincial Minister of Environment and Climate Change Strategy regarding the cancellation of the CARIP.

Amendment to the Main Motion
It was MOVED and SECONDED
That the MVRD Board amend the Main Motion, in part a), after the phrase "Provincial Minister of Municipal Affairs", by adding the phrase,

"Provincial Minister of Finance, and Provincial Minister of Environment and Climate Change Strategy".

CARRIED

Question on the Main Motion as Amended
Question was then called on the Main Motion as amended and it was

CARRIED

The Main Motion as amended now reads as follows:
That the MVRD Board:

a) authorize the Board Chair to write a letter to the Provincial Minister of Municipal Affairs, Provincial Minister of Finance, and Provincial Minister of Environment and Climate Change Strategy regarding the cancellation of the provincial Climate Action Revenue Incentive Program ("CARIP"), including its financial implications, impacts of the cancellation of the program, and requesting an environmentally-sustainable replacement of the CARIP with an improved program with payments to start in 2022 without conditions; and

b) refer the matter of the cancellation of the CARIP program to the Climate Action Committee and direct staff to prepare an additional response that provides details on suggested improvements to the program.

H. MOTIONS FOR WHICH NOTICE HAS BEEN GIVEN

No items presented.

I. OTHER BUSINESS

1. MVRD Board Committee Information Items and Delegation Summaries

It was MOVED and SECONDED
That the MVRD Board receive for information the MVRD Board Committee Information Items and Delegation Summaries, dated May 28, 2021.

CARRIED

J. BUSINESS ARISING FROM DELEGATIONS

No items presented.

K. RESOLUTION TO CLOSE MEETING

It was MOVED and SECONDED

That the MVRD Board close its regular meeting scheduled for May 28, 2021 pursuant to the *Community Charter* provisions, Section 90 (1) (a), (b), (i), (k), (m) and 90 (2) (b) as follows:

"90 (1) A part of a board meeting may be closed to the public if the subject matter being considered relates to or is one or more of the following:

(a) personal information about an identifiable individual who holds or is being considered for a position as an officer, employee or agent of the regional district or another position appointed by the regional district;

(b) personal information about an identifiable individual who is being considered for a regional award or honour, or who has offered to provide a gift to the regional district on condition of anonymity;

(i) the receipt of advice that is subject to solicitor-client privilege, including communications necessary for that purpose;

(k) negotiations and related discussions respecting the proposed provision of a regional district service that are at their preliminary stages and that, in the view of the board or committee, could reasonably be expected to harm the interests of the regional district if they were held in public;

(m) a matter that, under another enactment, is such that the public may be excluded from the meeting; and

90 (2) A part of a meeting must be closed to the public if the subject matter being considered relates to one or more of the following:

(b) the consideration of information received and held in confidence relating to negotiations between the regional district and a provincial government or the federal government or both, or between a provincial government or the federal government or both and a third party."

CARRIED

L. RISE AND REPORT (Items Released from Closed Meeting)

No items presented.

M. ADJOURNMENT/CONCLUSION

It was MOVED and SECONDED
That the MVRD Board adjourn its regular meeting of May 28, 2021.

CARRIED
(Time: 9:47 a.m.)

CERTIFIED CORRECT

Chris Plagnol, Corporate Officer

Sav Dhaliwal, Chair

To: Regional Economic Prosperity Management Board

From: Megan Gerryts, Senior Advisor, Regional Economic Prosperity Service

Date: May 11, 2021 Meeting Date: May 26, 2021

Subject: **Technical Paper – Preparing Metro Vancouver for the Digital Economy**

RECOMMENDATION

That the MVRD Board receive for information the report dated May 11, 2021, titled "Technical Paper – Preparing Metro Vancouver for the Digital Economy".

EXECUTIVE SUMMARY

Following direction from the MVRD Board, staff have prepared a technical paper on preparing Metro Vancouver for the Digital Economy. The paper posits that the rapidly changing economy requires the region to rethink its economic development approach. This approach needs to be adaptive, responsive and more reflective of where the economy is headed. In a global marketplace where investors have many choices, the region must position itself in the best possible way to attract investment in the region. Adopting this approach will drive the region's economic recovery and further its resiliency in a way that advances equitable opportunity and shared prosperity for all of Metro Vancouver's residents.

While not all of the economic development strategies in the paper are within the purview of the Regional Economic Prosperity Service, the paper contextualizes the work of the service and the system changes required to meet the challenges of the changing economy.

PURPOSE

To provide for the Management Board's information, a technical paper on preparing Metro Vancouver for the Digital Economy.

BACKGROUND

Following a presentation made by REPS staff to the MVRD Board on February 26, 2021, a request was made to outline the ideas conveyed in the presentation in a written format. In response to this request, staff have created a technical paper describing, in plain language, the challenges presented by this economic transition and outlining economic development strategies to contend with these challenges (Attachment 1). The paper was reviewed by various members of the Management Board, who have also provided quotes that are included in the document.

PREPARING METRO VANCOUVER FOR THE DIGITAL ECONOMY

The transition to a digital economy, one that is driven by innovation, ideas and intellectual property, has large implications on the nature of work and the allocation of labour. In order to take advantage of the opportunities presented by the digital economy, the paper puts forward four economic development strategies:

1. **Invest in our people** Reinforce a regional talent development structure that is more connected, industry-responsive, "future-proof", and adaptive to the rapidly changing labour market needs of industry

2. **Catalyze innovation** Develop the region's innovation capabilities to diversify and strengthen the productive advantages of established industries and to create entirely new ones that drive solutions to societal challenges

3. **Build capacity in our key industries** Align and deploy assets and fill gaps along the product / service value chains within our region's export-oriented industries

4. **Increase our global connectedness** Open up new markets for the region through trade facilitation, export assistance programs to increase the number of export-ready firms, and the attraction of foreign investment into the region within key industries

While not all of the economic development strategies are within the control of the Regional Economic Prosperity Service, the overarching philosophy informs the work of the service. As leaders in our region are able to mobilize around these strategic priorities, we will be able to advance a more robust, inclusive, and equitable economy.

FINANCIAL IMPLICATIONS
There are no financial implications associated with this report.

ALTERNATIVES
This is an information report. No alternatives are presented.

CONCLUSION
Staff have prepared a technical paper titled "Preparing Metro Vancouver for the Digital Economy" (Attachment 1) that outlines the challenges presented by the current transition to a digital economy and puts forward economic development strategies to help the Metro Vancouver region meet them. The report is presented for information.

Attachments: *(Doc# 45609099)*
1. Technical Paper – Preparing Metro Vancouver for the Digital Economy

45421508



Technical Paper: Preparing Metro Vancouver for the Digital Economy

Metro Vancouver Regional Economic Prosperity Service

Metro Vancouver's Regional Economic Prosperity Service

Metro Vancouver's Regional Economic Prosperity Service is the region's economic development service with the mission of collaborating to advance economic opportunity, more broadly shared prosperity, improved quality of life, and environmental sustainability for all the communities and residents in Canada's Pacific Gateway.

Collaborating with a cross-section of regional leaders from industry, First Nations, labour, government, non-profit organizations, and education, the Regional Economic Prosperity Service exists to foster greater regional collaboration on economic development issues of significance, to advise leaders on sound economic policy and strategy, to brand the region and its key industries to a global audience, and to attract strategic investment into the region.

A core component of the service's work is to undertake economic research and applied policy analysis to inform economic development decision-making that can attract strategic investment in the region. This technical paper is intended to advance informed economic development decision-making.

Message from the Chair



I am pleased to present the inaugural technical paper from Metro Vancouver's Regional Economic Prosperity Service, titled: *Preparing Metro Vancouver for the Digital Economy*.

This past year has truly been historic, and the disruptions wrought by the COVID-19 pandemic have revealed much. On the positive side, we learned that many of our systems are indeed resilient, that courage and compassion are endemic, and that bold changes are possible if we pull together.

However, the pandemic also exposed and exacerbated many divides, such as the uneven playing fields people experience in the health care and justice systems, in job and income security, and in feeling safe and respected.

The transition to an innovation-driven digital economy, where ideas and intellectual property are more valuable than physical assets, is already underway. At Metro Vancouver, we have always planned and prepared for the future and worked to ensure the resilience of our systems and essential services in the face of great change, both expected and unexpected. And now it is clear our commitment must go even deeper – to ensure the resilience of our economy, institutions and communities in the face of even faster changes.

Despite the challenges we have all faced, I am optimistic about our collective ability to navigate this transition and the opportunities that lie ahead, and I am confident that through our willingness to work together, we can build on our strong foundations and achieve a shared vision of a livable, prosperous, and sustainable region for all.

If we make the right moves today, play to our region's unique industrial strengths and remove systemic barriers to investment relative to other global regions, we can ensure our region is a key player in the 21st century global economy, for the benefit of all who are fortunate to call this region, "home."

Sav Dhaliwal,
Chair, Metro Vancouver Board of Directors

I. Executive Summary

The ongoing rapid transition to the digital economy, with its accompanying shifts and dislocations in the labour market, will require workers and governments alike to adapt to the changing demand for labour. The number of well-paid, full-time jobs is falling in production-based industries due to mechanization, automation, outsourcing, and the use of temporary and contract workers. Employment growth in extraction-based industries such as forestry and mining is constrained by environmental concerns and climate change. And while there will be many opportunities for firms to innovate and thrive in the digital economy, job seekers must overcome barriers to specialized education and training pathways, or risk being further left behind.

This paper lays out the challenges presented by the current transition to a digital economy and presents four economic development strategies to help the Metro Vancouver region meet them.

Digital Economy

The digital economy is driven by innovation. Increasingly, ideas and intellectual property are more valuable than physical assets. Digitization, automation, robotics, artificial intelligence (AI), and improvements to information technologies enable faster and more efficient processes, but also have large implications on the nature of work and allocation of labour.

To contend with the challenges and take advantage of the opportunities presented by the digital economy, the region's leaders should focus on the following four economic development strategies:

1. **Invest in our people**
   Reinforce a regional talent development structure that is more connected, industry-responsive, "future-proof", and adaptive to the rapidly changing labour market needs of industry

2. **Catalyze innovation**
   Develop the region's innovation capabilities to diversify and strengthen the productive advantages of established industries and to create entirely new ones that drive solutions to societal challenges

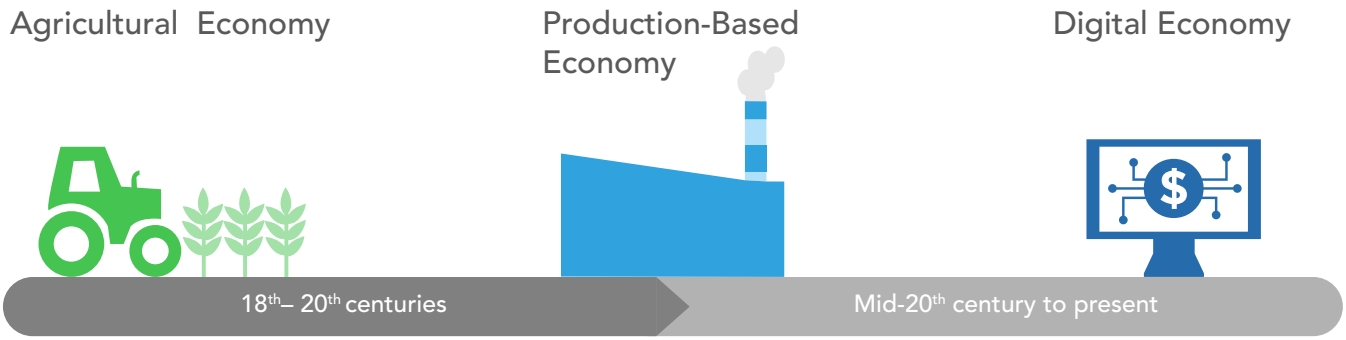
3. **Build capacity in our key industries**
   Align and deploy assets and fill gaps along the product / service value chains within our region's export-oriented industries

4. **Increase our global connectedness**
   Open up new markets for the region through trade facilitation, export assistance programs to increase the number of export-ready firms, and the attraction of foreign investment into the region within key industries

Prioritizing these areas will drive the region's economic recovery, further its resiliency, and power the region's next economic renaissance in a way that advances equitable opportunity and more broadly shared prosperity for all of Metro Vancouver's residents.

II. The Past: Transition from an Agricultural to a Production-Based Economy

The transition to a digital economy has been striking in its level of labour market disruption due to its speed, the rapid pace of skills transformation, and the high levels of potential job loss.



The transition from an agricultural economy to a production-centric one, which was driven by the introduction, adoption, and deployment of new time-saving equipment in both agriculture- and production-based industries, occurred over more than 250 years. Due to the long timeframe, growing production-oriented industries had time to reabsorb and redeploy the workers leaving the agricultural-based economy. This was due, in large part, to the low opportunity costs associated with this transition and the transferability of skills between field work and factory work. Specifically, the process of reabsorbing the excess supply of labour leaving farms was aided by the similar physical labour requirements between the two different economies during most of this transition. Additionally, the productivity gains achieved through new factory machinery and technology helped to grow the overall size of the production-based economy.

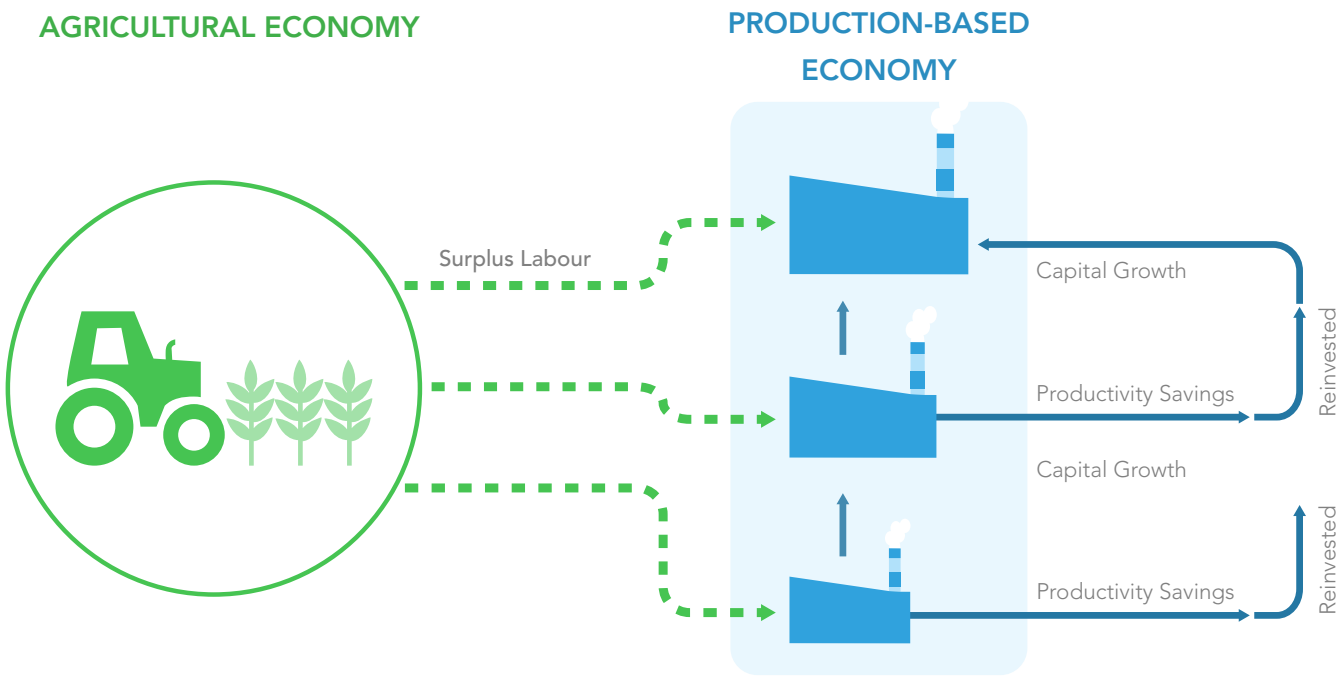
Efficient Reabsorption of Excess Labour due to:

Low opportunity costs: a worker could leave a farm and transition to employment on the floor of a factory, especially in commoditized / routine manufacturing where new skills or higher levels of education were not required.

Transferrable skills: the skills that were required for a worker in an agricultural-based economy adapted well to the production-oriented one.

Productivity gains: labour, on a unit basis, is much more productive in a manufacturing-based economy than in an agriculture-centric one. The rapid adoption and deployment of new machinery and technology (including within the agricultural sector) meant that efficiency gains could be reinvested, resulting in larger, more labour-dense, and concentrated manufacturing sectors that could accommodate more labour leaving the agricultural economy. (See Figure 1)

Figure 1: The Lewis Model of Economic Development[1]



1 The Lewis Model of Economic Development, the core of which is: the transfer of labour resources from the agricultural sector, where the work is menial and routine without sophisticated technology and where there is much labour that is underemployed, to the more modern industrial sector, where labour that can be deployed more productively without large wage increases will create a surplus (i.e. profits) that may be used for further growth and development, such as building more factories and expanding businesses.

III. Transition from a Production-Based to a Digital Economy

Unlike the 250-year transition from an agricultural economy to the industrialized one, the transition to the digital economy has occurred in fewer than 50 years. In a production-based economy, labour was the driving force of value creation. In today's digital economy, intellectual property, technology, capital, and knowledge are driving value creation and capture. Two important factors that allowed for labour to be efficiently absorbed and deployed during the previous transition: low opportunity costs and transferrable skills, are not present in the transition to the digital economy. In addition, the excess of labour leaving the production-based economy exceeds the amount of labour needed in the digital economy.

Percentage of workers at a high risk of seeing their jobs transformed through automation in Canada[2]:

- **11%** of all Canadian workers
- **33%** of workers without a certificate, degree, or diploma
- **27%** of workers in the bottom decile of income distribution
- **27%** of workers in manufacturing

2 Frenette, Marc, and Kristyn Frank. 2020. The Demographics of Automation in Canada: Who Is at Risk? IRPP Study 77. Montreal: Institute for Research on Public Policy. Retrieved from https://irpp.org/wp-content/uploads/2020/06/The-Demographics-of-Automation-in-Canada-Who-Is-at-Risk.pdf

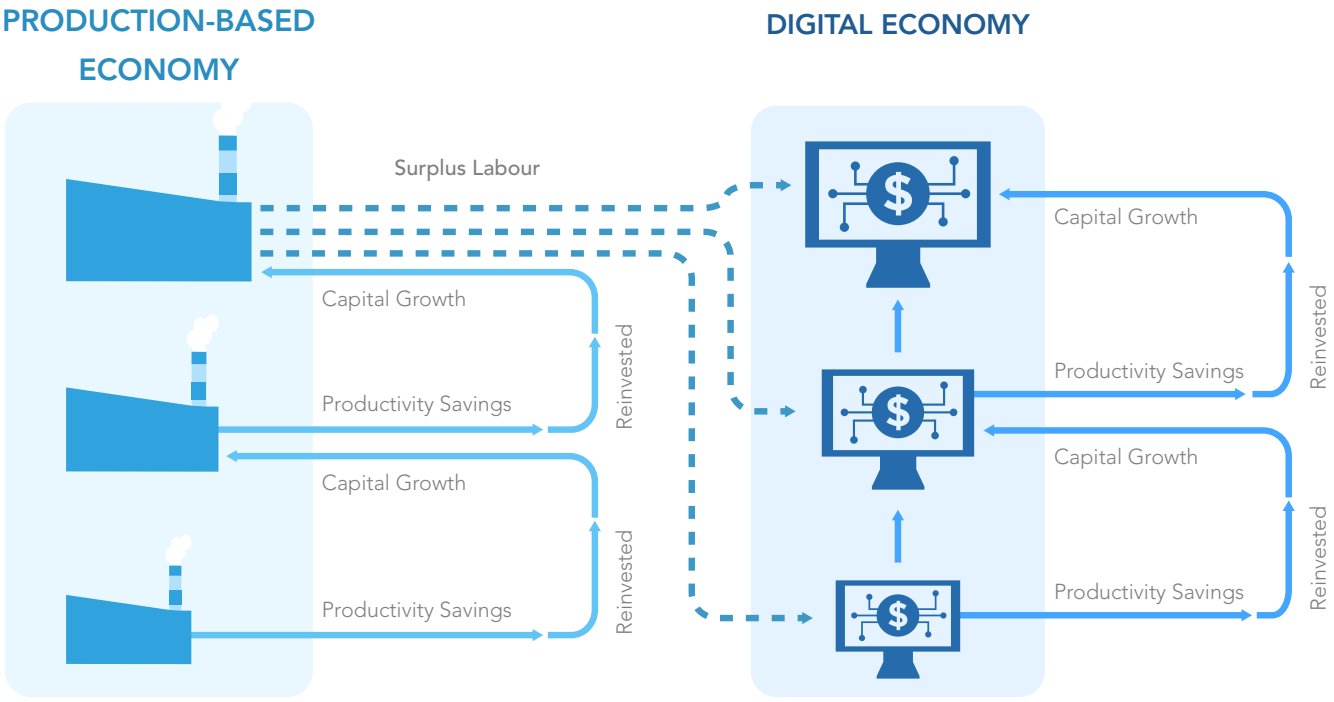
Difficult to Reabsorb Labour due to:

Lower demand: the digital economy is not labour-intensive, and due to rapid efficiency gains and other factors, the quantity of workers needed today is far lower than the production-based economy.

High opportunity cost: large investments are required to upskill, better educate, and retrain workers to enter the digital economy.

Skills not transferrable: the skills and competencies that were required for success in the production-based economy do not easily translate to the innovation-intensive industries of the digital age.

Figure 2: Extension of the Lewis Model of Economic Development



As the economy shifts, policy makers should focus on growing the region's competitive advanced industries, as opposed to putting in place policies meant solely to protect contracting sectors of the economy. By not also focusing on growing and preparing more residents for the economy of the future, the negative social and economic impacts of this transition will be amplified.

Negative Social and Economic Impacts:

Underemployment, precarious work, and the "gig" economy: the changing nature of work has given rise to precarious employment that lacks the benefits and protections available to previous generations.[3]

Employment growth concentrated in low-wage service-sector positions: some of the fastest growing occupational categories pre-pandemic in the Metro Vancouver region have been occupations such as restaurant servers, retail salespeople, cashiers, healthcare aides, and food preparation.[4] These occupations provide limited opportunity for advancement and are at a greater risk of automation.

Growth does not equal prosperity: headline economic measures, such as unemployment rates and gross domestic product (GDP), do not tell the full story in terms of the growing numbers of underemployed, working poor, and contract workers barely getting by during the "full employment" economy that preceded the global pandemic. This has been recognized by initiatives such as the Community Well-Being Index.[5]

Despite the rising growth rates seen in the economy over the last 50 years, many workers have fallen further behind as productive gains have been achieved through the rapid and mass adoption of new technologies at the expense of labour.

More people are becoming disconnected from traditional pathways into the middle class.

Prior to the COVID-19 pandemic:

- **13% of British Columbians were employed on a contract or temporary basis**, making on average $6/hour less than a permanent employee.[6]
- **8.2% of Canadians were participants in the unstable "gig economy".**[7]

Both of these numbers are likely to rise.

3 Statistics Canada (2019). Temporary Employment in Canada, 2018. Catalogue no. 11-627-M. Ottawa, ON: Statistics Canada. Retrieved from https://www150.statcan.gc.ca/n1/pub/11-627-m/11-627-m2019034-eng.htm#moreinfo

4 British Columbia WorkBC (2019). British Columbia Labour Market Outlook: 2019 Edition. Victoria, BC: British Columbia WorkBC. Retried from https://www.workbc.ca/getmedia/18214b5d-b338-4bbd-80bf-b04e48a11386/BC_Labour_Market_Outlook_2019.pdf.aspx

5 Indigenous Services Canada (2019). Community Wellbeing Index. [Website]. Retrieved from https://www.sac-isc.gc.ca/eng/1100100016579/1557319653695

6 Statistics Canada (2019). Measuring the Gig Economy in Canada Using Administrative Data, 2019. Catalogue no. 11F0019M. Ottawa, ON: Statistics Canada. Retrieved from https://www150.statcan.gc.ca/n1/pub/11f0019m/11f0019m2019025-eng.htm#moreinfo

7 Statistics Canada (2019). Temporary Employment in Canada, 2018. Catalogue no. 11-627-M. Ottawa, ON: Statistics Canada. Retrieved from https://www150.statcan.gc.ca/n1/pub/11-627-m/11-627-m2019034-eng.htm#moreinfo

" **At YVR, innovation is central to who we are and how we operate.** For many years, we have taken steps to adapt to the shift toward a digital economy. As we move through the pandemic, this shift is accelerating and we see a real opportunity for YVR to lead the exchange of learning and ideas that will drive B.C.'s economic recovery. This is our role as the Gateway to the New Economy. Operating our airport and safely moving people, planes and goods will remain at our core. At the same time, we are broadening our focus to also advance innovation, support the region and set the bar for sustainability, both in and outside of aviation. We are excited about the potential for partnership and collaboration and ensuring B.C. is ready to thrive in the future."

— Tamara Vrooman, President and CEO at the Vancouver Airport Authority



IV. Strategic Economic Development Priorities for the Region

To contend with the challenges and take advantage of the opportunities presented by the digital economy, the region's public, private, economic development, education, non-profit, labour, and philanthropic leaders should focus on the following four economic development strategies:

1. Invest in our people
2. Catalyze innovation
3. Build capacity in our key industries
4. Increase our global connectedness



Image Credit: Scott McAlpine/BCIT

1. Invest in Our People

Prepare the region's workforce for the digital economy

In a digital economy, specialized training and educational attainment are critical to economic success. The fastest growing sectors within the advanced economy are technology-centric, knowledge-based industries. This include sectors such as enterprise software, internet technology, biopharmaceuticals, clean technology, and digital media. These sectors offer well-paying jobs and career ladders, but require highly specialized education at all levels along the product / service value chain, from skilled machinists, to technicians, to engineers and scientists.

In order for the Metro Vancouver region to produce the right type of labour for the advanced digital economy, the region needs to ensure talent development systems are re-configured and linked across all educational systems, from kindergarten through high school to adult schools, technical colleges, and universities. In addition to ensuring that necessary programs are increasing their capacity, the system needs to be more industry-responsive, demand driven, future-forward, and equity-centred, providing greater opportunity for those that have faced historic barriers to participation, such as the region's Indigenous communities.

A regional education and talent development system for the digital age must be:

1. **Adaptive and responsive** to industry and fast-changing labour market needs in real-time, with industry representatives "at the table" in the development of stackable industry-recognized certificates, short-term talent development programs, and longer-term curricula to train students, job seekers, incumbent workers, and dislocated workers for occupations at low-risk of automation and in high demand by the industries of tomorrow
2. **Demand-driven** and linked between all talent development systems and institutions to provide education and talent development pathways and quick "pain point" identification to ensure training and educational advancement
3. **"Future-proof"** in preparing job seekers, incumbent workers, students, and dislocated workers for jobs that are at low-risk of redundancy and in high-demand by the industries that represent the drivers of tomorrow's economy
4. **Equity-centred**, focused on removing barriers to education for equity-denied groups and Indigenous communities, and developing comprehensive skills transfer programs for newly-arrived immigrants with professional licences in their former countries

> " **People are the key to unlocking our region's innovation potential**. An education system that is dynamic, undertaking cutting-edge research and engaging with industries, governments, and communities, is essential for creating a more prosperous society."
>
> — Joanne Curry, Vice President, External Relations, Simon Fraser University

2. Catalyze Innovation

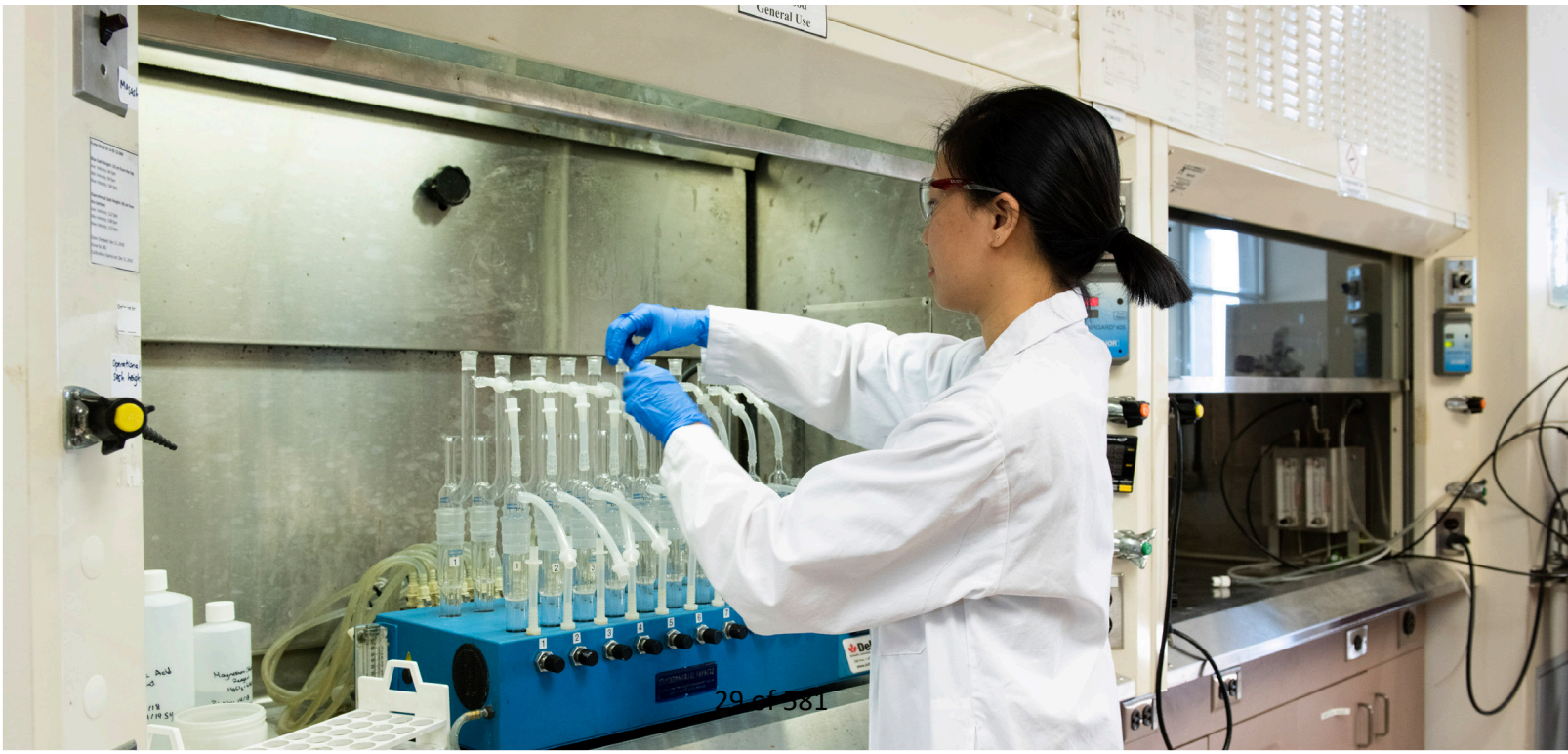
Through entrepreneurship, innovation and technological development, accelerate the region's development and commercialization of solutions for the world's great global challenges

Innovation will be vitally important for meeting the current economic, environmental, health, and social challenges facing the region and globe. Traditional 20th century economic development strategies tend to focus on the attraction of outside industries through incentives or other tactics to lure single businesses or companies to a region. Economic development for the digital age, however, must focus more on growth drivers, such as entrepreneurship, innovation, and technology development from within. Reframing the region's strategic economic development approach to prioritize innovation and entrepreneurship will boost the productive advantages of established and emerging industries while also creating entirely new industries, especially as the region addresses some of its strengths and weaknesses in a post-pandemic economy.

Productive Advantage

Many factors can contribute to a region's productive advantages in an industry, such as:

- Firm and employment concentrations
- Supplier specializations
- Research and development expertise
- Knowledge spillovers
- Deep pools of skilled labour
- Education and skills training
- Competitive cost environment
- Industry incentives
- Access to international markets



Metro Vancouver's innovation landscape benefits from three key features:

1. **The diversity and multidisciplinary nature of its established and emerging industrial base**

   Metro Vancouver is not dominated by a single industry. Instead, innovation is driven by its established industries, such as transportation and film production, as well as fast-emerging sectors in digital media, clean technology, and advanced transportation, and the connections and convergence between these industries.

2. **Leading research universities**

   The region's research universities are global leaders in applied and translational research, aiming to solve societal, environmental, health, industrial, and economic challenges through applied science, technology transfer, and the propagation of entrepreneurship.

3. **Regional commitment to address global challenges**

   The region is committed to addressing major global challenges locally, such as climate change, water and food security, and health pandemics. This commitment to research, develop, and commercialize solutions to these global challenges has the potential to become a significant driver of economic development in the region, positioning an increasing number of Metro Vancouver-based firms and institutions to become some of the world's leading exporters of these solutions.

By levering these regional differentiating features, the Metro Vancouver region can ensure that it is not simply consuming the products and services designed to solve these global challenges. Instead, the region can become a leading researcher, engineer, manufacturer, and exporter of these solutions. The starting point is investment in applied and translational research and talent, and the capitalization and commercialization of that research and innovation.

Catalyzing Innovation at Canada's Digital Technology Supercluster

The Digital Technology Supercluster, based in B.C., is proud to accelerate innovation to solve some of industry and society's biggest problems and help Canadian companies build job-ready, world-class, digital talent and teams.

The Supercluster does this by co-investing in Canadian-made technologies and rapid skilling systems. Along with funding, they bring together private and public sector organizations of all sizes to address challenges facing Canada's economic sectors including healthcare, natural resources, manufacturing, and other important industries.

> "**Through a collaborative innovation approach**, the Supercluster helps to drive solutions better than any single organization could on its own."
>
> — Gina Arsens, CFO, Digital Technology Supercluster

3. Build Capacity in Our Key Industries

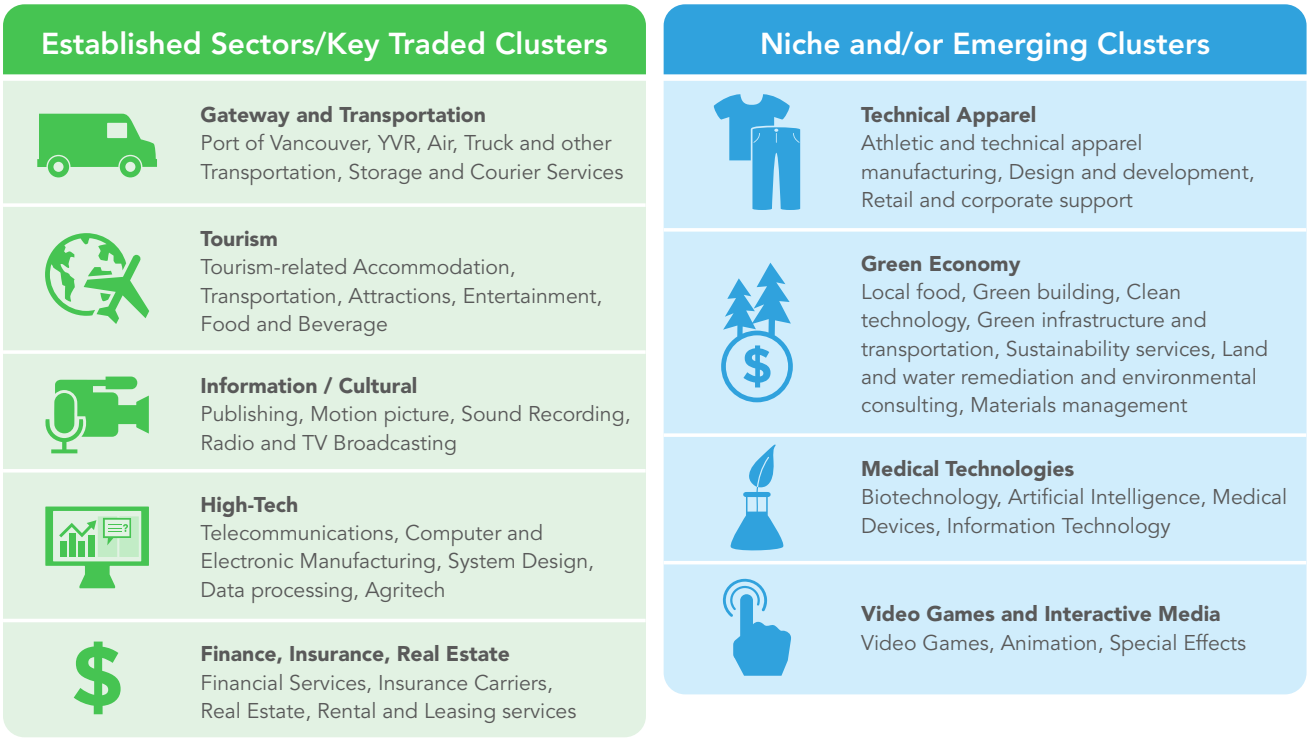
Play to the region's established and emerging industrial strengths as an economic development differentiator, in a globally competitive, digital economy

As the transition to the digital economy will outpace our ability to retrain and reabsorb workers, the region must prioritize strategies to build labour demand capacity within key industries in the region. Target industries should include those in which the region demonstrates productive advantages over other economic regions, such as deep talent pools, supplier concentration and specialization, research and development expertise, and knowledge spillovers. Nine industry clusters have been identified as established and emerging industries that should be targeted here in the Metro Vancouver region (Figure 3).

These industry clusters have the following features, which make them important industrial targets on which to focus the region's capacity-building strategies and activities:

- **High concentrations of interconnected businesses** producing a reinforcing cycle of job creation and wage growth, accelerating innovation and complementary linkages among industry members, and increasing the productivity of firms, suppliers, and workers
- **Export-oriented**, selling goods and services outside as well as within the region
- **Drive the local service economy** triggering ripple effects, in the form of job, wage, and tax revenue growth, which are felt by more locally-serving businesses, workers, and communities

Figure 3: Metro Vancouver Established Sectors and Niche and/or Emerging Clusters (Deloitte, Metro Vancouver SWOT and Scenario Analysis, dated: October 2020)



In order to maximize the clustering benefits of these industries, an "idea" to "export" capacity building approach must be adopted (Figure 4). This involves assessing the entire product or service value chains associated with the region's key industries, from research, to design, to create, to build, to market, to export. Based on that assessment, economic development-related assets or inputs, such as physical spaces, talent, education institutions, capital, networking organizations, and research and development, can be better aligned and deployed to strengthen and grow these key industry clusters. Importantly, the region must also implement strategies to fill any gaps along the value chain, such as limited access to capital or the lack of industrial space.

Finally, the region's leaders must institute strategies to reduce barriers to entry to these key sectors to enable a more diverse and inclusive workforce. Providing better pathways into these industries for people in under-represented groups must be a top priority as the region looks to ensure greater access to the rewards of this digital economy and its emerging industries. This will help build more ethnic, cultural, gender, and racial diversity within these industries and advance more inclusive and shared prosperity across the Metro Vancouver region going forward.

FIGURE 4: "IDEA" TO "EXPORT" VALUE CHAIN:



" The resilience of our economy depends, in part, on understanding the determinants of competitive success in an era of accelerating technological change. **A forward-looking economy must take advantage of opportunities afforded by emerging technologies, particularly in the export-oriented industries that do so much to underpin regional prosperity**."

— Jock Finlayson, Senior Policy Advisor, Business Council of British Columbia

4. Increase Our Global Connectedness

Build global connections to open up new markets and attract more investment into the region

Metro Vancouver's economy is highly reliant on its interactions with the global economy. Exports from the region, and foreign investments made into the region, drive business and job creation, along with generating tax revenues. Transactions such as tourists reserving hotels, international students studying at universities, businesses moving goods through Metro Vancouver's ports, and international firms opening North American headquarters in the region increase productivity, create jobs, and foster wage growth. These global connections need to be further developed as a key differentiator and lure for investment into Metro Vancouver going forward, strengthening the region's reputation as an attractive and safe market for international investors.

The region can increase its global connectedness through a targeted branding strategy to enhance the attractiveness, profile, and reputation of the region on a global stage.

Increase Global Connectedness:

1. **Market the region** as a place for businesses to succeed, capital to be invested, and skilled talent to be found in target industries
2. **Facilitate deeper trade relations** to open up new foreign markets for key industries
3. **Focus on export assistance** and "readiness" strategies, programs, and services to increase the number of export-ready firms
4. **Collaborate to attract foreign direct investment** in target industries

In a connected global economy, organizations have a wide variety of choices on where to invest. By investing in our people, catalyzing our innovation capacities, building capacity in our key industries, and increasing our global connectedness the Metro Vancouver region will be better positioned to attract foreign capital and investment into the region, targeted into our key industries. In turn, this foreign investment will produce ripple effects in our economy.

Diversity is our strength

In addition to the global connectedness of the region, Metro Vancouver is recognized for its diversity and multiculturalism. According to the 2016 census:

- 48% of the region's population is made up of immigrants
- 50% speak a language other than French or English[8]

8 Statistics Canada (2017). Focus on Geography Series, 2016 Census. Catalogue no. 98-404-X2016001. Ottawa, Ontario. Data products, 2016 Census. Retrieved from https://www12.statcan.gc.ca/census-recensement/2016/as-sa/fogs-spg/Facts-cma-eng.cfm?LANG=Eng&GK=CMA&GC=933&TOPIC=7#sec-geo-dq

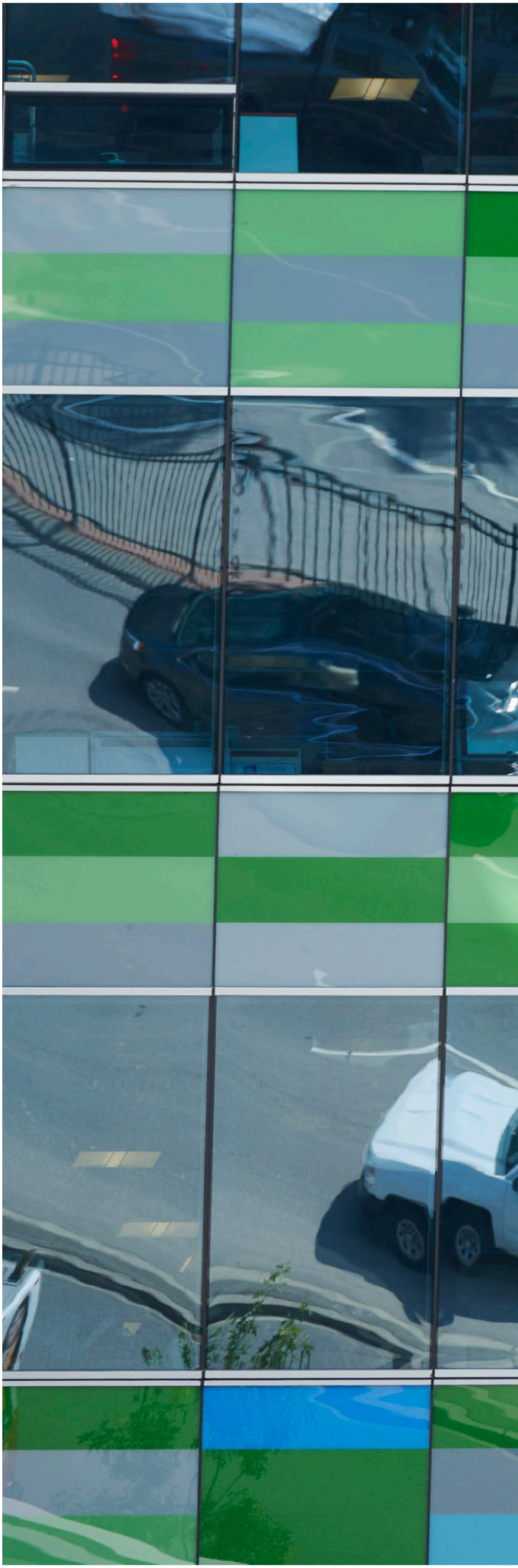
" **As we work to create more capacity to accommodate growth in trade, the digital programs we have in place aim to increase visibility and operating efficiencies across the supply chain.** Programs like these increase the region's reputation of having a reliable and efficient supply chain while attracting investment and connecting Canadian businesses to global markets, which is critical for the long-term economic viability of this gateway and of Canada."

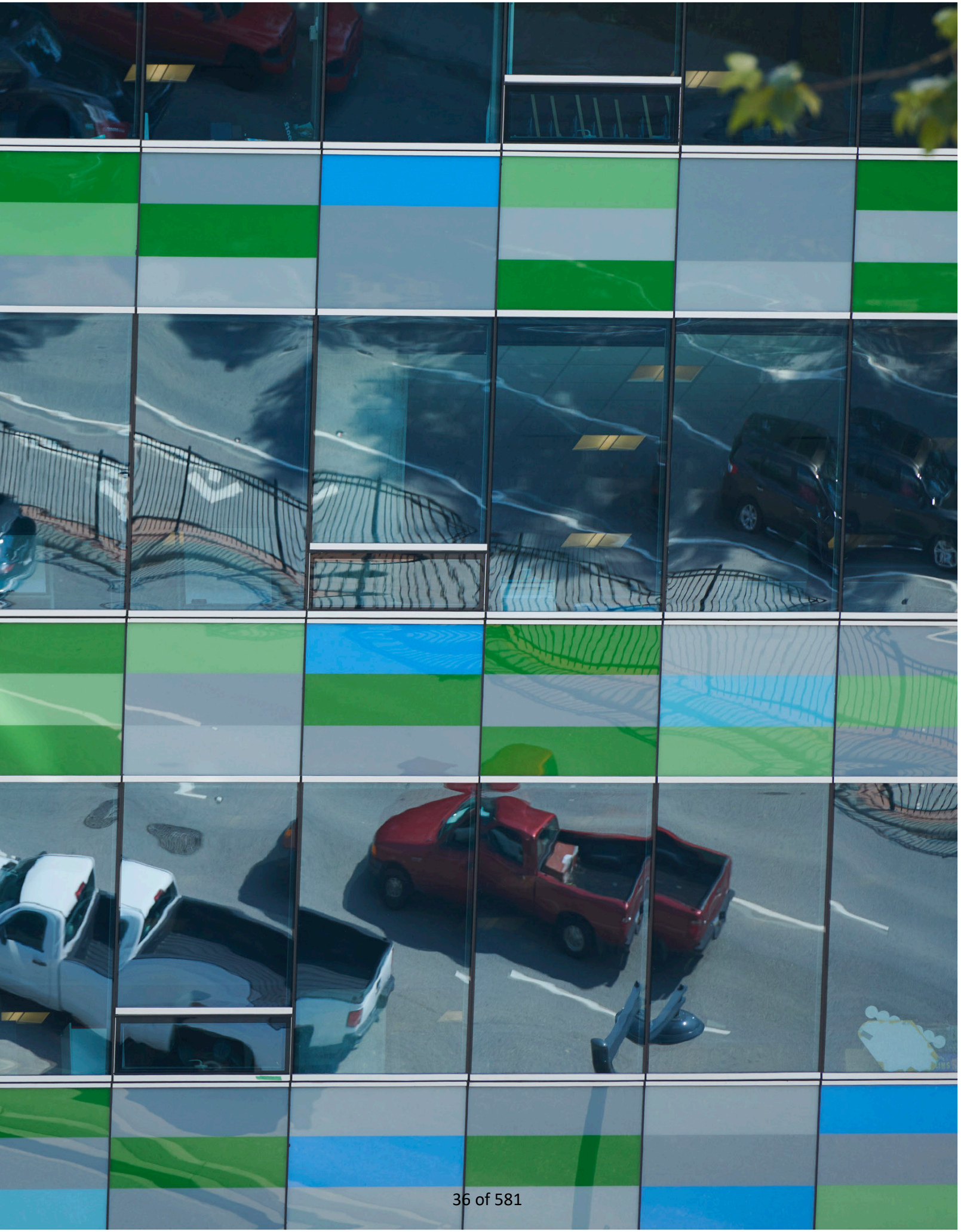
— Robin Silvester, President and Chief Executive Officer, Vancouver Fraser Port Authority



V. Conclusion

The rapid pace of the transition to a digital economy presents many global challenges, but also opportunities for the Metro Vancouver region. As the region contends with the economic impacts of the COVID-19 pandemic, public, private, economic development, education, non-profit, labour, and philanthropic leaders must re-think their approaches to economic development. By retooling our systems and processes for the digital age, Metro Vancouver can seize the opportunity presented by the transitioning economy and build more inclusive and shared prosperity for all residents.






metrovancouver
SERVICES AND SOLUTIONS FOR A LIVABLE REGION

To: Regional Economic Prosperity Management Board

From: Gregory Freeman, Senior Economist, Regional Economic Prosperity Service

Date: May 5, 2021 Meeting Date: May 26, 2021

Subject: **REPS Industry Cluster Selection Criteria**

RECOMMENDATION

That the MVRD Board receive for information the report dated May 5, 2021, titled "REPS Industry Cluster Selection Criteria".

EXECUTIVE SUMMARY

Metro Vancouver's Regional Economic Prosperity Service (REPS), as a regional service, will be most successful by fostering collaboration around and focusing its strategic investment attraction activities on a set of industry clusters of related companies, organizations, and institutions, which are concentrated in the Metro Vancouver region, that, taken together, raise overall productivity and operational efficiency, catalyze and accelerate innovation, and stimulate new business formation.

This report sets out the evaluation criteria for the industry clusters on which REPS will focus: growing, export-oriented industries in which the Metro Vancouver region has established or emerging competitive advantages, that create desirable jobs, and which do not conflict with other Metro Vancouver priorities. Based on these criteria, building on work prepared for REPS by Deloitte, and informed by exemplary work by established economic development organizations, REPS will initially focus on the following clusters:

- Trade and Transportation
- Digital Media and Entertainment
- Green Economy
- High-tech Manufacturing, Telecoms, and Software
- Life Sciences
- Apparel
- Agritech

PURPOSE

To establish evaluation criteria for identifying the industry clusters that will be the initial focus of the Metro Vancouver Regional Economic Prosperity Service.

BACKGROUND

As part of the establishment of REPS, Metro Vancouver commissioned Deloitte to prepare the *Metro Vancouver SWOT and Scenario Analysis* (October 2020). The report identifies five established/key traded clusters (Gateway & Transportation; Tourism; Information and Culture; High-Tech Industries; and Finance, Insurance, and Real Estate) plus four emerging clusters (Technical Apparel, Green Economy, Medical Technologies, and Video Games & Digital Media) in Metro Vancouver. These clusters are a useful starting point, but have some important limitations.

For example, the "Information and Culture" industry cluster definition is based North American Industry Classification System (NAICS) code 51, which groups together: publishers (print); publishers (software); motion picture & video industries; sound recording industries; radio & television broadcasting; cable & other programming; wired & wireless & other telecommunications carriers; satellite communications; other communications; data processing, hosting, and related services; and other information services. Video games and digital media, identified as a separate cluster, are a subset of this definition. This amalgamated industry definition is useful for accessing government statistics that are reported by industry, but is not as helpful for focused economic development and investment attraction work, where one might usefully distinguish between the film industry and (most of) the software industry.

INDUSTRY CLUSTER SELECTION CRITERIA

REPS seeks to attract, develop, and support growing, export-oriented industries in which the Metro Vancouver region has a strategic or productive advantage (i.e. labor market pooling, supplier specializations, research and development expertise, etcetera); where the industry supports quality jobs; and where there is an opportunity for timely [economic development-related] intervention that can make a meaningful difference.

- **Growing** REPS is looking for growing industries: industries that are either already growing or could grow given the right catalyst. An expanding industry is important because it creates the opportunity to add to the total number of firms generating direct and value-added economic activity and jobs in the region, rather than substituting new entrants for existing ones.
- **Export-oriented** REPS works with export-oriented industries, rather than population-serving ones. Most of the Metro Vancouver economy is comprised of population-serving industries, such as construction and the majority of the finance, insurance and real estate sector. These sectors do not require an economic development strategy – the competition to supply groceries or haircuts is local, not global – and these industries will thrive (or not) with the rest of the regional economy. The selected industries must be global in two senses. First, they can operate and theoretically sell products or services from "anywhere": the firms in the industry serving a particular market need not be located there. Second, their potential market is international. The global nature of these industries brings both opportunities and exposure to fierce competition.
- **Competitive advantages** REPS seeks industries where the Metro Vancouver region has existing or emerging competitive advantages. Whether it is institutions, industrial specialization, research competencies, infrastructure, favorable government policy or incentives, talent, or something else, there is some combination of conditions that favors the development of the industry in the Metro Vancouver region rather than somewhere else. This is particularly important since regions around the world are vying to attract the most desirable industries and individual firms often have flexibility in their location decisions.
- **Quality jobs** The selected industries should create high-quality jobs in support of the goal of sustained and more inclusive regional prosperity. Globally competitive industries often (though not always) require a skilled and therefore well-compensated workforce to be competitive. When firms and individuals in these industries purchase goods and services from other firms in the region, the multiplier effect adds to the regional economy.

- **Move the needle** REPS is looking for opportunities where action – whether in the form of regional collaboration, a change in economic policy or strategy, or some other discrete action – can move the needle with respect to the chances of an industry thriving in Metro Vancouver.
- **Timely** The REPS industry selection is also influenced by timeliness, both in the sense of global economic trends and serendipity. REPS is looking for industries that benefit from economic tailwinds such those focused on the transition to a low carbon economy, while remaining open to exciting business attraction opportunities that may crop up from time to time.
- **Avoid** REPS will not consider industries that, if expanded here, would make it harder to meet key policy objectives such as Metro's Climate 2050 and Clean Air Plan goals. REPS will also not consider industries that carry reputational risk nor those in which the region has no clearly identifiable competitive advantages.

Finally, the selected industries need to be grouped in logical clusters consistent with REPS mission to promote the region and its key industries to a global audience. As such the groups and naming conventions need to be broadly similar to those used in other regions and it should be readily apparent to non-specialists what type of firms are included in the group.

Evaluation Process
The evaluation started with the key industry clusters identified as established or emerging in the Deloitte report. For each cluster defined by a 2-digit NAICS code, it was determined whether the sectors collected therein individually met the selection criteria, and where they did, considered whether economic development efforts would be better served by keeping those sectors together, or grouping them together in a different set of clusters. Separate consideration was also given to the various components of clusters defined using 4-digit NAICS codes.

Next, the common treatment of industries and definition of industry clusters by other organizations was considered, including:

- Business Council of British Columbia
- Conference Board of Canada
- Greater Vancouver Board of Trade and World Trade Centre of Vancouver
- Vancouver Economic Commission

Based on this review and the selection criteria, an initial industry cluster list for REPS has been established.

SELECTED (INITIAL) INDUSTRY CLUSTERS

International Trade and Transportation
Key Components: port, airport, rail, logistics, warehousing

Digital Media and Entertainment
Key Components: film (motion picture and video production), video games, digital media

Green Economy
Key Components: green buildings (design, manufacturing, installation and services related to low-carbon buildings) and clean transportation (low & zero emission vehicles and components; renewable & low carbon fuels and charging infrastructure; transferable technologies and services)

Hi-tech Manufacturing, Telecoms, and Software
Key Components: hi-tech equipment manufacturing, software, computer programming services, wired & wireless & other telecommunications, data processing & related services & other info services

Life Sciences
Key Components: research, testing and medical labs; medical devices and equipment; drugs and pharmaceuticals

Apparel
Key Components: technical apparel and "athleisure"

Agritech
Key Components: manufacturing, software, systems for agriculture including vertical agriculture, and cellular agriculture

Part of the REPS mandate is to conduct economic research relevant to the promotion of the selected industry clusters. Based on ongoing findings, and in conjunction with the industry selection criteria, the selected REPS industry cluster composition may shift, and industries (or even entire clusters) may be added or dropped when warranted.

FINANCIAL IMPLICATIONS
There are no financial implications associated with the report.

ALTERNATIVES
This is an information report. No alternatives are presented.

CONCLUSION
REPS will focus on growing, export-oriented industries in which the Metro Vancouver region has established or emerging competitive advantages, that create desirable jobs, and which do not conflict with other Metro Vancouver priorities. Initially, REPS will pursue the following industry clusters: Trade and Transportation; Digital Media and Entertainment; Green Economy; High-tech Manufacturing, Telecoms, and Software; Life Sciences; Apparel; and Agritech.

REFERENCES
1. Metro Vancouver SWOT and Scenario Analysis (October 2020)

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To: Regional Economic Prosperity Management Board

From: Gregory Freeman, Senior Economist, Regional Economic Prosperity Service
Megan Gerryts, Senior Advisor, Regional Economic Prosperity Service

Date: May 7, 2021 Meeting Date: May 26, 2021

Subject: **Clean Transportation Sector Profile**

RECOMMENDATION

That the MVRD Board receive for information the report dated May 7, 2021, titled "Clean Transportation Sector Profile".

EXECUTIVE SUMMARY

The clean transportation sector presents an immense opportunity for the Metro Vancouver region as the world seeks solutions to the climate emergency. Driven by the specialization in hydrogen and fuel cell technology, this sector includes low and zero emission vehicles and components, renewable and low carbon fuels and charging infrastructure, and transferable systems and technologies. Supported by a strong innovation ecosystem and benefiting from the larger green economy industry cluster, the clean transportation sector would benefit from regional efforts to strengthen local competitive advantages, to fill any gaps along the clean transportation industry value chain, and to attract additional investment. The next step of this initiative is to undertake a gap analysis of the sector to understand how to strengthen the industry to be more globally competitive.

PURPOSE

To present a profile of the clean transportation sector in the region for information to the Regional Economic Prosperity Service Management Board.

BACKGROUND

One of the key functions of the Regional Economic Prosperity Service (REPS) is to conduct regional data collection and research, in particular where that research can target and drive strategic investment in the region and maximize the economic impacts of that investment. The clean transportation sector has been identified as an area of focus for REPS, as part of the "green economy" industrial cluster. The overall industry cluster is growing, export-oriented, provides quality jobs, and benefits from economic tailwinds due to the transition to a low-carbon economy in response to the global climate emergency. Most importantly, the region has productive advantages in the intensely competitive global clean transportation sector.

Attachment 1 to this report presents for the Management Board's information a profile of the clean transportation sector in the Metro Vancouver region. Attachment 2 provides a regional map profiling the various firms operating in this space.

CLEAN TRANSPORTATION SECTOR

Metro Vancouver's clean transportation sector features both emerging and mature clean transportation firms. The clean transportation sector consists of the following areas:

- **Low- and Zero-Emission Vehicles and Components,** including low and zero emission light-, medium- and heavy-duty vehicles, rail and low-carbon marine transport
- **Renewable and Low Carbon Fuels and Charging Infrastructure,** including hydrogen fuel cells, battery storage, and other renewable fuels
- **Transferable Technologies and Services,** including improvements to transportation systems through vehicle automation, intelligent grid interface, smart grid technologies and intelligent transportation systems technology

The Metro Vancouver region has several differentiators in the clean transportation sector, which make this sector a promising area for future investment.

In-region Specialization: The Metro Vancouver region has demonstrated specialization in Hydrogen and fuel cell technology, pioneering new technologies in this export-driven market.

Innovation Ecosystem: Startup accelerators, incubators, world-leading research universities and government investment in innovation create a promising landscape that supports this sector.

Green Economy Cluster Benefits: The clean transportation sector is a part of the larger green economy cluster in the region, which confers additional advantages such as:

- Accessing workers in transferrable occupations;
- Promoting cross-sector industry linkages; and,
- Facilitating access to investment opportunities.

Government Investments: The provincial and federal governments have committed to a host of investments in clean transportation from zero-emission buses, to charging infrastructure, to the development and commercialization of clean technology.

MOVING FROM LOCAL DEMAND TO GLOBAL COMPETITIVENESS

The Metro Vancouver region is collectively moving to de-carbonize transportation. The region benefits from all orders of government pursuing reductions in emissions from transportation. Emissions targets and zero emission vehicle (ZEV) mandates help create a local clean transportation consumer market, but are not sufficient to attract and grow an export-oriented industrial base locally. Clean transportation technologies, products, and services can be provided from almost anywhere globally, and many regions are vying to host firms in this industry.

While global competition makes it more challenging to develop and sustain a thriving clean transportation sector, the export-oriented nature of the industry means that increasing global competitiveness can increase market share and drive industry growth, creating high-wage jobs and regional prosperity. The entire region benefits from firms selling products and services world-wide and bringing revenue back and recycling it locally.

Next Steps
The next phase of REPS work in clean transportation will be to undertake a gap analysis of the sector. Knowing Metro Vancouver's regional strengths and weaknesses in clean transportation provides a baseline to build regional economic development strategies to further strengthen and grow the globally-facing segments of this industry.

The gap analysis will consist of convening focus groups and interviews to better understand the needs, challenges, and frustrations of entrepreneurs, investors, and firms operating the sector. The goal is to identify regional strengths and weaknesses, and to generate actionable recommendations for improving the desirability of the Metro Vancouver region as a place for firms to flourish while serving global markets.

ALTERNATIVES
This is an information report. No alternatives are presented.

FINANCIAL IMPLICATIONS
There are no financial implications associated with this report.

CONCLUSION
One of the key functions of the REPS is to conduct regional data collection and research, in particular where that research can drive strategic investment in the region. The clean transportation sector represents an area of opportunity for the region. Building on the region's strengths, there is an opportunity to strengthen this industry cluster's growth in the region and attract investment into this important sector. Attachment 1 to this report presents for the Management Board's information a profile of the clean transportation sector in the Metro Vancouver region. Attachment 2 provides a regional map profiling the various firms operating in this space.

Attachments
1. Clean Transportation Sector Profile
2. Map of the Clean Transportation Sector in the Metro Vancouver Region

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Leading the Way in Clean Transportation

Prepared by the Metro Vancouver Regional Economic Prosperity Service, May 2021

Why Metro Vancouver?

Metro Vancouver is home to a vibrant network of emerging and mature clean transportation companies, with a particular specialization in hydrogen and fuel cell technology. The sector is supported by world-leading research universities, specialized academic programs, start-up accelerators, and incubators. Progressive local, regional and provincial greenhouse gas reduction policies and funding initiatives at the provincial and federal levels demonstrate an encouraging climate for the clean transportation industry. Furthermore, a receptive public has enthusiastically embraced zero-carbon transportation.

Metro Vancouver organizations are driving change in clean transportation across many specializations.

Specialization	Examples of Organizations in Metro Vancouver
Low- & Zero-Emission Vehicles and Components	Advanced Intelligence Systems, Corvus Energy, Electra Meccanica, FVT Research, Green Light, GreenPower Motor Company, Greenwit Technologies, Grin Technologies, OHM Cycles, Veemo
Renewable & Low Carbon Fuels and Charging Infrastructure	AVL Fuel Cell Canada, Ballard Power Systems, CSA Group, Delta, Q Technologies, E-One Moli Energy, Greenlight Innovation, Ionomr Innovations, Loop Energy, Mercedes-Benz Canada Fuel Cell Division, Molicel, nanoOne, PowerTech Labs, SMPC Technologies Ltd., Hydra, Hydrogen in Motion, Hydrogen Technology and Energy Corporation, Invinity Energy Systems, Parkland Refinery, Westport Fuel Systems
Transferable Technologies and Services	Alpha Technologies, Corinex, IRDI System, Plugzio, Pulse.eco, ReCharged, SandVault, SmartCity ITS, Uplight,

The Clean Energy Vehicle Sector Assessment completed for the BC Government in 2016 found this sector generates ***over $702 million in total direct economic activity*** across the province.

LOW-CARBON INNOVATION ECOSYSTEM:

Metro Vancouver benefits from a rich ecosystem of startup accelerators and incubators, world-leading research universities, and government investment in innovation. From accelerators to clean energy research centres, Metro Vancouver is aggressively advancing technological solutions to meet ambitious greenhouse gas emission reduction goals.

30+ startup accelerators and incubators Including cleantech accelerators such as **Creative Destruction Lab**, **Foresight CAC**, and **SFU VentureLabs**

Specialized academic & training programs include **UBC Clean Energy Research Centre**, **BCIT Centre for Energy Systems Applications**, **SFU School of Sustainable Energy,** and **BCIT EV Maintenance Training Program**.

Industry Associations & Collaborations such as **BC Hydrogen Fuel Cell Association**, **Vancouver Marine Centre for Climate**, **BC Cleantech**, and **Project Greenlight**

Regional Strengths: Hydrogen & Fuel Cell Technology; Data Analytics & Optimization; Robotics & Unmanned Aerial Vehicles; Low Carbon Fuels

Our regional strengths are fertile ground for a growing cleantech industry.

Metro Vancouver's value proposition for investors:

- High quality of life
- Port of Vancouver and YVR Airport provide global gateways
- World-class talent
- Competitive cost of doing business
- Resilient civil society
- Connectivity within the Cascadia Innovation Corridor

The clean transportation sector is part of a larger technology cluster that includes sectors focused on reducing the carbon footprint of buildings as well as technology in general. The strength and size of the larger cluster improves access to workers in transferable occupations, promotes cross-sector industry linkages, and facilitates greater access to early stage capital. Investments in technology and innovation in one area can improve productivity across the whole industry cluster.

Progressive municipal, regional and provincial initiatives reinforce the transition to clean transportation.



British Columbia supports the development of companies operating in the zero-emission vehicle (ZEV) sector, and encourages international investment in the local ZEV sector. The province has set **a target for 100% of all sales of new light-duty cars and trucks to be zero emission by 2040.** Rebates are provided for the adoption of EV technology, including for medium and heavy-duty vehicles, such as airport and port vehicles.

Emissions targets and ZEV mandates help create a clean transportation consumer market but are not sufficient to attract and grow an export-oriented industrial base. **In BC the alignment of municipal, regional, and provincial policies demonstrates an encouraging climate for the clean transportation industry**. Together, these policies contribute to the creation of a "sandbox" where firms can test their innovations and gauge receptiveness to their products.



The federal government and regional authorities are investing in clean transportation.

FEDERAL GOVERNMENT

$2.75 billion investment in zero-emission buses.

$280 million in funding to increase the number of charging and refueling stations.

$2.4 million in research & development funding to reduce emissions from aviation, rail and marine transportation.

$95 million joint Federal-Provincial investment in the Centre for Innovation and Clean Energy supports the development and commercialization of clean technology in B.C.

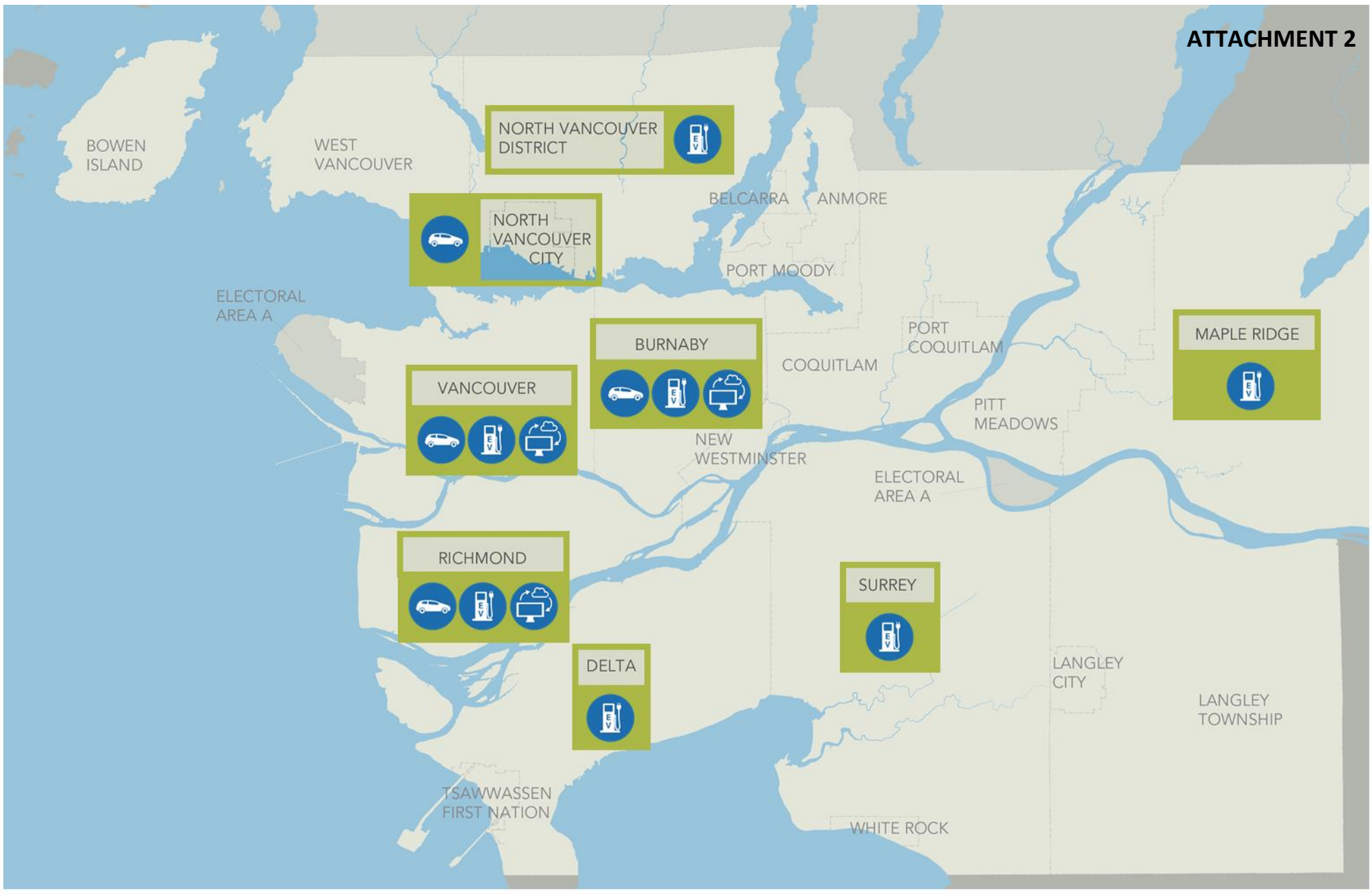
REGIONAL AUTHORITIES

TransLink is pursuing an aggressive approach to **decarbonizing transit** through its *Low Carbon Fleet Strategy.*

The Port of Vancouver uses innovative programs such as shore power to realize their vision of becoming the **world's most sustainable port**.

Vancouver International Airport is committed to being **net zero by 2030** through strategies such as renewable fuels and fleet electrification.

ATTACHMENT 2



Burnaby

Advanced Intelligent Systems: Custom robotics company that creates autonomous custom robotic solutions to solve industry problems.

Alpha Technologies: Providers of DC, AC, and renewable powering solutions for the Telecom, Traffic, Broadband, Renewable Energy, and Industrial markets.

AVL Fuel Cell Canada: Cutting edge proton exchange membrane fuel cell development for all applications, including automotive, heavy duty and marine.

Ballard Power Systems: Developer and manufacturer of proton exchange membrane fuel cell products for markets such as heavy-duty motive, portable power, and material handling.

Blue-O Technology: Researcher and developer of nanotechnology based supports for hydrogen based fuel cell products and applications.

Daimler (Mercedes-Benz Canada Fuel Cell Division): Production of fuel stacks and sub-assemblies, as well as to the advancement of fuel stack production technology.

Delta-Q Technologies: manufacturer of industrial battery chargers for lead acid and lithium-ion batteries.

Green Light Cycle Ltd: Designer and manufacturer of electric bicycles.

Greenlight Innovation: manufactures testing and assembly equipment for fuel cells, electrolysers and batteries.

Loop Energy: hydrogen fuel cell solutions for next-generation zero-emission vehicles and power generators.

nanoOne: Producer of low cost, high performance cathode powders used in lithium ion batteries.

Parkland Refinery: Commercial-scale co-processing tests by mixing bio-crude oils with petroleum crude in the manufacturing process.

SMPC Technologies Ltd.: Developers of a Level 2 charger that allows direct connection to the 600V distribution network, currently developing a 50kW and 100kW DC Level 3 charger.

Xantrex: Specializes in the development, manufacturing and marketing of power electronic products for the mobile power market.

Delta

Hydra: Sources green hydrogen and provides clean fuel to fleets at below-diesel prices, enabling a rapid and economical transition to cleaner trucking.

Maple Ridge

E-One Moli Energy: Lithium-ion battery research and development company.

Molicel: Manufacturer of high performance, superior quality rechargeable lithium-ion cells and battery pack products.

North Vancouver City

OHM Cycles: Designer and producer of electric bicycles.

North Vancouver District

HTEC (Hydrogen Technology and Energy Corporation): Developer and provider of hydrogen transportation and fuel supply infrastructure.

Richmond

Corvus Energy: Large-scale maritime-certified hydrogen fuel cell systems.

CSA Group: High pressure test facility that tests hydrogen industry products from suppliers.

IRDI System: manufacturer of infrared communication equipment in hydrogen enriched environments.

Plugzio: An electricity access control platform that gives any property the ability to monitor, manage and monetize access to electricity.

SandVault: Developer of CycleStation the first public use bicycle system to feature wireless installation by using GPRS communication and solar power.

Surrey

PowerTech Labs: Testing and development for fueling/charging infrastructure, vehicle systems/components, and codes/standards.

Vancouver

Corinex: Smart metering and smart grid solutions through broadband over powerline (BPL) technology.

Electra Meccanica: Developer and manufacturer of all-electric, single passenger, three-wheeled electric vehicles.

GreenPower Motor Company: Purpose built EV passenger, student and cargo transportation.

Greenwit Technologies: Design, engineering, manufacturing, importing and distribution of electric two-wheeled scooters, electric power-assisted bicycles and motorbikes.

Grin Technologies: Research and development company advancing the state of after-market electric bicycle conversion kits.

Hydrogen in Motion: hydrogen energy storage research and development company.

Invinity Energy Systems: Vanadium-based energy storage systems for commercial and industrial sites, grid network infrastructure projects and off-grid applications.

Ionomr Innovations: Developer of ion-exchange membranes & polymers for use in hydrogen fuel cells and hydrogen generation.

ReCharged: Ad funded EV charging stations integrating with autonomous vehicles.

SmartCity ITS: Intelligent Transportation Systems (ITS) supply and integration for municipalities and agencies across Canada.

Uplight: End-to-end customer-centric technology solutions dedicated solely to serving the energy ecosystem.

Veemo: Developers of an electric-assist, enclosed, smartphone-connected pedaled vehicle intended to replace automobiles in urban and sub-urban areas.

Westport Fuel Systems: Inventors, engineers, manufacturers and suppliers of advanced clean fuel systems and components.

metrovancouver
SERVICES AND SOLUTIONS FOR A LIVABLE REGION

To: Electoral Area Committee

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

Date: May 11, 2021 Meeting Date: June 3, 2021

Subject: **Howe Sound Fire Protection Services Feasibility Study**

RECOMMENDATION

That the MVRD Board receive for information the report dated May 11, 2021, titled *"*Howe Sound Fire Protection Services Feasibility Study*"*.

EXECUTIVE SUMMARY

The Howe Sound Fire Protection Feasibility Study examines fire service delivery options for the Electoral Area A Howe Sound mainland communities of Montizambert Wynd, Strachan Point, and Ocean Point. The study recognizes that any fire service would be delivered through service agreements with the adjacent jurisdiction of the Village of Lions Bay, with backup support from the District of West Vancouver. The study found that previously identified needs for access and water system improvements to support firefighting in Montizambert Wynd and Strachan Point remain, while the community of Ocean Point has no immediate infrastructure deficiencies preventing consideration of fire protection services. The study recommends consideration of separate fire service areas for each community in phases, subject to support from residents and negotiation of service agreements with the Village of Lions Bay.

PURPOSE

To provide the Electoral Area Committee and MVRD Board with the Howe Sound Fire Protection Feasibility Study.

BACKGROUND

The Howe Sound Fire Protection Feasibility Study (Attachment) was approved as part of the 2020 Electoral Area Services budget and is on the 2021 Committee Work Plan. It has been recently completed by Dave Mitchell & Associates Ltd. and is now ready for receipt by the Committee and Board.

SUMMARY OF INFRASTRUCTURE AND COST ISSUES FOR EACH COMMUNITY

Below is a brief summary of the key infrastructure issues and known costs based on previous reports identified in the study for each of the three communities, as well as cost considerations needed to weigh the value of introducing potential fire protection services for the Howe Sound communities.

Montizambert Wynd (13 single-family residences)

The areas of concern include water supply (storage, flow, distribution), road and property access challenges. Consideration of fire protection service delivery would be predicated on the establishment of a water system that is capable of meeting the fire protection requirements, along with a need to establish a turnaround that meets the fire department requirements.

A 1995 report estimated costs for improving the water supply system at between $169,000 – $340,000, and a 2001 estimate was between $80,000 - $280,000. In both reports, the least expensive approach for Montizambert Wynd involved purchasing water supplies from the District of West Vancouver. Previous attempts to secure water from or to be incorporated with the District have been unsuccessful.

Strachan Point (17 single-family residences)
The community of Strachan Point currently has challenges with respect to the adequacy of its water system and the suitability of its road access with respect to fire protection services. Overall, the provision of fire protection services is viable provided the firefighting water supply requirements can be met by the community.

A 2001 report estimated that the required water system improvements for Strachan Point would cost more than $500,000. A 2009 review included a preferred upgrade option that was estimated to cost nearly $1.2 million. More recent upgrades done by the community to infrastructure and water supplies are insufficient for firefighting.

Ocean Point (16 single-family residences and 8 townhomes)
The community of Ocean Point currently has an established water supply system suitable for both potable water needs and firefighting purposes. In summary, the provision of fire protection services would be possible since there are no access issues but subject to a reassessment of water storage and flow rates.

According to a 2001 Report, its water system met Building Code requirements for fire protection, and there are four hydrants with sufficient water pressure and a large enough reservoir for firefighting, as well as locally stored fire protection equipment.

Cost Considerations
A key factor in determining fire insurance costs is the rating given by the Fire Underwriters, which is a national organization owned or controlled by the insurance industry. (It should be noted that the actual cost of insurance for any homeowner or business varies based on a number of individual and site-specific factors.)

The study summarizes the cost considerations required to weigh the value of introducing potential fire protection services for Howe Sound communities:

> *Where a community has a fire department that meets Fire Underwriters' standards for performance, the cost of insurance can be significantly decreased. Thus, one of the cost-benefit analyses that underpins the investment required to establish or maintain a rated fire department is the trade-off between the taxes needed to pay for the department (and meet Fire Underwriters' standards) and the expected savings for residents and businesses on insurance costs. In the case of Montizambert Wynd and Strachan Point, the cost of the infrastructure improvements which are a necessary predicate to obtaining fire protection, must also be taken into account.* (Pages 22-23)

While detailed cost calculations for each service area are not part of the study (these would require personal insurance information from residents and also precise costs from the Village of Lions Bay

related to the provision of a fire service, which have not yet been determined), the study notes that some insurance cost reduction should be possible from the introduction of a fire service. Based on limited resident feedback, some residents reported that their annual fire insurance rates were in range of $10,000. Discussions with the Village of Lions Bay will be required to calculate per-household costs of any potential service and allow residents and Metro Vancouver to consider the cost-benefit of such a service.

NEXT STEPS

Following receipt of the study by the Committee and MVRD Board, Metro Vancouver will set up meetings to present the study and answer questions with residents of the three Howe Sound mainland communities. Village of Lions Bay and District of West Vancouver staff will be invited to these meetings. Staff will also liaise with the Village of Lions Bay staff to understand their cost-analysis and timelines related to the potential provision of fire protection services, as the Village would be the main provider of any services. Any future proposed actions, such as consideration of one or more service areas, will be brought to the Electoral Area Committee and MVRD Board for discussion and direction.

ALTERNATIVES

This is an information report. No alternatives are presented.

FINANCIAL IMPLICATIONS

Costs associated with this study were approximately $20,000 in 2020 and were included as part of the 2020 MVRD Board approved Electoral Area Services budget. Some additional costs (less than $5,000) are expected in 2021 for engaging with residents and others on the study, such as consultant time to provide technical expertise at community meetings. The 2021 Electoral Area Services budget can accommodate these costs.

CONCLUSION

The study concludes that “Provision of fire protection for Montizambert Wynd, Strachan Point and Ocean Point is possible though each of the three areas has one or more issues to be resolved. As well, new service areas will be required with approval by area residents based on identified costs from Lions Bay. Lions Bay in turn will require confirmation of the degree to which its fire response will be supported for these additional areas by West Vancouver.” Discussions with the Village of Lions Bay will be required to understand costs of any potential service and allow residents and Metro Vancouver to consider the cost-benefit of such a service. Metro Vancouver staff will hold virtual community meetings with residents as a next step and any future proposed actions, will be brought to the Electoral Area Committee and MVRD Board for discussion and direction.

Attachment *(45628518)*

Howe Sound Fire Protection Services Feasibility Study

45593856

FIRE PROTECTION SERVICES FEASIBILITY STUDY

for

Electoral Area A, Unincorporated Communities of
Ocean Point, Strachan Point and Montizambert Wynd

Prepared for Metro Vancouver by
Dave Mitchell & Associates Ltd.
May 2021

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Executive Summary

The Metro Vancouver Regional District ("Metro") is reviewing the options for providing fire protection and emergency response services for three unincorporated communities in Electoral Area A: Montizambert Wynd, Strachan Point and Ocean Point. These neighborhoods, which are located along Highway 99 between West Vancouver and Lions Bay, currently lack any fire protection. They are too small to maintain their own fire service, and would need to contract for services with one of the neighbouring communities. Dave Mitchell & Associates Ltd. ("DMA" or the "Consultants) were retained in October 2020 to conduct a feasibility study to determine the options for fire protection from the fire department in the Village of Lions Bay. For background information on the Consultants, see Appendix 2.

The three communities present different levels of opportunity and challenge. Montizambert Wynd, which abuts the border with West Vancouver, comprises 13 separate properties, all of which have been developed. It presents significant access challenges, with narrow roads, steep topography, significant interface fire risk, severely limited water supplies for firefighting and some large residential structures. The roads do not meet Building Code requirements for fire department access.[1] Previous studies by Dayton & Knight Ltd. in 1995 and 2001, that examined both water supplies and fire protection issues, noted the need for significant improvements in water availability for both fire protection purposes and household use.[2] The estimated costs for improving the water supply system ranged from $169,000 – $340,000 (in 1995)[3] and $80,000 - $280,000 (in 2001).[4] In both reports, the least expensive approach for Montizambert Wynd involved purchasing water supplies from West Vancouver. The two studies also only considered a service contract with West Vancouver as an option for fire protection – there was no express consideration of contracting with Lions Bay. Over the years that this issue has been actively reviewed, the parties have been unable to arrive at an agreement which would see West Vancouver sell water to Montizambert residents and West Vancouver has turned down several requests to provide contracted fire protection. In 2012/13, it also rejected a residents' petition for a boundary extension over Montizambert Wynd.

Strachan Point consists of 17 residential properties, of which the majority are now developed. Like Montizambert Wynd, it presents a challenging topography, with steep slopes, a narrow private road providing access from Highway 99, two light-duty bridges and inadequate water supplies for firefighting. The roads and bridges are privately-owned and maintained by

[1] Dayton & Knight Ltd., *Greater Vancouver Regional District: Ocean Point, Strachan Point and Montizambert Wynd – Preliminary Fire Service Infrastructure Requirements* (November 2001), at p. 5-5 (the "2001 Report"). The access requirements refer to the requirements found in the BC Building Code, Division B, s. 3.2.5.6. While the lack of compliant access does not necessarily preclude fire department use, it does affect the willingness of both West Vancouver and Lions Bay to consider providing service.

[2] When reviewed by Dayton & Knight, Montizambert Wynd was the subject of a long-standing "boil water" advisory from the Health Authority.

[3] Dayton & Knight Ltd., *Greater Vancouver Regional District Electoral Areas: Report on Montizambert Water Supply* (March 1995), at section 3.5, pp. 3-7 to 3-8 (the "1995 Report").

[4] 2001 Report, section 8.3, at pp. 8-2 to 8-3.

Strachan Point Estates, in which the residents are shareholders.[5] The 2001 Report estimated that the required water system improvements for Strachan Point would cost more than $500,000. A follow up review was conducted in 2009.[6] The preferred option, which included a new well, treatment processes, distribution system improvements and material upgrades for fire protection purposes, had an estimated cost at that time of nearly $1.2 million.[7] The upgrades since were reviewed in 2020. While the improved system provides potable water for residents, the infrastructure and water supplies are insufficient for firefighting.

Ocean Point is the largest, newest and most developed of the three communities. Its infrastructure was built in the early 1990s, and the development consists of 24 strata properties in total: eight townhomes and 16 single family residences. According to the 2001 Report, its water system met Building Code requirements for fire protection.[8] There are four hydrants with sufficient water pressure (up to 800 Imperial gallons per minute or "Igpm") and a large enough reservoir for firefighting, as well as locally stored fire protection equipment.[9] Each building in the development is sprinklered and connected to a monitored fire alarm system. The roads meet the requirements outlined in the Building Code,[10] and turn arounds are available. The community is accessed through a gate system.

There has been at least one significant fire in recent years among these three communities. The fire occurred in January 2014 in Strachan Point. Lions Bay Fire Rescue ("LBFR") responded to the incident, as did West Vancouver Fire & Rescue Services ("WVFRS") along with the fire boat from Vancouver Fire/Rescue Services. The limited water supply in the area did not allow for an effective fire attack and the home was destroyed. Nevertheless, the responding departments prevented the fire from spreading to the adjacent houses. As the fire occurred in the winter, the interface risk – which is considerable for both Montizambert Wynd and Strachan Point – fortunately was minimal. A summer fire of similar magnitude, however, could easily spread quickly through heavily treed slopes and neighbourhoods. It also should be noted that the fire response from the two departments (or the fire boat), absent a formal agreement, is unlikely to be repeated, since none of them has authority to operate in these communities.

The Consultants' review of the three areas involved two detailed site visits to assess access and infrastructure issues, including roads, bridges, water availability, building types, situational risk and terrain. During each site visit, discussions were held with various area residents, who

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[5] Email from Metro Vancouver to DMA, 13 November 2020. Note: the largest lot (#17) is not part of the Estate organization but is cooperating with it.

[6] Dayton & Knight Ltd., *Metro Vancouver: Strachan Point Water System – Upgrade Options* (January 2009) (the "2009 Report"). Collectively, the three reports are referred to as the "Dayton & Knight Reports".

[7] 2009 Report, at p. 25. The fire protection upgrades alone were estimated to cost about $470,000, over two stages of implementation.

[8] 2001 Report, at p. 5-1.

[9] *Ibid.*

[10] 2001 Report at s. 5.1.2, p. 5-2. The building code requirements are contained in Division B, Section 3.2.5.6.

provided additional access to properties as well as expressing their hope for a change in the level of fire protection. The Consultants and Metro staff also undertook three web-hosted meetings with area residents to gather additional input and views. In each of the three sessions, those attending expressed their strong interest in obtaining a fire protection services.

The challenges noted in the Dayton & Knight Reports for Montizambert Wynd and Strachan Point, however, largely remain. Restricted access and limited water supply for firefighting are also identified as risks in the Emergency Plan,[11] in particular for Strachan Point and Montizambert Wynd. In addition, all three neighborhoods are transected in whole or in part by the CN rail lines, which potentially impacts any emergency response.

One of the primary differences from past studies is that today Lions Bay has indicated a general willingness to provide services, subject to an appropriate services agreement being struck, and concerns regarding access and water supplies mitigated. A fire response from Lions Bay is within the eight-kilometre limit required by the Fire Underwriters, which should improve the fire protection rating for each area that eventually is covered.

The infrastructure requirements, however, vary significantly between the three communities. As such, the roll out of fire protection may have to be staggered, until the concerns are adequately addressed. This would suggest that three local service areas – one covering each community – will need to be created, so that funds can be raised, and work commenced. In the case of each of Strachan Point and Montizambert Wynd, the initial focus of the service areas will need to be on undertaking the infrastructure improvements that will support a fire response. With Ocean Point, the service area would be for fire protection and emergency response services, and an agreement negotiated for service with Lions Bay.

At the same time, work with Lions Bay and West Vancouver will be required. For Lions Bay, a water tender may be needed to support its more extended operating environment, the cost of which, in whole or large part, would have to be borne by one or more of the new service areas. With West Vancouver, the issue will be to confirm what support it will provide to Lions Bay. Both jurisdictions are party to the Metro-wide 1995 Mutual Aid Agreement for Emergencies (the "1995 Aid Agreement"), and West Vancouver currently will respond into Lions Bay to support that Department's operations. The level of support that West Vancouver will provide if Lions Bay expands its operating jurisdiction will need to be formally confirmed and documented. This will include confirmation of the level of support provided to West Vancouver by North Vancouver City and North Vancouver District for responses to Lions Bay or any of the three communities in Electoral Area A.

[11] *Metro Vancouver Regional District, Electoral Area A Emergency Management Plan* (February 2019) (the "Emergency Plan")

Scope of Review and Project Methodology

The purpose of this project was to examine the potential for the delivery of fire protection and emergency response services by the Lions Bay Fire Department to three unincorporated communities in Electoral Area A: Montizambert Wynd, Strachan Point and Ocean Point.

The project included a review of relevant background materials and meetings with the District of West Vancouver and Village of Lions Bay to assess their interest in providing a fire service as well their ability to address unique local conditions. The Consultants also conducted two on-site reviews to assess road access for apparatus, the relative fire risk in each community, as well as the state of the various water systems. Community involvement was obtained through web-hosted meetings with residents in each of the three areas and interactions during the on-site visits.

Site Reviews

The Consultants conducted two site reviews on October 27 and November 3, 2020. The on-site reviews provided the opportunity to assess the road systems, water supply, access, interface issues and other risks. During the first site visit, several local residents met and discussed with the Consultants various issues and provided detailed information on the existing water supply, risks and access. We thank them for providing useful background information and filling out the historical record of prior efforts to obtain fire protection services in these communities.

Stakeholder Consultations

A series of web-hosted evening meetings were held with residents from the three communities in the first week of November 2020. The sessions were facilitated by Metro staff who opened each session by describing the purpose of the project. The Consultants then provided a brief background for each member of the review team.

In each of these sessions, the residents participating outlined their concerns and expectations for service in the future. Each session lasted approximately one hour and at the conclusion the residents were encouraged to provide any additional background information or further questions.

Montizambert Wynd

A Zoom meeting for Montizambert Wynd residents was held on November 2nd. Four residents participated and their focus was fire protection with several references to the existing water system and its history. The residents expressed their strong interest in achieving fire protected status for insurance purposes.

Strachan Point

Strachan Point residents participated via Zoom on November 4th with three residents attending in addition to the Electoral Area A Director. In this meeting the residents reviewed the upgrades to their existing water system, discussed the 2014 structure fire and also noted that response by

Lions Bay has included attendance along with the BC Ambulance Service for some incidents. The residents had previously provided examples of their costs for fire insurance and expressed their support to obtain fire protection services.

Ocean Point

Four residents from Ocean Point participated in a Zoom meeting on November 5th and, similar to Montizambert and Strachan Point, expressed their support for efforts to obtain fire protection services.

Project Background

The issue of fire protection in the three communities of Montizambert Wynd, Strachan Point and Ocean Point is of long standing. The problem is essentially three-fold:

(a) The communities are too small to support their own, collective fire service. They therefore have to contract with either West Vancouver or Lions Bay to obtain service. West Vancouver has historically rejected inquiries regarding the contracted provision of either water supplies (to Montizambert Wynd) or fire protection services. While Lions Bay has been more receptive, at least in relation to Ocean's Point, agreement has never been reached.

(b) There are significant infrastructure deficiencies – principally access challenges and water supply problems – in both Montizambert Wynd and Strachan Point that would materially impede the provision of an effective and safe fire response. Neither Lions Bay nor West Vancouver are prepared to provide a fire response unless those issues are addressed or mitigated.

(c) The costs of the necessary infrastructure improvement, when considered in conjunction with the cost for obtaining contracted fire protection services, has been seen by the residents as prohibitive for two of the three communities.

The on-going attempts by local residents, supported by their Electoral Area director, to arrange for fire protection services have, to date, produced no result. Similarly, various efforts to obtain grant funding for infrastructure improvements have generally been unsuccessful.[12]

Formal discussions of the problem, and related infrastructure deficiencies, date from at least 1995, with the first Dayton & Knight Report (summarized below). At that time, a very loose understanding appears to have existed that West Vancouver's department may respond "as a courtesy."[13] A similar policy seems to have been in place from Lions Bay.[14] However, as local governments increasingly wrestled with issues of liability and the risks attendant on out-of-jurisdiction responses, by the early 2000s, West Vancouver and Lions Bay both made it clear that their respective departments were not authorized to respond to incidents in the three communities.

The 2001 Report (see below) identified material water infrastructure deficiencies in both Montizambert Wynd and Strachan Point that required correction before effective fire protection could be provided. The cost of the improvements for the water systems were significant.

[12] Metro Vancouver, Memorandum by H. Kellas to T. Atva, "Additional Information related to Strachan Point" (18 February 2008).

[13] 1995 Report, at p. 1-2.

[14] Metro Vancouver, V. Vinje, Memorandum to Aboriginal Affairs and Electoral Area Committee, "Fire Protection Services – Howe Sound Communities" (22 March 2000), at p. 1. The memorandum is also alternately dated 11 April 2000.

Strachan Point's water system was reviewed by Dayton & Knight again in 2009 (see summary below).

In some respects, the impact of access issues on a fire response was not deeply considered in either the 1995 or 2001 Reports.[15] The access challenges in two of the three communities, however, are material, and drive what improvements are required to their respective water systems.[16] For Montizambert Wynd, access limitations may impact the willingness and ability of either Lions Bay or West Vancouver to provide a response, even if the water issues are addressed. Access and water issues are considered further, in the Operational Issues section.

1995 Report

The 1995 study conducted by Dayton & Knight Ltd. provided a review of the Montizambert water supply. The report identified a number of concerns including low water flow in the late summer, disruption during sub zero temperatures, mechanical failure of some components and lack of effective fire protection[17]. This report noted that this area did not include hydrants or a distribution pipe to maintain a fire flow and that water to fight a fire in this area would have to be transported by tanker.[18] The 1995 Report did not address access issues for fire protection purposes and assumed that any fire protection response would be arranged with West Vancouver.

2001 Report

Dayton & Knight provided a more complete study in 2001 that examined fire service infrastructure requirements for each of the three areas. By that time both West Vancouver and Lions Bay had indicated that their respective departments were not permitted to respond out of jurisdiction to the three communities.

The water system at Ocean Point was reviewed and determined to be compliant with the FUS requirements and capable of providing a fire flow of 800 IGPM.[19] Similarly, the community met BC Building Code standards for fire department access.[20]

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[15] For Montizambert Wynd, the 1995 Report did not examine access issues at all. In the 2001 Report, Dayton & Knight suggested that the creation of a turn-around was all that was required, and that the costs of upgrading more comprehensively to Building Code standards was not worth considering (see 2001 Report, s. 6.3.2, at p. 6.-6; and s. 7.3, at p. 7-4).

[16] Access and egress concerns were cited as one of the reasons why West Vancouver rejected a 2010 request for contracted fire services from Montizambert Wynd residents: Letter to C. Johnston from West Vancouver Fire, 6 July 2010. The extent and nature of those issues, however, were not enunciated.

[17] Dayton & Knight, 1995 Report, p. 1-1.

[18] *Ibid.,* p. 1-2.

[19] The hydrant system at Ocean Point was tested and found compliant in a report provided by Black Fire Consulting dated January 8, 2021.

[20] Dayton & Knight, 2001 Report, at p. 1-1. The Ocean Point system was tested 8 January 2021 and all four fire hydrants provided in excess of 800 IGPM.

The system at Strachan Point was determined to be hydraulically deficient, as 50-millimetre pipes could not provide the 600 to 800 IGPM recommended fire flows. The estimated cost to upgrade the system was $515,000 or $36,800 per property.[21] The report noted access issues for Strachan Point, including the need for apparatus to back up to reach certain of the properties. It notes that the "average" width for the private access was "3.5 metres," but did not discuss whether there were any areas less than 3.5 metres in width that would create problems for fire apparatus.[22] Access, however, was deemed deficient in a number of respects, including width, centreline radius, overhead clearance and turn-arounds.[23] At the time, however, based on discussions with the WVFRS, they noted that although access "does not meet B.C. Building Code requirements" it was "considered satisfactory by the District of West Vancouver's Fire Department." The cost of upgrading access was considered neither practical nor affordable.[24] It should be noted that the WVFRS no longer considers access to be acceptable, as discussed further below.

The water system at Montizambert Wynd was also found to be deficient, as the 50-millimetre pipes could not provide the recommended fire flow; in addition, there was no water storage system for fire protection. Of several options, the recommendation favoured by Dayton & Knight was to connect to West Vancouver's water system (if that could be agreed) at a cost of $115,000 or $8,850 per property. If that were not to be possible the other option would be upgrade the water system to municipal standards at an estimated cost of $280,000 or $21,540 per property.[25] As with Strachan Point, Dayton & Knight found that access did not meet fire service access requirements for width, centerline radius, overhead clearance and turnaround facilities. Based on observations of the residents, it assumed that the bailey bridge was sufficient for fire apparatus, but did not independently confirm that point.[26] Again, based on discussions with WFRS, access was "considered satisfactory" provided that "a turnaround is provided." The cost of upgrading access was considered not practical (though some improvements to provide a



Figure 1: Montizambert Wynd water supply (wooden enclosure) above Montizambert Creek (photo taken on 27 October 2020)

[21] 2001 Report, p. 1-1.

[22] *Ibid.,* at section 3.2.2, p. 3-3.

[23] *Ibid.,* at section 5.2.2, p. 5-3.

[24] *Ibid.,* at section 6.2.2, pp. 6-2 to 6-3.

[25] *Ibid.,* p. 1-2.

[26] *Ibid*., at section 5.3.2, pp. 5-4 to 5-5.

turnaround were recommended).[27] As with Strachan Point, WVFRS no longer considers access to be acceptable. Indeed, by 2010, West Vancouver had indicated to residents in Montizambert Wynd that access issues were a significant factor in its decision to refuse to provide contracted fire services.[28]

2009 Report

The 2009 Report by Dayton & Knight considered upgrade options for Strachan Point. It noted the existing water system was built in 1969/70 and provided water to 14 homes. The recommended improvements included increasing the size of the reservoir, installing a backup generator and upgrading "…the existing water distribution system to municipal standards to ensure that the community has fire protection."[29] The report noted that the paved roads at 3.5 metres in width met the needs of fire truck access (based on the width of apparatus in use by West Vancouver) but did not meet Building Code requirements including overhead clearance and turnaround facilities for dead-end portions of the road. It recommended that the two bridges be tested to ensure that they were safe for fire apparatus.[30] It also noted that "Access should again be reviewed" with WVFRS to ensure that it was still considered satisfactory.[31]

The report then discussed the requirements for an adequate fire flow and provided Class C estimates for each of three components, with the fire protection upgrades being done in two phases to meet the FUS requirements, the first estimated at $423,750 and the second at $46,250.[32]

Each of the previous reports cites water supply issues with Montizambert Wynd and Strachan Point. Upgrade costs have been provided in these reports and it should be noted that some improvements were initiated at Strachan Point. That said, water supply issues in terms of water pressure and capacity remain a concern as noted by both fire departments in a following section and these concerns would need to be addressed prior to fire response being initiated for either of the two neighborhoods. As well, the most recent report by Dayton & Knight was produced in 2009 and so required changes to the system and the costs these would need recalibration.

Summary

The infrastructure deficiencies in Montizambert Wynd and in Strachan Point have not changed materially since the Dayton & Knight reports were issued. The need for improved access and upgraded water systems to support firefighting remain, and present significant hurdles that must, as a pre-requisite, be addressed before fire protection services can be made available.

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[27] *Ibid.,* at section 6.3.2, pp. 6-6 to 6-7.

[28] Manager's Report, 7 July 2010 to Electoral Area Committee, in Electoral Area Committee Regular Meeting, Agenda Package, which report noted that the refusal was based on the "quality of road that accesses the area and about on-site water supply." See p. EA34.

[29] 2009 Report, p. 2.

[30] *Ibid.,* pp. 5-6.

[31] *Ibid.,* p. 5-6.

[32] *Ibid.,* p. 24.

Both Lions Bay (as the principal service provider) and WVFRS (as the mutual aid partner) would need to see significant infrastructure improvements before fire protection services can be provided. Conversely, the community of Ocean Point has no immediate infrastructure deficiencies that would prevent consideration of a request for fire protection services.

Community Descriptions

Metro is the local government for Electoral Area A, which includes the unincorporated communities of Montizambert Wynd, Strachan Point and Ocean Point. These communities are located on the mainland along Howe Sound, north of the District of West Vancouver.

Figure 2 below shows the location of the three communities within the north and south boundaries of Metro Area A.

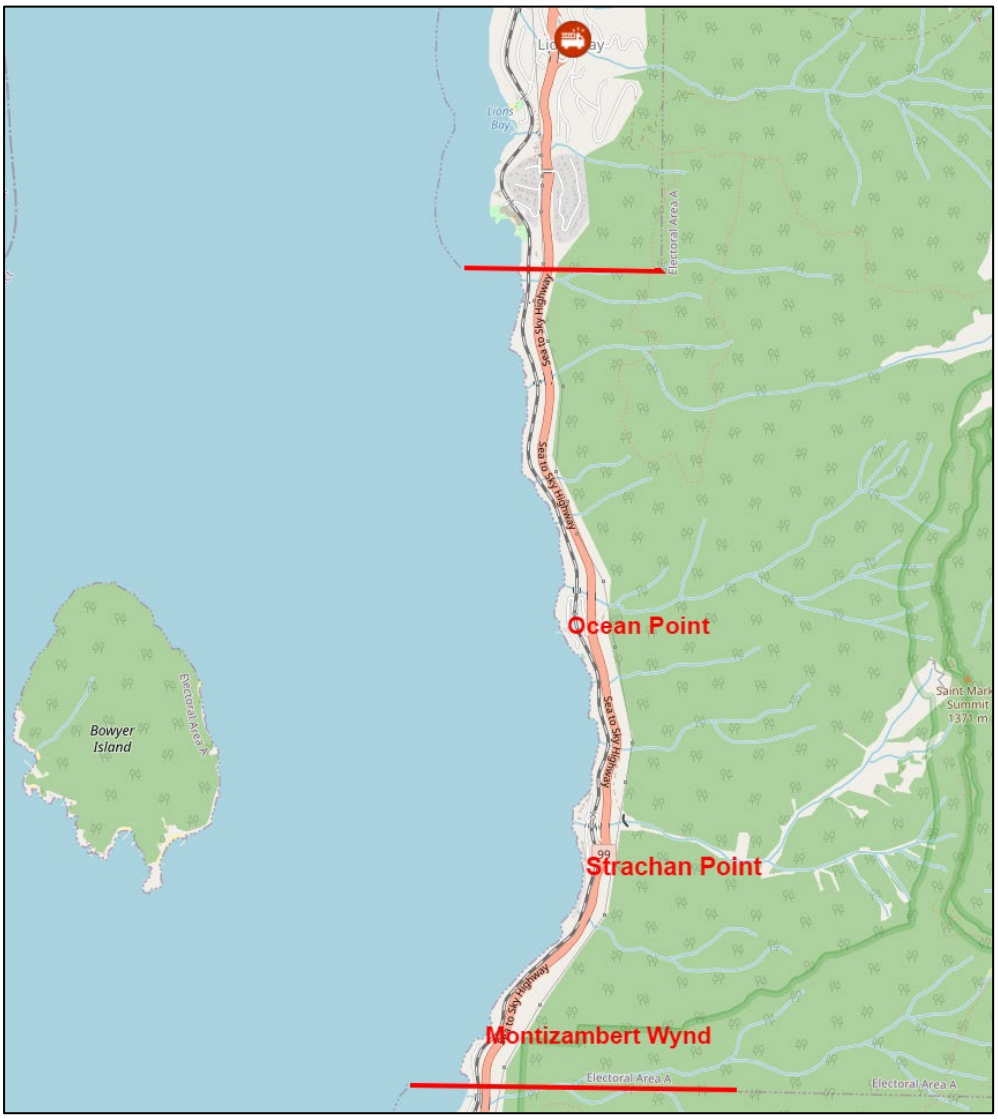


Figure 2: Three Communities within North and South Boundaries of Metro Area A

Montizambert Wynd

Montizambert Wynd is immediately north of the boundary with West Vancouver. There are a total of 16 properties in the subdivision, with 13 lots along the foreshore. Lots 14, 15 and 16 are above the highway and are undeveloped. For the purposes of this report, only the 13 foreshore homes, with approximately 25 residents, are being considered for fire protection. One foreshore property – Lot 7 – appears to be under re-development.[33]

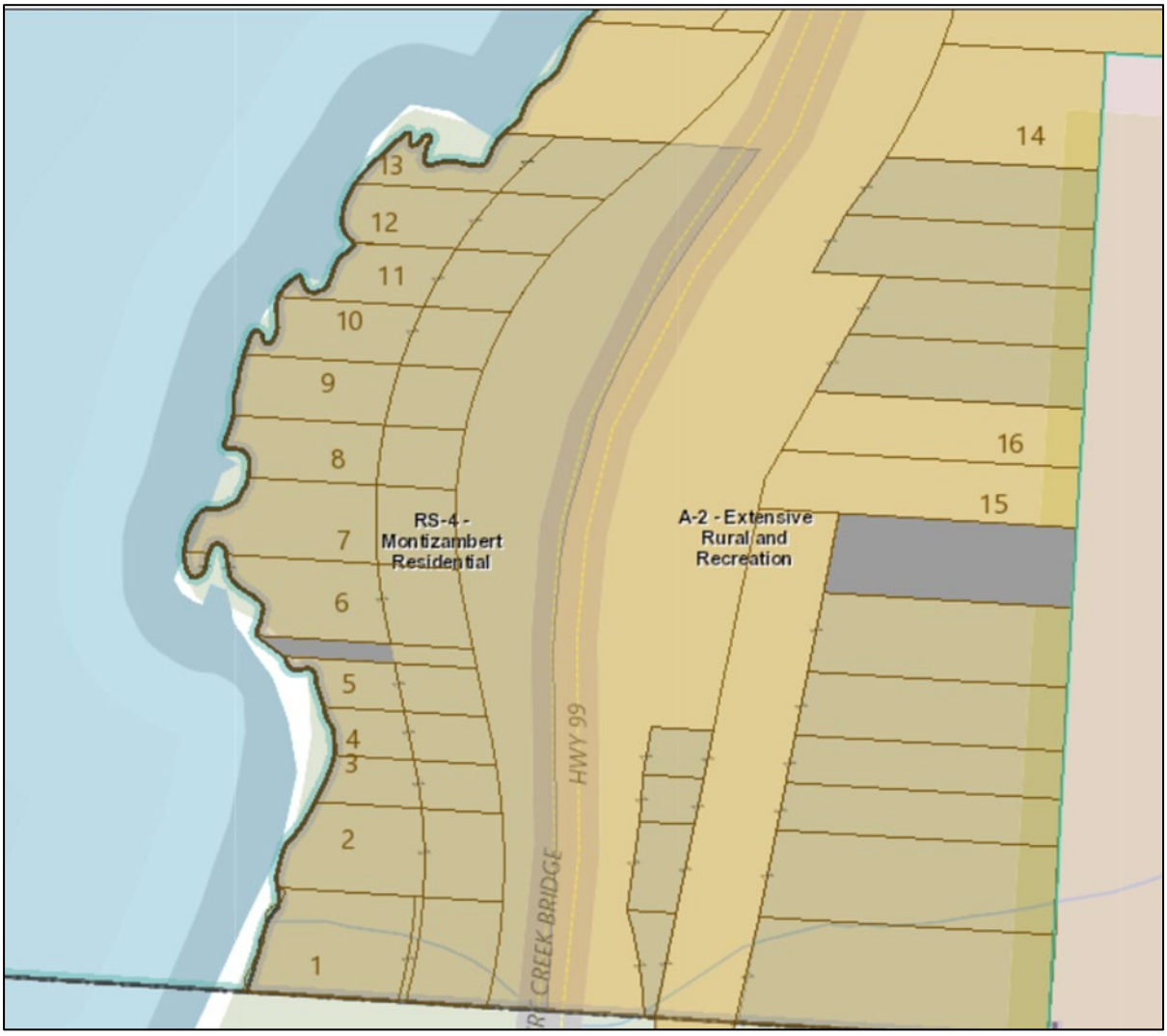


Figure 3: Montizambert Wynd (Source: Metro Vancouver GIS Mapping)

Access to Montizambert Wynd from Highway 99 is by way of Lawrence Avenue in West Vancouver, which crosses the CN Rail right-of-way and tracks. Access also involves the road crossing through parkland owned by West Vancouver, without the benefit of a formal easement. The bailey bridge, which is between Lots 1 and 2 in the subdivision and crosses Montizambert

[33] The 2020 assessment for Lot 7 was for land only. The previous year showed a 2,380 square foot house. Source: BC Assessment website.

Creek, is owned and maintained by the Ministry of Transportation and Infrastructure, while the road itself passes over the residents' lots by way of a private easement.

The road is narrow, effectively a single vehicle wide, with limited overhead clearance as a result of over-growing, mature trees.[34] Significant portions of the road are very steeply graded. (Figure 4 and Figure 5) There also is an undeveloped lane right-of-way between Lots 5 and 6. No fire access-compliant turn-around currently exists.



Figure 4: Montizambert Wynd (photo taken on 2 November 2020)

The road's grade and narrowness would make backing up an engine or water tender a slow and potentially risky undertaking, particularly at night or during the winter. Individual residences range widely in size, from 840 square feet to more than 7,300 square feet.[35] Any fire response to this area will require careful pre-planning; individual pre-plans for the larger structures also will be necessary.

It should be noted that a number of the lots actually extend above Highway 99 (all but lots 7, 8 and 9). None of these extended lots appear to be developed (or have any reasonable form of access). Development should be restricted unless compliant fire access and water supplies are made available.



Figure 5: Montizambert Wynd (photo taken 2 November 2020)

The Emergency Plan identifies a number of special concerns regarding this community, including the following:[36]

- No Structural Fire Service available;

[34] Dayton & Knight indicate that Montizambert Wynd is about 2.9 metres (about 9.5 feet) wide: 2001 Report, at p. 3-5.

[35] Source: BC Assessment website. As noted, 7 Montizambert Wynd appears to under re-development.

[36] Emergency Plan, at p. 89. It should be noted that, technically, the CN Rail line does not bisect the inhabited portion of the community. However, the tracks do transect the only point of access and a derailment (or passing train) may block access in and out of Montizambert Wynd.

- Not sufficient water available for fire fighting;
- Water may not be potable (surface supply from creek);
- Access to residences by narrow road and light duty bridge over Montizambert Creek which is likely source of emergency;
- Steep rocky shore offering no easy marine access for evacuation north of creek where most residences located;
- All residences are downslope from CN Rail tracks; train may block road access if derailment occurs; and
- CN Rail tracks bisect [access to the] community.

Strachan Point

The Strachan Point community is immediately north of Montizambert Wynd. It comprises 17 residential properties with approximately 30 residents.[37]

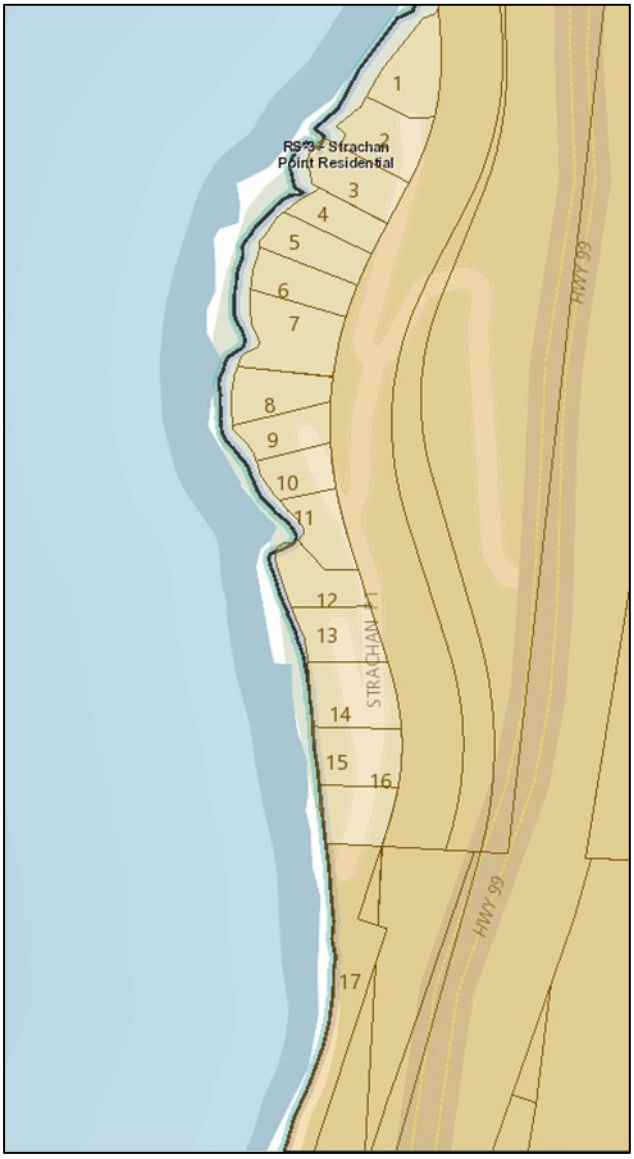


Figure 6: Strachan Point (Source: Metro Vancouver GIS Mapping)

Strachan Point lies between Montizambert Wynd and Ocean Point and is accessed from the southbound lane on Highway 99[38]. Strachan Point Road crosses Charles Creek over two bridges as well as the CN Rail line.

[37] Emergency Plan, at p. 90.

[38] At the present time there is no north-bound access to Strachan Point from Highway 99.

Strachan Point has one property (#17) which is not part of the corporation that covers the remainder of the lots, but is being considered in this review due to shared road access. This property has an independent water system drawn from a separate source.



Figure 7: Strachan Point property #17 (photo taken 27 October 2020)

Strachan Point has provided a number of upgrades to their water system and have provided hose cabinets with extinguishers and other equipment as shown in Figure 8. There is however a concern with regard to the size of the water supply lines as well as system storage[39].



Figure 8: One of several Strachan Point fire safety cabinets (photo taken 27 October 2020)

Strachan Point also has at least one access point to Howe Sound that could be considered for drafting purposes. This ocean access is at the south limit of this area adjacent to property #16 as shown below in Figure 9.

[39] The Lions Bay Fire Chief commented that at the 2014 structure fire, the stored water only lasted a few minutes.



Figure 9: Ocean Access south of property #16 (photo taken 27 October 2020).

As with Montizambert Wynd, the Emergency Plan notes a series of special concerns regarding Strachan Point including the following: [40]

- No Structural Fire Service available;
- Not sufficient water available for fire fighting unless drafting from ocean;
- Water may not be potable (surface supply from creek); [41]
- Access to residences by narrow road and light duty bridge over Charles Creek which is likely source of emergency;
- Steep rocky shore offering no easy marine access for evacuation north of creek, small boat launch located at south end of development;
- All residences are downslope from CN Rail tracks; train may block road access if derailment occurs; and
- CN Rail tracks bisect [the road access to the] community.

[40] Emergency Plan at p. 91.

[41] The Emergency Plan is somewhat out of date. Since it was written, the area residents have upgraded the local water system to provide potable water and the Emergency Plan should be updated to reflect those improvements.

Ocean Point

Ocean Point is the third neighborhood to the north of West Vancouver and is immediately south of Lions Bay. The Metro emergency plan notes this is a strata property, with eight town homes and 16 single-family residences.



Figure 10: Ocean Point (Source: Metro Vancouver Emergency Plan)

The 2001 Report indicated that both the water supplies, which includes four hydrants and a 100,000 gallon reservoir, and the road access, met fire protection requirements. The water supplies were sufficient to meet the Fire Underwriters requirements,[42] while the roads met

[42] Fire Underwriters, *Water Supply for Public Fire Protection* (1999). This standard remains current as of the date of this report, although a new standard is under development by the Fire Underwriters.

Building Code standards.[43] There is a turn around at the end of the development that meets fire access standards. Access to the community itself is through a locked gate with keypad access.

The road surface in Ocean Point is hard surfaced and with sufficient width to allow vehicles to pass and is clear of overhanging trees or other impediments.

There is also sufficient space at the end of Ocean Point Drive to allow larger vehicles to turn around.

The community itself is transected by the CN rail line with the upper townhomes separated from the single family properties on the foreshore. In addition, while the east face of the townhomes is level entry, the west side is up to 5 stories in height.

Ocean Point also has a compliant water system with fire hydrants which are regularly tested for fire flow and condition.



Figure 11: Ocean Point Drive (photo taken 27 October 2020)

[43] 2001 Report, at s. 5.1.1 and 5.1.2, pp. 5-1 to 5-2.



Figure 12: South end of Ocean Point Drive (photo taken 27 October 2020)

The Emergency Plan notes a number of special concerns, including the following: [44]

- Gated Community, access requires code;
- No Structural Fire Service available;
- Steep rocky shore offering no easy marine access for evacuation; [Note: the Emergency Plan will be updated as the boat launch in Figure 13 has subsequently been added]
- All single-family residences are downslope from CN Rail tracks, train may block road access if derailment occurs;
- Newman Creek borders north end of development, immediately adjacent to one residence; and

[44] Emergency Plan at p. 93.

- CN Rail tracks bisect community.



Figure 13: Ocean Point, Howe Sound Access (photo taken 27 October 2020)

Fire Underwriters

This section examines the role and importance of Fire Underwriters' reviews for residents in a fire protection area and provides a brief overview of the methodology that those surveys employ. As the rating provided by the Fire Underwriters materially impacts insurance costs for both residential and commercial property owners, it is important to understand how the rating system operates and the potential impact it has on the cost-benefit analysis of local governments and property owners investing in their fire services. In particular, it is important to understand how investing in the fire service through civic taxes, to establish, maintain or improve an area's rating from the Fire Underwriters, can potentially result in a net return (or the maintenance of major net savings) for residents and area businesses.

The Fire Underwriters are a national organization owned or controlled by the insurance industry. The primary purpose of the Fire Underwriters is to establish the Dwelling Protection Grade ("DPG") and Public Fire Protection Classification ("PFPC") for each community in the country.[45] The DPG rating generally applies to single family detached residences,[46] whereas the PFPC rating applies to multi-family residential, commercial, industrial and institutional buildings or districts, and generally is applied by the "commercial lines" arm of the insurance industry.[47]

The Lions Bay department was last reviewed by the Fire Underwriters in 2019 and received a DPG 3A and PFPC 3 rating.

Most residential homeowners and businesses carry fire and general perils insurance, and any person with a mortgage is required to maintain such insurance by the mortgagee bank or financial institution. Entities responsible for strata developments are required by provincial legislation to maintain insurance coverage.

Where a community has a fire department that meets Fire Underwriters' standards for performance, the cost of insurance can be significantly decreased. Thus, one of the cost-benefit analyses that underpins the investment required to establish or maintain a rated fire department is the trade-off between the taxes needed to pay for the department (and meet Fire Underwriters' standards) and the expected savings for residents and businesses on insurance costs. In the case of Montizambert Wynd and Strachan Point, the cost of the infrastructure

[45] There is on-going consideration by the Fire Underwriters of the two types of classifications: it is possible that in the not-to-distant future, the two ratings will be combined so that only a single rating system exists, covering both residential and commercial/multi-family properties.

[46] Under the Fire Underwriters' definitions, the DPG ratings generally apply to the following: "One- and Two-Family Detached Dwellings (buildings containing not more than two dwelling units) in which each dwelling unit is occupied by members of a single family with not more than three outsiders, if any, accommodated in rented rooms." In addition, under this system a "typical" detached dwelling is a maximum of 3,600 square feet in size. Fire Underwriters Survey website, "Terms of Reference", http://www.fireunderwriters.ca/dwelling-protection-grade.html accessed on 18 August 2020.

[47] Fire Underwriters Survey website, "What is the PFPC" at http://www.fireunderwriters.ca/public-fire-protection-classification.html, accessed on 18 August 2020.

improvements which are a necessary predicate to obtaining fire protection, must also be taken into account.

With a well-rated fire department, the savings on insurance premiums often will offset, in whole or in significant part, the costs of operating the department. For an individual with a house that is assessed at a replacement cost[48] for insurance purposes of $300,000, a "protected" or "semi-protected" rating will generally result in cost saving on insurance of more than $2,000 (annually). For commercial properties, significant reductions in insurance rates can be expected when the community obtains a PFPC rating of 7 or better. From the savings enjoyed on insurance, the tax cost of maintaining the service would then need to be deducted to determine the net direct financial benefit (or cost) of having a "rated" department.[49]

There are no commercial properties of which we are aware in either Montizambert or Strachan Point. However, to the extent that the Strachan Point corporation owns property which is insured against fire losses, it is likely that such property would be handled under commercial insurance lines (and therefore rated under the PFPC classification). For Ocean Point, the townhomes may be treated as multi-family property subject to commercial lines insurance (so, subject to the PFPC rating), as would any common properties, held by the strata, which are insured against fire risk. If the individual family residences on the foreshore are bare strata, it is likely that they would fall under the residential insurance lines and the DPG rating.

By way of example, the following tables are sometimes shown in Fire Underwriters' reviews.[50] They show the amount by which "average" insurance costs drop for residential and commercial properties as the DPG or PFPC rating improves:

[48] It is important to emphasize that "replacement cost" and the "tax value" of a home are not interchangeable concepts. Replacement cost is driven by square footage and the cost of construction, while the tax value of a home is driven by market factors.

[49] The rating system is described in greater detail in the next section. It must be stressed that the actual cost of insurance for any homeowner or business varies based on a number of individual and site-specific factors. While the Fire Underwriters' fire grading for the area has a significant impact, a host of other considerations are also involved in the setting of insurance rates, including matters specific to the individuals or properties involved, or the competitive forces at work in the region.

[50] These tables are now several years old. Most of the more recent reports we have seen have not included them, or, where they have been included, have involved insurance cost figures which are particular to the locale. When created by Fire Underwriters , these figures were calculated on broad-based national averages in the reports in which they were used.

Table 1: DPG Rating - Estimated Insurance Costs

Replacement Value $	Unprotected Rate $		Semi Protected Rate $		Fully Protected Rate $
100,000	1,165	60± % Reduction	465	32± % Reduction	315
125,000	1,470		585		400
150,000	1,750		700		475
175,000	2,040		815		555
200,000	2,710		1,215		739
250,000	3,290		1,475		893
300,000	3,880		1,741		1,053
350,000	4,422		1,987		1,201
400,000	4,953		2,226		1,349
450,000	5,489		2,465		1,491

Table 1 is out of date, in that insurance costs have climbed significantly since the table was produced (~2016). However, it is still useful in showing the material savings that result from having a semi- or fully-protected rating from the Fire Underwriters.

Table 2: PFPC Rating - Estimated Insurance Cost Decreases

Public Fire Protection Classification	U- Rate Percentage Decreases
PFPC 10 to PFPC 9	99.2%
PFPC 9 to PFPC 8	96.6%
PFPC 8 to PFPC 7	82.4%
PFPC 7 to PFPC 6	74.4%
PFPC 6 to PFPC 5	63.1%
PFPC 5 to PFPC 4	53.8%
PFPC 4 to PFPC 3	48.0%
PFPC 3 to PFPC 2	47.3%
PFPC 2 to PFPC 1	45.8%

As can be seen in Table 2, ratings improvements in the commercial classification do not result in linear decreases. From a cost-benefit perspective, moving a rating from PFPC 8 down to ~PFPC 4 provides the optimal savings for businesses and multi-family properties. That non-linear relationship is worthy of consideration on a cost-benefit analysis between the amount required to be invested in improving the service and the expected insurance savings for owners

of commercial, industrial and multi-family properties.[51] Below PFPC 4, the amount of investment needed to obtain the improved rating likely will outweigh any insurance savings.

A complicating factor is that the ratings applied to a community are not necessarily uniform. Fire Underwriters considers a series of issues (some of which are examined further below), which include distance from the fire hall and availability of water supplies. Depending on the size and nature of the service area, the insurance benefits may not be equally enjoyed by all ratepayers. Thus, if the fire zone is larger than eight kilometres by road network (assuming the hall in the centre), the residents outside of the eight-kilometre zone may not enjoy the cost savings received by those residents who live within the zone.

Water Supply Requirements

The Fire Underwriters have established a series of requirements that must be met before a water system is considered adequate for firefighting purposes.[52] The system storage capacity is determined by the buildings in the community and where it is also the potable water supply, it must have a residual capacity included. The fire flow that is calculated will require specific water pressures and volume that can be managed by the piping infrastructure and pump system. The hydrant or standpipes also need to support the required fire flow. For Strachan Point and Montizambert Wynd, these are aspects that would require evaluation as part of any water system upgrade and approvals.

The actual recommended fire flow is a calculation provided by the Fire Underwriters based on their survey and it does not appear this has been undertaken for any of the three areas.

As discussed in a previous section, the Lions Bay PFPC rating would likely apply in Ocean Point for the townhouses and community-owned structures that are insured. The Fire Underwriters DPG rating is broken into six possible ratings (with DPG 1 being the best and DPG 5 being “unprotected”; there is a split rating at DPG 3, with 3A showing there is hydrant system and 3B being the rating applied when the fire department relies on water tenders).

DPG 1 and DPG 2

Ratings of DPG 1 and 2 require a recognized water system (so, fire hydrants with sufficient pressure, supply and redundancy), and generally are not given to volunteer or paid-on-call departments.

[51] The amount of savings can also vary with the particular type of industry or commercial undertaking. See the more detailed discussion of PFPC ratings below. The table gives the average of all savings, across all industry types.

[52] Fire Underwriters, *Water Supply for Public Fire Protection* (1999).

DPG 3A

A DPG 3A rating means that the area is serviced by a water supply system that meets Fire Underwriters' requirements. The Fire Underwriters' website summarizes these requirements as follows: [53]

> Water supply system designed in accordance with Fire Underwriters Survey standard "Water Supply for Public Fire Protection" must meet all minimum standards specified in the document. In general terms, to meet all minimum standards, the water supply system should be designed to be capable of providing required fire flows simultaneously with Maximum Daily Consumption at a minimum residual pressure of 138 kPa (20 psi), and have not less than 110,000 Litres (24,000 I.gal)[54] in available storage.

Of the three communities, only Ocean Point meets these fundamental requirements.

DPG 3B

Where a community lacks a compliant water system, the Fire Underwriters apply a different assessment standard – *Alternative Water Supplies for Public Fire Protection* – which generally limits a department's rating to DPG 3B.[55] Under this standard a department must be able to meet the requirements of NFPA 1142, in relation to its ability to use a tender to shuttle the necessary supplies of water to a fire scene.[56] The Fire Underwriters summarize the requirements as follows:[57]

> A Public municipal-type water supply is not required for DPG 3B, however [a] fire department must have adequate equipment, training and access to approved alternative water supplies to deliver standard shuttle service in accordance with NFPA 1142, Standard on Water Supplies for Suburban and Rural Fire Fighting. A formal plan for use of alternative water supplies must be in place and available for review detailing the alternative water supply points and characteristics. To be credited, fire department access to alternative water supplies must be 24 hours per day and 365 days per year. Refill capacity from alternative water supplies using drafting techniques requires a pump that has a minimum capacity of 450 LPM (100 IGPM) at 275-415 kPa (40-60 psi).[58]

Neither Lions Bay nor WVFRS currently uses tenders. Conceptually, however, it may be possible to address some part of the water supply concerns through the use of tenders – though this would have a significant impact on the apparatus needs (including apparatus storage) and

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[53] Source: https://fireunderwriters.ca/Grading/Dwelling-Protection-Grade, Accessed: 8 November 2020.

[54] Imperial Gallons.

[55] Fire Underwriters, *Alternative Water Supplies for Public Fire Protection*, (undated: ~2012).

[56] National Fire Protection Association, *NFPA 1142: Standard on Water Supplies for Suburban and Rural Fire Fighting* (2017 Edition) ("NPFA 1142").

[57] Fire Underwriters, "Minimum Criteria for Dwelling Protection Grade 3B: Alternative Water Supply" at: https://fireunderwriters.ca/Grading/Dwelling-Protection-Grade

[58] *Ibid*.

training requirements for Lions Bay. Ideally, there also would need to be an identified local source of water from which to refill the tenders. This potential approach would require detailed consideration and planning with Lions Bay, along with appropriate costing, as well as a cost-benefit assessment versus the upgrading of the local water infrastructures.

DPG 4

A DPG 4 rating is applied by the Fire Underwriters in two circumstances: one, where a fire department would otherwise meet a higher rating, but is missing some component of the qualification; and two, where a contracted fire service is provided by a department that has a 3B rating (presumably to reflect greater travel distances). A DPG 4 rating is typically treated as "semi-protected" by most insurers who apply the Fire Underwriters rating system.

DPG 5

A DPG 5 rating means that the property is unprotected. This either means that there is no recognized fire protection – as currently is the case for the three communities under study – or certain critical requirements are not met (e.g., the property is more than 8 kilometres by road from a fire hall). It should be noted that where there is a recognized fire service, various insurers will still provide some discount where travel distances exceed those prescribed by the Fire Underwriters, though that practice varies.

Response Issues

Travel Distances

As noted, the Fire Underwriters use a number of criteria to determine insurance ratings for residential and commercial structures including the distance by road network from an accredited fire hall. Within the area being reviewed, the only two fire halls that could be considered are Lions Bay Hall 1 and West Vancouver Hall 2. In terms of residential structures the Fire Underwriters provide the following guidance:[59]

> Recognized response distances are limited to 8 km by road of continuously accessible (and appropriately maintained) public roads. Response from within 5 km by road is preferred due to reduction in response times. Private roads may be recognized where evidence of maintenance reliability is evaluated and accepted by Fire Underwriters Survey.

For the multi-family property and strata-owned property in Ocean Point, the rating is likely under the PFPC standard, which sets a maximum distance from a fire hall of five kilometres.

On this basis, the travel distances to the three area from each of the two fire departments can be calculated.[60] For each of the following examples, the distance is calculated to the furthest extent of the road network within the three areas.

Lions Bay can provide a response within the preferred five kilometre travel distance for two communities and and eight kilometres for the third:

- Distance from Lions Bay Hall to
    - Ocean Point: 4.3 kilometres;
    - Strachan Point: 5 kilometres; and
    - Montizambert Wynd: 7.6 kilometres.

West Vancouver could only provide a response within eight kilometres for Montizambert Wynd:

- Distance from West Vancouver Hall 2 to
    - Montizambert Wynd: 6 kilometres;
    - Strachan Point: 9.8 kilometres; and
    - Ocean Point: 9.1 kilometres.

[59] Source: https://fireunderwriters.ca/Grading/Dwelling-Protection-Grade Accessed 9 November 2020.

[60] Distance calculated using ESRI and Google Earth Pro.

Their response to Strachan Point might be improved if the centre median was removed at the entrance, however at the present time the only access is from the southbound lanes. Strachan Point cannot currently be accessed from the northbound lane (see Figure 14 below).



Figure 14: S2S Highway Northbound at Strachan Point Road

To the extent that the involvement of WVFRS is limited to the provision of mutual aid in support of Lions Bay, however, these additional travel distances are not significant. For mutual aid responses, the Fire Underwriters will provide credit for assistance provided by a department up to 25 kilometres away.

Travel Time

Travel times to each of the three areas are variable and can only be estimated lacking any real time historical data. For Lions Bay their response time will be contingent on paging volunteers and the time taken to staff their first-out Engine; this time may vary by time of day as fewer members are generally available during normal working hours on weekdays.

For West Vancouver, their response from Hall 2 in Horseshoe Bay can be estimated but without historical data such estimates are uncertain. Response time to each of the three areas would be different with the shortest distance being to Montizambert Wynd, and Strachan Point being the longest, given the lack of any northbound access from Highway 99.

Infrastructure Requirements

Each of the three communities has unique attributes and challenges to be considered when determining whether fire protection services are immediately available. With Lions Bay as the primary response department, an exterior level of service is feasible from the standpoint of equipment and training, however improving both the water supply infrastructure and road access are key prerequisites for any service delivery to two of the three communities.

Montizambert Wynd

The community at Montizambert Wynd would need to address several issues before a potential fire protection agreement would be considered feasible. The areas of concern include water supply (storage, flow, distribution), road and property access challenges.

The water supply (fire flow) requirements cannot be met with the existing water system as the analysis in the previous studies have indicated.[61] It would require water infrastructure upgrades, either in conjunction upgrading the existing water system and connecting with the West Vancouver system or as an independent firefighting system, separate from the potable water system. The latter could be accomplished either through the establishment of a reservoir through a new intake fed by the creek. Both options would require new infrastructure upgrades to meet the necessary fire flow requirements through appropriate water supply piping and hydrants. Dayton & Knight noted in their 2001 Report that West Vancouver would not consider the option of a connection to its system solely for firefighting water supply.[62]

In the 2001 Report, the option for connecting to the West Vancouver system that best meets the fire flow requirements is option 3, although some properties at the north end may not achieve the full fire flow.[63] Since that report, however, there has been no agreement with West Vancouver to see its water supplies extended to cover Montizambert Wynd.

The fifth option in the 2001 Report involved the establishment of a new, compliant water system that would meet both household and firefighting requirements.[64] This option was, at the time, considerably more expensive than the one involving the connection to the West Vancouver system. Since that high-level cost estimate was made 20 years ago, standards for potable water have been made more stringent, and the overall cost of infrastructure projects of this nature have risen significantly and should be updated.

Road access and egress to Montizambert Wynd properties is through a single lane road which crosses a Bailey bridge (it needs to be confirmed whether this bridge has been rated and when that occurred) and continues initially with an uphill grade of which peaks at Lot 7 then a downhill grade to a dead end with no turnaround. The width of the road is narrow (see Figure 4 and

[61] 2001 Report, p. 8-2.

[62] *Ibid.,* p. 6-3.

[63] *Ibid.,* pp. 7-2 to 7-3.

[64] *Ibid.,* pp. 7-3 to 7-4.

Figure 5) and might be adequate for apparatus that would potentially respond only as far as Lot 7, providing a suitable turnaround area could be provided at this location.

The road configuration would prevent fire apparatus from proceeding safely past Lot 7, due to both road's narrowness and steep grade. It would be difficult to safely traverse this part of the road in fire apparatus at the best of times, and highly risky in winter weather conditions or at night.

Without a turnaround, the apparatus would also be required to try to exit in reverse up the steep incline. Egress concerns also exist in circumstances where the fire moves into the interface, which would result in apparatus becoming potentially trapped by a fast moving wildfire.

The net result would be the need to move all firefighting equipment by hand to any incident scene to the north of the road peak. In situations where there is limited or no access for fire vehicles to an area, it may be prudent to provide a storage container within the area for fire hose, pumps and other equipment. Typically, this equipment would be owned and maintained by the fire department.

The response challenges are also compounded by the restricted access to most residential structures, which is gained by way of steep stairways. Most structures have significantly limited accessibility that would be challenging to manage. The forested areas encroach on and between properties and in many cases, the terrain would prevent all around access or the use of ground ladders in many properties. The implementation of community-wide FireSmart activities, to reduce the potential fuel load and mitigate the risk of a structure fire spreading into the interface, should be undertaken.

Consideration of fire protection service delivery would be predicated on the establishment of a water system that is capable of meeting the fire protection requirements, along with a need to establish a turnaround near Lot 7 that meets the fire department requirements. It would also be highly recommended that any arrangement also include the completion of a community pre-incident response plan, along with a preplan for each individual property to take into account the unique challenges and characteristics of individual lots.

Strachan Point

The community of Strachan Point currently has challenges with respect to the adequacy of its water system and the suitability of its road access with respect to fire protection services. The 2009 Report is the most recent evaluation of the water needs for the community and it outlined the domestic and firefighting needs along with potential options. The 2009 Report, consistent with the 2001 Report, concluded that the existing infrastructure was insufficient to supply the required fire flows for fire suppression operations. [65]

While the community has several standpipes connected to the potable water system, both the capacity of the piping used and size of standpipes are insufficient to support the recommended fire flow of 600 - 800 Igpm. In addition, the amount of storage required to support the fire flow

[65] 2009 Report, p. 5-3

was calculated at 72,000 Imperial gallons ("Igal"), and the current reservoir has a capacity of only 8,000 Igal.[66]

The presence of numerous swimming pools in the community was noted in the 2009 Report and the site visit in 2020 confirmed the finding that they were not suitable as a source of firefighting water supply, due primarily to their locations on the ocean side of the residences where drafting would not be feasible.

Consideration was also given to using the ocean as a firefighting water supply. In the 2009 Report, a de-salination plant was considered but rejected as part of the potable water system due to the costs involved. From a firefighting perspective, the establishment of a saltwater supply system involves significant costs and give rise to a number of concerns. Even without the potable water considerations, there would be a need for power and a backup generator system to create the required pressure and more importantly there would not be adequate storage capacity available to meet the fire protection needs.

After a review of the previous reports and the site visits, it was ascertained that the most viable solution was the provision of a fire protection water supply through the creation of a stand-alone reservoir and distribution system of sufficient capacity as described in the 2009 Report.[67] The recent upgrade included the provision of potable water however there is insufficient infrastructure and capacity for firefighting as was evident during the 2014 fire.

The existing road access (including overhead clearances) does not meet the B.C. Building Code requirements for fire access, but was evaluated as being viable by Lions Bay for one Engine, however the lack of adequate turnaround areas for roads ending at lots #12, #7 and #1 still creates some challenges. Similarly, the terrain around some of the structures presents a challenge for firefighters to access the sides of the structures and/or the use of ground ladders when needed. It is recommended that these access issues would be best addressed by the creation of a community pre-incident plan and individual property preplans to take into account the unique aspects of each lot.

Overall, the provision of fire protection services is viable provided the firefighting water supply requirements can be met by the community.

Ocean Point

The community of Ocean Point currently has an established water supply system suitable for both potable water needs and firefighting purposes. There is a 100,000 Igal[68] water storage reservoir that supplies water through existing infrastructure, which includes suitably located fire hydrants. The requirement for the community, based upon the 2001 report that covered 10 homes and 8 townhouses, was 76,000 Igal. At the time, there were six lots that were undeveloped, which could result in a new storage requirement which should be re-assessed.

[66] *Ibid.,* p. 19.

[67] *Ibid.,* p. 24.

[68] Imperial gallon.

The recommended fire flow noted in earlier studies, calls for 600 - 800 Igpm[69] to meet firefighting water supply requirements.[70] These pressure requirements were met, as the flow range of the system was rated at 800 - 965 Igpm depending on the lot location.[71] The hydrant system at Ocean Point has most recently been tested in January 2021 and each of the four hydrants meets or exceeds these flow rates[72].

In summary, the provision of fire protection services would be possible since there are no access issues but subject to a reassessment of water storage and flow rates.

[69] Imperial Gallons per minute.

[70] 2001 Report.

[71] Dayton and Knight report, p. 5-1.

[72] The four hydrants respectively had tested flow rates of 970, 1100, 1275 and 1275 Igpm.

Adjacent Fire Departments

Issues related to the provision of a fire response for the three neighborhoods were discussed with Lions Bay and West Vancouver using a matrix model to evaluate the following:

- Road access concerns and limitations
- Water supply concerns and limitations
- Staffing availability 7/24 and any limitations
- Department's level of service (Exterior, Interior, Full Service)
- Level of Service that could be provided to each neighborhood
- Provision of First Medical Response ("FMR") or Motor Vehicle Incident ("MVI") for each neighborhood
- Any service that would not be provided
- Availability of Pre-planning
- Response provided under Metro Vancouver Mutual Aid Agreement
- Response provided under a Service Agreement
- Backfill requirements for West Vancouver's response in support of Lions Bay
- For West Vancouver the applicability, or not, of the shared services agreement with North Vancouver District and North Vancouver City
- Cost for the service to each neighborhood
- Does current bylaw allow for response to any of these neighborhoods
- If not, would Council consider amending the bylaw to provide a response
- Minimum conditions to provide a response
- Apparatus required for a response to these neighborhoods

Lions Bay Fire Rescue

Response issues were reviewed with LBFR Fire Chief and Chief Administrative Officer who provided comment based on each of the three neighborhoods.

Issue	LBFR Comment
Do you always request a response from West Vancouver for a structure fire?	No, we would size up the event and see how many of our members are responding.
When was the last joint response to a structure fire in Lions Bay?	Bayview Road, Lions Bay Strachan Point, Metro
When was their last joint response to an emergency other than a structure fire?	Over 10 year ago for an MVA. West Vancouver left when we arrived on scene.
How many joint responses to you do annually (approximately/on average)?	Nil

Ocean Point

Ocean Point: Issue	LBFR Comment
When was your most recent review of the area for access by Type 1 Engines, Ladders, Rescue	3 years ago
Any concerns about road access and if so, what are they?	No
How would they limit your response?	No
Any concerns about water supply and if so, what are they?	We need to have records for ALL specifics on supply, storage, GPM, etc.
Would this limit your response, and if so, how?	Not expected to be an issue
What level of fire service would you be prepared to provide?	We need a lot more information before we could commit to providing Interior service level – All safety considerations would have to be confirmed including number of FFs responding; we may not be able to go in to the large 4-Plex at all – need to do further investigation and pre-planning include the roof plan
Would you provide First Medical Response (FMR) or response to Motor Vehicle Incidents (MVI) in this area?	We already do
Is there a specific service you would not perform in this area?	We need a lot more information before we could commit to providing Interior service level – All safety considerations would have to be confirmed including number of FFs responding; we may not be able to go in to the large 4-Plex at all – need to do further investigation and pre-planning include the roof plan
Have you pre-planned this area and if so when was that?	No
Do you consider the 1995 Mutual Aid agreement to be applicable in this area?	No, including no Council consent at this point
If not, would this be a service agreement and if so, what do you estimate your costs for this?	Noted that the CFO still working on the numbers
Would your bylaw currently allow you to respond to this area?	No
If not, would your Council consider an amendment to provide response to this area?	Yes, they will consider depending on Fire Chief and CAO recommendation and resolution of key issues, including confirmation of insurance coverage in the event of a total loss of apparatus.

Ocean Point: Issue	LBFR Comment
What are the minimum requirements for your response to this area?	1 engine with 4 members and confirmation of coverage for Village by 2nd Lions Bay staffed engine or external fire department(s) – would need to include provision for no response or aborted response if simultaneous fire in Village Noted they may not respond if fully occupied in Lions Bay
Do you have the appropriate equipment/apparatus to provide fire response, if not, what is required? Lions Bay: if a ladder was required, should clarify if West Vancouver could/would provide one.	Yes, subject to review of the multi-story structure on the uphill side. Noted that this is related to the pre-plans

Strachan Point

Strachan Point: Issue	LBFR Comment
Any concerns about road access and if so, what are they?	Yes, narrow in spots and risk of being cut off. Noted LBFR could get an Engine right to the limit but it is twisty; some risk of being trapped, we relay pumped when we had the fire some years ago. Some attempt at fuel mitigation would be helpful.
How would they limit your response?	Would only take in 1 engine
Any concerns about water supply and if so, what are they?	Yes, they do not have adequate water supply/storage for fire fighting and the standpipes are too close to the homes. Noted that in the previous fire, they were out of water in about 5 minutes. Pipes also may not be rated for firefighting water supply.
Would this limit your response, and if so, how?	Would not commit to a service agreement unless water supply rectified
What level of fire service would you be prepared to provide?	None without adequate water – Exterior exposures only to prevent spread
Would you provide FMR or MVI in this area?	Already do
Is there a specific service you would not perform in this area?	Fire fighting without water – no Interior attack
Have you pre-planned this area and if so when was that?	No, went down there many years ago to check it out and determined we would not respond due to water issues

Strachan Point: Issue	LBFR Comment
Do you consider the 1995 Mutual Aid agreement to be applicable in this area?	No
If not, would this be a service agreement and if so, what do you estimate your costs for this?	CAO noted that the CFO still working on the numbers
Would your bylaw currently allow you to respond to this area?	No
If not, would your Council consider an amendment to provide response to this area?	May consider on recommendation of Fire Chief and CAO if key issues could be resolved.
What are the minimum requirements for your response to this area?	Adequate water supply, 1 engine with 4 members and confirmation of coverage for Village by 2nd Lions Bay Engine or external fire department(s) – would need to include provision for no response or aborted response if simultaneous fire in Village
Do you have the appropriate equipment/apparatus to provide fire response, if not, what is required?	Yes

Montizambert Wynd

Montizambert Wynd: Issue	LBFR Comment
Any concerns about road access and if so, what are they?	Yes, very narrow access
How would they limit your response?	Would have to use 2 apparatus and lay in a lot of hose from West Vancouver side of boundary
Any concerns about water supply and if so, what are they?	Yes, inadequate water supply for fire fighting – need to know GPM for West Vancouver hydrant With reference to the West Vancouver hydrant there will need to be permission as this may drain that water supply entirely for all depending on it
Would this limit your response, and if so, how?	Yes, would likely have to use a second Engine to pump water, thus depleting coverage for Lions Bay, so that would have to be addressed.
What level of fire service would you be prepared to provide?	None without adequate water supply – even then, would only do Exterior exposures to prevent spread
Would you provide FMR or MVI in this area?	Already do
Is there a specific service you would not perform in this area?	Would not do Interior attack
Have you pre-planned this area and if so when was that?	No

Montizambert Wynd: Issue	LBFR Comment
Do you consider the 1995 Mutual Aid agreement to be applicable in this area?	No
If not, would this be a service agreement and if so, what do you estimate your costs for this?	CAO noted that the CFO still working on the numbers
Would your bylaw currently allow you to respond to this area?	No
If not, would your Council consider an amendment to provide response to this area?	May consider on recommendation of Fire Chief and CAO if key issues could be rectified
What are the minimum requirements for your response to this area?	Adequate water supply, 1 engine with 4 members and confirmation of coverage for Village by 2nd Lions Bay Engine or external fire department(s) – would need to include provision for no response or aborted response if simultaneous fire in Village
Do you have the appropriate equipment/apparatus to provide fire response, if not, what is required?	Yes Fire Chief noted they may stop at the bridge

West Vancouver Fire & Rescue Services

Response issues were reviewed with the WVFRS Fire Chief who provided comment based on each of the three neighborhoods.

Issue	WVFRS Comment
How does West Vancouver currently manage backfilling in its area when it responds on a mutual aid call to Lions Bay?	We have three options: 1. We move up units within West Van, then 2. Units come from North Vancouver City and District, then 3. For a longer time period we will call overtime to backfill a hall or spare apparatus.
Has West Vancouver ever backfilled Lions Bay, when Lions Bay was responding to an incident and/or would they ever propose to do so?	Not that we are aware of
Has West Vancouver ever responded to a second incident in Lions Bay, where Lions Bay was already fully involved with a different incident?	Not to my knowledge.

Ocean Point

Ocean Point: Issue	WVFRS Comment
When was your most recent review of the area for access by Type 1 Engines, Ladders, Rescue	Have not been past the gate with apparatus but did review a few weeks back with the command vehicle
Any concerns about road access and if so, what are they?	No
How would they limit your response?	Noted that we have not gone past the gate
Any concerns about water supply and if so, what are they?	No
Would this limit your response, and if so, how?	No
What level of fire service would you be prepared to provide?	Provided there was water and access, there would not be any restrictions. If an interior attack would need a full assignment from West Vancouver, 3 Engines, 1 Tower and Duty Chief. We also have a working fire call, between a first alarm and a second alarm. The working fire would provide 2 engines, 1 tower and a duty chief. And that would involve the city and district. That level of response would be contingent on their cooperation with that.
Would you provide FMR or MVI in this area?	No
Is there a specific service you would not perform in this area?	Nothing beyond a fire response. For a wildfire response and we were tasked, we would respond with an SPU and a crew but that would be a different agreement.
For West Vancouver would your response be contingent on Lions Bay being on scene?	Yes, but with a service agreement. At the present time we do not have the authority to respond there.
If they were not on scene would you still respond to this area?	Would not be an automatic response, would need authority first
Have you pre-planned this area and if so when was that?	No
Do you consider the 1995 Mutual Aid agreement to be applicable in this area?	No
If not, would this be a service agreement and if so, what do you estimate your costs for this?	Haven't considered the costs and would be a service agreement. Would be required to recover costs whatever the agreement is technically called.

Ocean Point: Issue	WVFRS Comment
Would you consider backfill in West Vancouver by the City of District of North Vancouver as Mutual Aid or part of the North Shore shared services agreement?	May need a bit more discussion with the North Vancouver City and North Vancouver District, but it looks like backfill would be under the mutual aid agreement
Would your bylaw currently allow you to respond to this area?	No
If not, would your Council consider an amendment to provide response to this area?	Hasn't been placed in front of them to this point but may in the future based on more information. At the moment though, no
What are the minimum requirements for your response to this area? Does this mean you have to have the 2nd Lions Bay Engine staffed before sending the first Engine to one of their areas. Peter DeJong, may not respond if we were fully occupied in Lions Bay	A full assignment from West Vancouver equates to 3 Engines, 1 Tower and Duty Chief. We also have a working fire call, between a first alarm and a second alarm. The working fire would provide 2 engines, 1 tower and a duty chief. And that would involve the city and district. That level of response would be contingent on their cooperation with that.
Do you have the appropriate equipment/apparatus to provide fire response, if not, what is required?	Needs a further look

Strachan Point

Strachan Point: Issue	WVFRS Comment
Any concerns about road access and if so, what are they?	The bridges and the weight rating, also the width. There was snow on the ground and for a fire response on that basis would have huge concerns.
How would they limit your response?	We do not have a mini pump, only the Type 1, probably just one Engine and the duty chief. We would not take the Tower
Any concerns about water supply and if so, what are they?	Concerned about it, would need a pretty robust assessment. Also, not close enough to the ocean to make drafting easy.
Would this limit your response, and if so, how?	Response limited by water, probably not do an interior attack without sufficient water.
What level of fire service would you be prepared to provide?	Exterior only depending on where in the area, at the further distant point it would be very limited.
Would you provide FMR or MVI in this area?	No, we have done MVI on the highway, but not in Strachan Point

Strachan Point: Issue	WVFRS Comment
Is there a specific service you would not perform in this area?	Nothing beyond a fire response. For a wildfire response and we were tasked, we would respond with an SPU and a crew but that would be a different agreement. Also limited as for Lions Bay in terms of access and egress, worry about having crews trapped.
For West Vancouver would your response be contingent on Lions Bay being on scene?	Yes, but with a service agreement. At the present time we do not have the authority to respond there.
If they were not on scene would you still respond to this area?	Would not be an automatic response, would need authority first
Have you pre-planned this area and if so when was that?	No
Do you consider the 1995 Mutual Aid agreement to be applicable in this area?	No
If not, would this be a service agreement and if so, what do you estimate your costs for this?	Have not considered the costs and would be a service agreement. Would be required to recover costs whatever the agreement is technically called.
Would you consider backfill in West Vancouver by the City of District of North Vancouver as Mutual Aid or part of the North Shore shared services agreement?	Mutual aid
Would your bylaw currently allow you to respond to this area?	No
If not, would your Council consider an amendment to provide response to this area?	Hasn't been placed in front of them to this point but may in the future based on more information. At the moment though, no.
What are the minimum requirements for your response to this area?	First alarm as above which is, 3 Engines, 1 Tower and Duty Chief. We also have a working fire call, between a first alarm and a second alarm. The working fire would provide 2 engines, 1 tower and a duty chief. And that would involve the city and district. That level of response would be contingent on their cooperation with that.
Do you have the appropriate equipment/apparatus to provide fire response, if not, what is required?	A smaller engine would be an improvement but don't have one now

Montizambert Wynd

Montizambert Wynd: Issue	WVFRS Comment
Any concerns about road access and if so, what are they?	Bridge and road access are concerns, worry about water supply and access/having crews get trapped.
How would they limit your response?	Yes, would not be willing to put an engine there at this point
Any concerns about water supply and if so, what are they?	There really isn't a water supply. With reference to the West Vancouver hydrant there will need to be permission as this may drain that water supply entirely for all depending on it
Would this limit your response, and if so, how?	Would limit the response as we need a plan to get water to the truck and then to the houses, would require relay pumping and a lot of preplanning. Had a look at drafting from the marina but that would take up a lot of setup that would take considerable time.
What level of fire service would you be prepared to provide?	Exterior
Would you provide FMR or MVI in this area?	We go to the marina at the present time, but we might go there
Is there a specific service you would not perform in this area?	Would not do interior.
For West Vancouver would your response be contingent on Lions Bay being on scene?	Yes, but with a service agreement. At the present time we do not have the authority to respond there.
If they were not on scene would you still respond to this area?	Would not be an automatic response, would need authority first
Have you pre-planned this area and if so when was that?	No
Do you consider the 1995 Mutual Aid agreement to be applicable in this area?	No
If not, would this be a service agreement and if so, what do you estimate your costs for this?	Have not considered the costs and would be a service agreement. Would be required to recover costs whatever the agreement is technically called.
Would you consider backfill in West Vancouver by the City of District of North Vancouver as Mutual Aid or part of the North Shore shared services agreement?	May need a bit more discussion with the two departments but looks like backfill would be under the mutual aid agreement.
Would your bylaw currently allow you to respond to this area?	No
If not, would your Council consider an amendment to provide response to this area?	Has not been placed in front of them to this point but may in the future based on more information. At the moment though, no.

Montizambert Wynd: Issue	WVFRS Comment
What are the minimum requirements for your response to this area?	1st alarm assignment. 3 Engines, 1 Tower and Duty Chief. We also have a working fire call, between a first alarm and a second alarm. The working fire would provide 2 engines, 1 tower and a duty chief. And that would involve the city and district. That level of response would be contingent on their cooperation with that.
Do you have the appropriate equipment/apparatus to provide fire response, if not, what is required?	A mini-pump, smaller engine and/or a tender.

Lions Bay and West Vancouver: Response Model/Scene Operations

Issue	Lions Bay Comment	West Vancouver Comment
Do you have an agreed incident response plan with the other department?	No, we would have to create one	Not aware
For West Vancouver: is the response model for Lions Bay understood by North Vancouver City and North Vancouver District?		As per the 1995 mutual aid
For West Vancouver: can you confirm that the City or North Vancouver District will respond to Ocean Point, Strachan Point, Montizambert Wynd either as the first-in response or in support?		No not at the moment.
What is your minimum number of firefighters that could be expected?	4-6 on a weekday, minimum 7 on weekends (could be double), and about 20 in evenings	15 at all times
Does this change by day of week or hour of the day?	Yes	No
What is your DPG rating and what year was this done?	DPG 3A – March 2020	DPG 1, 2018
What is your PFPC rating and what year was this done?	PFPC 3 – March 2020	PFPC 3, 2018

Issue	Lions Bay Comment	West Vancouver Comment
Do you currently have the capability to draft from the ocean?	Yes	Yes
Is the fireground accountability system the same for the two departments?	Yes	Will check. North Vancouver City and North Vancouver District use a different system (Blue Card), not completely 100% but close
Which department would be responsible for developing and maintaining pre-plans?	Each responsible for own area	We would
How would you see the role of IC being determined if your two departments respond together?	First engine on scene would establish IC	First in would establish command but would transfer to Lions Bay if we were first.
If the other department was tied up at another call, would your department respond as the first-in unit?	Yes	Lions Bay yes, not the others as of now

Mutual Aid

Lions Bay and West Vancouver are parties to the 1995 Agreement along with 17 other communities (including Metro, in relation to the Sasamat Volunteer Fire Department).[73] The 1995 Agreement enables the parties to provide support to one another in connection with a major incident. It also permits a responding department to charge for any emergency response services provided to a neighbour. As is common in such agreements, a party may, without liability, refuse to provide assistance.

Lions Bay has, on several occasions, requested mutual aid from West Vancouver for support within the Village itself. The resources provided by WVFRS support Lions Bay to the level at which the latter is operating. That is, if Lions Bay is operating as exterior only, then West Vancouver provides service at that level, but does not exceed it.

Although Metro is a party to the 1995 Agreement, in the event that it establishes new service areas for the three communities covered by this report, that agreement would have to be amended to apply to these new areas. Alternatively, it may be preferable to create a standalone mutual aid structure addressing the provision of assistance by WVFRS into any of the communities being serviced by Lions Bay. These issues are canvassed in the "Legal Structure and Requirements" section below.

Based on our discussions with WVFRS, there is no conceptual objection to developing such a new agreement to cover these communities – provided that the issues of access and water supply in Montizambert Wynd and Strachan Point are satisfactorily addressed.

[73] At the time the agreement was signed, there were 20 parties, as the University Endowment Lands had a separate fire department which was consolidated with Vancouver Fire/Rescue Services in November 1995.

Legal Structure and Requirements

The provision of fire protection and related services into the three communities will require the establishment of one or more local service areas under the provision of the *Local Government Act*. Given the disparity in requirements, we would suggest that three local service areas be established. When created, the following matters should be considered:

(a) For Ocean Point, the service created will be for fire protection and emergency response services. We recommend a broader description of what services may be provided, rather than simply saying "fire protection", since we are aware of situations where local governments have been advised that the description is not broad enough to encompass medical first responder or other types of emergency responses from a fire department. The service establishment bylaw should specifically contemplate that the service may be provided either directly or by contract with a third party, and otherwise will need to meet the requirements of the *Local Government Act* for elector approval and content (e.g., maximum taxation rate, service area delineation, etc.).

(b) For each of Strachan Point and Montizambert Wynd, the service will need to be more broadly described, and include the right to fund the construction and maintenance of water systems and related infrastructure necessary to support the provision of fire services. The latter will need to include any upgrades required for access/egress in each of the communities, in addition to building out the respective water systems to a point where they can support an effective and safe fire response. These infrastructure improvements will likely constitute a pre-requisite for receiving fire protection services.

(c) All three service establishment bylaws should expressly contemplate that fire inspections and pre-planning of fire risks, also are covered and may be funded. While the majority of the risks are residential, and both the existing and future fire inspection obligations under provincial legislation apply only to commercial and public buildings,[74] for operational reasons pre-plans for each residence should be established, particularly in Montizambert Wynd and Strachan Point. Strata-owned and multi-family properties in Ocean Point, if material, may also require inspection.

(d) Since fire departments in British Columbia do not have inherent powers, consideration will also need to be given to granting powers to any contracted fire service. Metro has a very good precedent bylaw covering the operations of the Sasamat Volunteer Fire Department. We would suggest that a general powers bylaw covering the three service areas (and other parts of Electoral A in the immediate vicinity) be crafted and made to apply to any contracted service. The development of this operational powers bylaw should be done in consultation with Lions Bay, and should be at least as broad as the powers that are granted to that department within its own jurisdiction. Alternatively, the

[74] Under the *Fire Services Act*, see sections 26 and 36. Under the new, but still-to-be-proclaimed, *Fire Safety Act*, see Part 4 (sections 8 – 10).

service establishment bylaws and service agreement could incorporate by reference the powers granted to the Lions Bay department under its own, constituting bylaw.

One or more service agreements will be required with Lions Bay covering the provision of fire suppression and any other emergency response services into each relevant community. In addition to providing for the payment of the negotiated fees for service, it will need to specify both the range of service being provided as well as the standard to which they will be supplied. The agreement should set out the level of service provided by the contracted department, as contemplated under the training standards set by the Office of the Fire Commissioner (i.e., exterior only, interior or full service). It also should set out respective responsibilities for various matters, included water supplies, hydrant testing/maintenance, access issues (e.g., winter road clearing) and similar matters.

The service agreement will need to address liability. It should expressly recognize that the service is being provided by a volunteer or paid-on-call department, and that a response may be delayed or insufficient as a result. It also should recognize, where appropriate, any limitations arising from access challenges and water supply issues.

As discussed, Lions Bay currently receives mutual aid support from West Vancouver under the 1995 Agreement. Although Metro is a party to the 1995 Agreement, its participation relates only to the Sasamat Volunteer Department and its service area. If West Vancouver is prepared to provide support into one or more of these three communities, either:

(a) an amendment to the 1995 Agreement, adding the new areas, will be required; or

(b) a separate aid agreement will need to be developed between the three parties (Metro, Lions Bay and West Vancouver).

The second option is clearly the easiest to manage. It also will enable the parties to better tailor the agreement to the specific situation. The new aid agreement should specify what support will be provided by West Vancouver, and in what circumstances. We would anticipate that any such standalone agreement would include the right to charge for the cost of assistance provided, on substantially the same terms as the 1995 Agreement. This approach would need to be reflected in any fire protection service agreement between Metro and Lions Bay, to ensure that the costs of a mutual aid response can be flowed through to the relevant service area.

As part of any such new arrangement, it may be useful to include both North Vancouver City and North Vancouver District as parties, since their departments work in an integrated fashion with WVFRS.

From an operational powers perspective, the new agreement should specify the operational powers of any assisting department. If Metro creates a new operational powers bylaw, we recommend that it expressly address situations where external assistance from an aid partner is being provided.

Our understanding is that, in relation to the 2014 fire in Strachan Point, one of the Vancouver fire boats responded. The cost of that response was not paid. If a fire boat response may be

needed or required in the future, Metro Vancouver and the responding department will need to work out the details (and payment requirements) in advance with the City of Vancouver.

Implementation Timeline

A high-level timeline to implement the service for the three areas will be developed to guide the evaluation process. The timeline will also identify budget impacts and the major issues to be resolved.

The implementation timeline will reflect the flow chart on the following page which identifies at a high level the items to be discussed and agreed. This model reflects the concept that Lions Bay would be the responding fire department, potentially supported by West Vancouver. Each of the three neighborhood areas is somewhat different in terms of the critical issues of the condition of the road network[75], water supply and situational risk in terms of property location, property type and property access.

[75] Road width, grade, overhead clearance and the ability to turn apparatus around vary with each of the three areas.

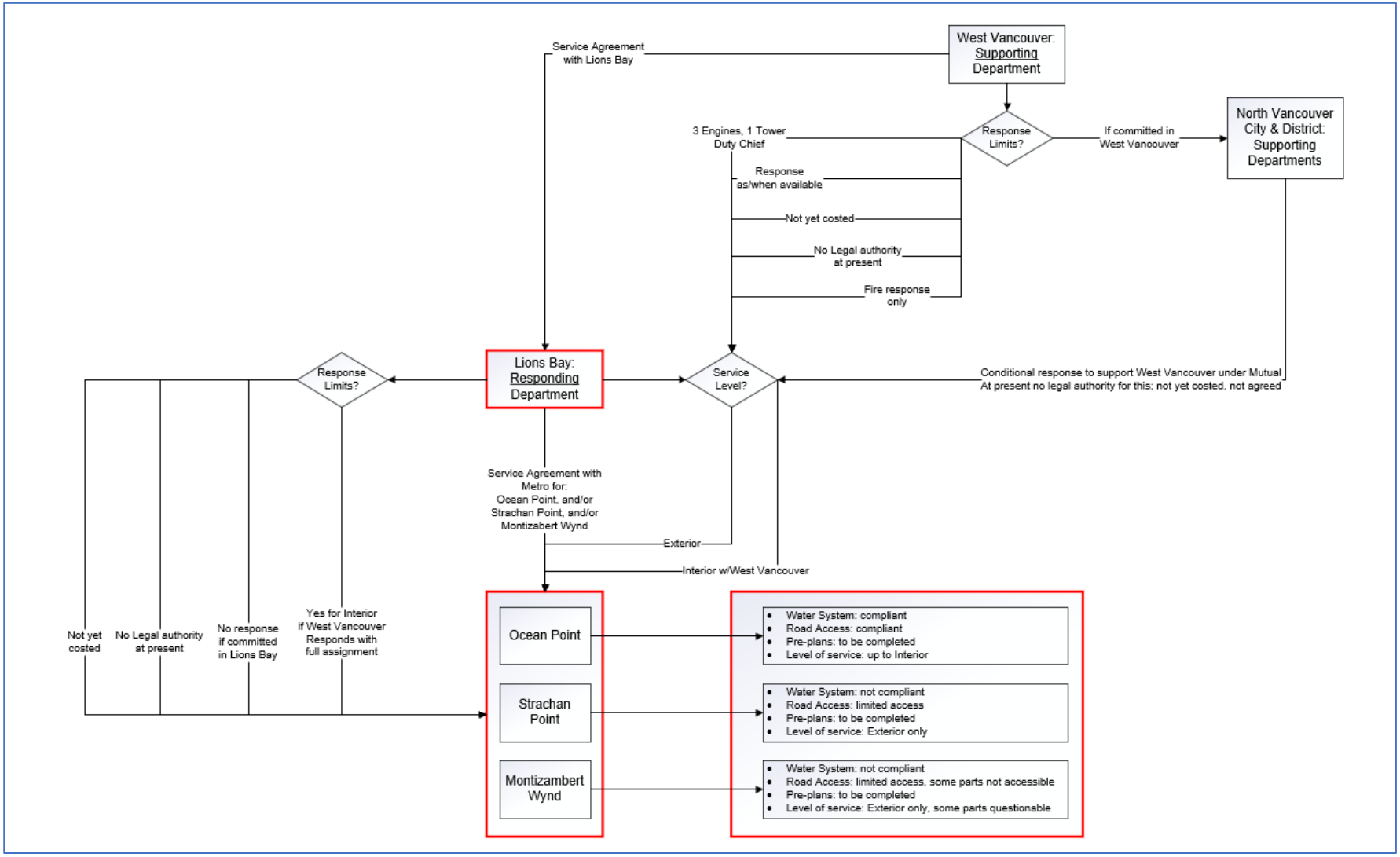


Figure 15: Implementation Issues

Summary and Conclusions

Provision of fire protection for Montizambert Wynd, Strachan Point and Ocean Point is possible though each of the three areas has one or more issues to be resolved. As well, new service areas will be required with approval by area residents based on identified costs from Lions Bay. Lions Bay in turn will require confirmation of the degree to which its fire response will be supported for these additional areas by West Vancouver. In turn West Vancouver will require confirmation that its existing coverage agreement with North Vancouver City and North Vancouver District Fire Departments would also apply in Area A as well as Lions Bay.

1. It is possible to provide protection in this area, and it would probably be best to phase it.

2. Some insurance cost reduction should be possible, we know that Strachan Point agrees it is unprotected and current rates range around $10,000.

3. Metro A granted permission for Lions Bay response to Ocean Point in 2002 so this is already in place.[76]

4. Ocean Point would be the easiest and most compliant in terms of water supply, road access and modern construction with sprinklers, then Strachan Point and then Montizambert Wynd

5. Strachan Point has mostly reasonable roads, but lacks water.

6. Montizambert Wynd has a more challenging road network and lacks water and given the narrowness of the road and the steepness of the terrain might be the most difficult to provide; it would be a real challenge getting a Type 1 Engine into this area. One future consideration might be a Type 3 Engine however neither Lions Bay nor West Vancouver has one.

7. Preplans for Strachan and Montizambert should be part of requirements (community level and for properties). The pre-plans should contemplate the train tracks and the access and egress issues.

8. The 8 kilometre coverage works from Lions Bay for all three local areas, West Vancouver can only meet this requirement for Montizambert Wynd.

9. The Metro mutual aid agreement may be a challenge for the purpose of providing a response to the three local areas. It could however provide the backup for West Vancouver, subject to concurrence by North Vancouver City and North Vancouver District Fire Departments.

[76] Source: Metro Vancouver Timeline of Fire Aid Agreement Discussions provided by email October 21, 2020.

10. Strachan and Montizambert have bailey-type bridges that are probably okay but should be checked to ensure they can carry the weight of any fire apparatus that may respond some which can approve the maximum gross vehicle weight for three axle units.

11. Lions Bay has clarified its defined level of service as Exterior but could provide an Interior level of service based on West Vancouver also responding with a first alarm assignment.

12. If the three areas get added to Lions Bay, it may be best to excise the S2S highway so they can continue to benefit from EMBC task numbers for extrication.[77]

13. Lions Bay may want to consider procuring a Type 3 Engine for their own use, and which could be first out for Strachan and Montizambert (contract fees could be used to pay for amortized cost of purchase).

14. Ocean Point townhouses on the east side of the tracks have buildings that may be 50 or more feet above ground level and a single axle ladder truck may be a consideration see Figure 16. Alternately the level of service may be different for this one structure if a ladder truck is not available.[78]

15. One option is to consider hypothetical costs - perhaps using the BCAA tool to predict some sample insurance costs then show what the application of 3B status could do to the costs. The caveat is that insurance varies from underwriter to underwriter.



Figure 16

[77] Highways that are within the fire protection boundary are not considered eligible for EMBC reimbursement which is for “out of jurisdiction” responses.

[78] As responding fire department, Lions Bay may wish to consider a review by the FUS to confirm apparatus requirements for this portion of Ocean Point.

Appendix 1: Acronyms and Defined Terms

Term/Acronym	Definition
1995 Aid Agreement	Metro-wide 1995 Mutual Aid Agreement for Emergencies
1995 Report	Dayton & Knight Ltd., *Greater Vancouver Regional District Electoral Areas: Report on Montizambert Water Supply* (March 1995)
2001 Report	Dayton & Knight Ltd., *Greater Vancouver Regional District: Ocean Point, Strachan Point and Montizambert Wynd – Preliminary Fire Service Infrastructure Requirements* (November 2001)
2009 Report	Dayton & Knight Ltd., *Metro Vancouver: Strachan Point Water System – Upgrade Options* (January 2009).
Consultants	Dave Mitchell & Associates Ltd.
Dayton & Knight Reports	Refers collectively to the three reports (1995, 2001, and 2009)
DMA	Dave Mitchell & Associates Ltd.
DPG	Dwelling Protection Grade
Emergency Plan	*Metro Vancouver Regional District, Electoral Area A Emergency Management Plan* (February 2019)
FMR	First Medical Response
Igpm	Imperial gallons per minute
Igal	Imperial gallons
l/s	Litres per second
LBFR	Lions Bay Fire Rescue
Metro	Metro Vancouver Regional District
MVI	Motor Vehicle Incident
NFPA 1142	National Fire Protection Association *Standard on Water Supplies for Suburban and Rural Fire Fighting* (2017 Edition)
PFPC	Public Fire Protection Classification
WVFRS	West Vancouver Fire & Rescue Services

Appendix 2: Consultants' Backgrounds

Dave Mitchell

Dave Mitchell retired as Division Chief, Communications in 1998 from Vancouver Fire & Rescue Services following a career spanning 32 years. During this time, he was responsible for managing the emergency call taking and dispatch for the Vancouver and Whistler Fire Departments. In 1998, Dave was hired by E-Comm, Emergency Communications BC as its first Director of Operations. In this role he was a member of the founding senior management team and was responsible for the transition of the Regional 9-1-1 Control Centre staff from the Vancouver Police Department to its current location at 3301 East Pender in June 1999.

He left E-Comm in June 2000 to work as a consultant, and since that time has managed the development of corporate, strategic and operational plans for a number of clients. As principal of DMA, Dave participates on all projects undertaken by the company either as the lead consultant or by providing his expertise at an advisory or support level.

Dave holds a Bachelor of Arts Degree (Geography) from Simon Fraser University in addition to a diploma from their Executive Management Development Program. He is past Chair of the Board of Directors of the Vancouver General Hospital and University of British Columbia Hospital Foundation, is currently Chair of the Justice Institute of British Columbia Foundation, and a member of the Fire Chiefs' Association of British Columbia, and the Canadian Association of Management Consultants.

Gordon Anderson

Gordon Anderson retired in 2019 with 29 years in the fire service, serving for the last five as the British Columbia Fire Commissioner. In this role, he was the senior fire authority for the Province providing advice to government and supporting local government fire services, as well as dealing with fire service issues at the national level.

During this time he implemented a new Structure Firefighter Training Standard (the Playbook), modernized and expanded the wildland interface Structure Protection Program in partnership with the BC Wildfire Service and the Fire Chiefs' Association of BC and, with extensive stakeholder input, successfully developed and passed new provincial legislation to repeal and replace the current Fire Services Act (implementation pending).

Prior to joining the Office of the Fire Commissioner, he spent 13 years with volunteer fire departments, five years with the Victoria City Police and 22 years in Esquimalt Fire Rescue (a combination police/fire public safety department) where he rose through the ranks to finish his last six years as Deputy Fire Chief. He has extensive experience as a career department Chief Training Officer and 12 years as a contract instructor for the Justice Institute of BC's firefighter training program and all four levels of the Fire Officer Certificate Program.

Gord has a Bachelor of Arts degree from the University of Victoria and NFPA Fire Officer Level 4 certification; in 2018 he earned a Bachelor of Public Safety Administration degree. He also holds certification as an Executive Chief Fire Officer and is a Fellow at the Institution of Fire

Engineers (United Kingdom). He is past-President of the Council of Canadian Fire Marshals and Fire Commissioners as well as having served on the governance board of the Canadian Public Safety Operations Organization.

Jim Cook

Jim Cook is an experienced professional with over 38 years of experience in the fire service. He has extensive knowledge and experience with budgets, labour relations, fire operations, strategic planning, executive leadership, project management, community engagement, and organizational change. Jim began his career in the New Westminster Fire Department. He was promoted to the position of Deputy Chief in 2001. In 2008, Jim was appointed to the position of Fire Chief in West Vancouver where he worked to improve the mutual and automatic aid agreements in the region including with Lions Bay. His work there also included transitioning the department to the E-Comm Wide Area Radio System. During his career, Jim has worked on several committees and boards including the BC Municipal Pension Plan, BC Investment Management Corporation, Vancouver Hospital Foundation, BC Fire & Life Safety Education Program, First Responder Program and the BC Fire Chiefs Association. He is also a past-President of the Greater Vancouver Fire Chiefs Association.

Wayne Humphry

Wayne has over 40 years' experience with the BC fire service. He retired in 2009 from Vancouver Fire/Rescue after a career spanning 31 years. During this time, Wayne served in fire suppression, rising to the rank of Battalion Chief. He also worked extensively with Vancouver Fire's training division as an instructor and Division Chief between 1996 and 2009. Based on his work in both roles he has extensive experience in fire rescue emergency operations, specialty teams, logistical planning and budgeting, training and development, facilitation, and project creation and management. In addition to his work with Vancouver Fire he has been an instructor at the Justice Institute of BC, at UBC's Sauder School of Business as well as for Capilano University.

Wayne has developed and delivered in-house Firefighter and Fire Officer Development seminars, including ProBoard certified programs, for various career and volunteer/paid-on-call fire departments throughout BC, Alberta, Manitoba, and the Northwest Territories. His training expertise includes Firefighter I & II, Fire Officer Level 1, 2 and 3 programs – Emergency Incident Management (BCEMS/ICS, Command Post and EOC operations, fire behavior, strategies and tactics); Incident Safety Officer; Rapid Intervention Teams; Fire Service Instructor; and Live Fire Exercises Levels 1, 2 & 3. Wayne was also a Fire and Rescue Services Subject Matter Expert for the JI's Critical Incident Simulation Centre's program development for multi-agency, multi-jurisdictional incident management training.

Ian MacDonald

Ian MacDonald is a retired corporate securities lawyer who practiced international corporate law in Canada and the United Kingdom. Ian was a partner with a major Toronto firm in the 1990s, and moved to England in 1997, where he became the managing partner of a specialist litigation and intellectual property practice. He retired from active practice in 2004.

Ian has worked with Dave Mitchell & Associates since 2007 and has participated in almost all the major fire and emergency service projects since that time. He assists with the analysis of the legal and governance structures affecting fire and emergency services, ranging from establishment and operational bylaws to WorkSafe issues.

Peter Wunder

Peter Wunder is a B.C. registered Professional Engineer with over 35 years' experience in the design, development, implementation, commissioning, operation and maintenance of complex mechanical, electrical, and control systems. He has extensive experience in alternate energy solutions in the automotive and transportation industry including integration of hydrogen fuel cells and diesel to natural gas conversions. He has managed many challenging programs and has worked closely with regulatory bodies to ensure the successful certification and commercial introduction of products using these new technologies. Additionally, he is an experienced marine systems engineer and served on ships in the Royal Canadian Navy as Head of the Marine Systems Engineering Department, responsible for the safe operation and maintenance of all marine systems on board. In this capacity he was also Head of the shipboard Damage Control and Firefighting organization with experience in the operation and maintenance of fire suppression equipment and systems including Dry Chemical (Purple-K), Aqueous Film Forming Foam (AFFF), CO2 Flood, High Velocity Nozzles and Low Velocity Fog Applicators, and Galley Fire Suppression Systems (Range Guard). He also has direct experience in training fighting personnel onboard ship in many emergency scenarios including helicopter crashes.

metrovancouver
SERVICES AND SOLUTIONS FOR A LIVABLE REGION

To: Electoral Area Committee

From: Tom Pearce, Planner, Regional Planning and Housing Services

Date: May 11, 2021 Meeting Date: June 3, 2021

Subject: **Barnston Island Flood Construction Level Study – Engagement Update**

RECOMMENDATION

That the MVRD Board receive for information the report dated May 11, 2021, titled "Barnston Island Flood Construction Level Study – Engagement Update".

EXECUTIVE SUMMARY

The Barnston Island Flood Construction Level Study was commissioned to determine the appropriate flood construction level for new construction on Barnston Island, and was completed in early 2021. The MVRD Board provided direction in February 2021 in support of engaging with residents, including the Katzie First Nation, and relevant government agencies regarding the consultant report. Staff met with representatives of the Agricultural Land Commission, Ministry of Transportation and Infrastructure, Ministry of Forests, Lands, Natural Resource Operations and Rural Development, and the Lands Manager for the Katzie First Nation.

Issues discussed included potential impacts of fill on farm land, future referrals of applications to MoTI, and existing drainage challenges on Katzie First Nation IR 3. A virtual community meeting for Barnston Island residents was hosted on May 20. Residents expressed understanding of the long-term goal of a higher flood construction level and the need to include exemptions for certain buildings. Staff will review and consider feedback, and will prepare applicable zoning and building bylaw amendments for consideration by the Electoral Area Committee and Board.

PURPOSE

To provide the Electoral Area Committee and MVRD Board with an update on engagement regarding the Barnston Island Flood Construction Level Study engagement.

BACKGROUND

The objective of the Barnston Island Flood Construction Level Study (Reference 1) was to consider a consistent flood construction level across the Island, balancing the interests of residents with the costs of new construction, and potential liability to Metro Vancouver associated with issuing building permits. The study was completed in February 2021 and includes a number of recommendations, including that new house construction be built to a minimum 6.5 m above median sea level at its highest point, an increase in the current base elevation of 3 to 6 m, with exemptions for certain types of construction, such as certain agricultural buildings, renovations of existing buildings, and construction of minor buildings.

At its February 28, 2021 meeting, the MVRD Board passed the following resolutions:

That the MVRD Board:

a) support staff engagement with Barnston Island residents, including the Katzie First Nation, and relevant government agencies based on the consultant report attached to the report titled "Barnston Island Flood Construction Level Study", dated January 11, 2021; and

b) direct staff to subsequently bring forward recommendations on implementing a flood construction level for the Electoral Area Committee and MVRD Board's consideration.

This report addresses part (a) of the motion above.

ENGAGEMENT SUMMARY

Staff, with assistance from Associated Engineering (B.C.) Ltd. who completed the study, hosted several meetings to gather feedback about the flood construction level study. A summary of feedback is provided below.

Agricultural Land Commission

A meeting with staff from the Agricultural Land Commission (ALC) was held March 8, 2021. The following was discussed:

- potentially more impacts to soil based agricultural with the placement of fill; reductions in farmable space; potential drainage changes and impacts on adjacent neighbours;
- initial preference for dwellings on pilings to minimize soil impacts;
- potential delays with placing fill and allowing time for fill settlement prior to building (up to 2 years); and
- proposed exemptions for some farm buildings.

See Attachment 1 for written comments from the ALC.

Ministry of Transportation and Infrastructure (MoTI) and Ministry of Forests, Lands, Natural Resource Operations and Rural Development (MFLNRORD)

Staff hosted a joint meeting with MoTI and MFLNRORD staff on April 12, 2021. Some of the issues that were noted included:

- potential impacts to the roads on Island from trucks depositing large amounts of fill (smaller trucks will have less impact to Island roads);
- preference for disposition of fill during the drier months to minimize settlement impacts;
- need to consider steepness of the approach from the road to the dwelling; and
- referrals with MoTI will be required to regulate the interface between the road, dike and driveways e.g. drainage, types of fill, steepness considerations.

See Attachment 2 for email comments from the MFLNRORD staff.

Katzie First Nation

Staff had a meeting with the Katzie First Nation Lands Manager on April 29, 2021 where the following was noted:

- existing drainage challenges on IR no.3;
- potentially different approaches for dwellings on the outside on the dike (i.e. pilings vs fill); and
- opportunities to collaborate on further studies.

Barnston Island Virtual Community Meeting
A virtual meeting with residents was held on May 20. Five residents participated, along with the Electoral Area A Director and MoTI staff. In summary:

- residents asked questions related to the use of pilings versus fill, and noted that bringing fill could create ferry line-ups;
- residents voiced support for the exemptions noted in the study related to agricultural buildings and certain types of building activities.

These comments and any written submissions will be considered as part of the implementation of the study.

NEXT STEPS
Staff will review and consider the feedback received and prepare applicable zoning and building bylaw amendments to bring forward for consideration by the Electoral Area Committee and Board.

ALTERNATIVES
This is an information report. No alternatives are presented.

FINANCIAL IMPLICATIONS
There are no financial implications associated with this report.

CONCLUSION
This report provides an update on the engagement conducted on the flood construction level study for Barnston Island. Feedback was received from Barnston Island residents, as well as from Katzie First Nation staff and relevant government agencies. Staff will review and consider all the feedback received and bring forward proposed bylaw amendments for consideration by the Electoral Area Committee and Board.

Attachments *(45615467)*
1. ALC comments on the Barnston Island Flood Construction Level Study (May 12, 2021)
2. Email comments from the Ministry of Forests, Lands, Natural Resource Operations and Rural Development staff on the Barnston Island Flood Construction Level Study (May 10, 2021)

Reference
Barnston Island Flood Construction Level Study (February 2021)

45608687

Agricultural Land Commission
201 – 4940 Canada Way
Burnaby, British Columbia V5G 4K6
Tel: 604 660-7000 | Fax: 604 660-7033
www.alc.gov.bc.ca

May 12, 2021

Reply to the attention of Shannon Lambie
ALC Planning Review: 46773

Tom Pearce
Regional Planner, Regional Planning and Housing Services
Tom.Pearce@metrovancouver.org

DELIVERED ELECTRONICALLY

Re: Barnston Island Flood Construction Level Study

Thank you for forwarding a copy of the Barnston Island Flood Construction Level Study (the "Study") for review and comment by the Agricultural Land Commission (ALC). The following comments are provided to help ensure that the Study is consistent with the purposes of the *ALC Act*, the Agricultural Land Reserve (ALR) General Regulation, the ALR Use Regulation, and any decisions of the ALC.

Barnston Island is situated in the Fraser River between Surrey and Pitt Meadows, within Metro Vancouver Electoral Area A, and is home to Katzie First Nation Reserve No. 3. The area is primarily an agricultural community, and the entire island is located within the ALR.

Elevations on Barnston Island vary between 1 m and 4 m. The perimeter of the island is protected by an aging, non-standard dike. Without the dike, the island would regularly flood. The dike is maintained by the Barnston Island Diking District Commission, composed of island resident volunteers with oversight from the Province. In 2013, the Province proposed to transfer the dike to Metro Vancouver, however, Metro Vancouver opposed the transfer until the Province fully addressed the physical and legal issues associated with the diking infrastructure.

A 2013 study reported serious concerns with the dike, noting that dike failure could occur prior to overtopping due to seepage, piping, or erosion. Upgrading the dikes presents many challenges related to property ownership, setbacks, and an inadequate tax base. Because of this, Metro Vancouver commissioned this Study to provide guidance on establishing a flood construction level for Barnston Island. Flood construction levels establish minimum building elevations for future development to minimize flood damage.

The Study recommends that new residential construction should be built to a minimum 7.2 meters, increasing current elevations between 3 to 6 meters depending on the location. The Study further recommends that the proposed flood construction level should be applicable to all buildings used for residential purposes (including farm dwellings), business, assembly, or the storage of goods damageable by floodwaters. The study does not recommend allowing an exception for farm dwellings as is recommended in the provincial Flood Hazard Area Land Use Management Guidelines (2018). This is due to the high flood exposure and the vulnerability due to the non-standard dikes.

The Study recommends the following exemptions from the flood construction levels: agricultural buildings (not including houses or livestock buildings); renovations of existing buildings or structures that do not involve an addition; the modification of a portion of a building or structure

for use as a carport, garage, or entryway; minor buildings such as storage buildings, porches, domestic greenhouses; and non-conforming structures undergoing additions of up to 25% of floor area provided the degree of non-conformity is not increased.

ALC Staff Response
On March 8, 2021, ALC staff met with Metro Vancouver staff to review the Study recommendations and to discuss their implications. In the meeting, Metro Vancouver staff noted that flood construction building elevations could be achieved by filling or by constructing on piers or stilts. Given that the Study recommends an increase in elevation for new building construction, ALC staff expressed preliminary concern with the volume and coverage of fill required to meet this recommendation.

The ALC Use Regulation (Section 35) permits the placement of fill for residences and farm structures if: (i) the total area from which soil is removed, or on which fill is placed, is 1,000 m^2 or less; and (ii) if the area from which the soil is removed, or on which the fill is placed, is in a floodplain, the resulting elevation level is consistent with the minimum elevation level established under all applicable local government enactments and first nation government laws, if any, respecting flood protection in the floodplain.

It is possible that the fill amounts required to meet the recommended flood construction level would not require ALC review of approval. As such ALC staff do not object to the recommended 7.2 meter flood construction elevation for residential buildings and livestock buildings, given the considerable flood risk present on Barnston Island.

With respect to the recommended exemptions, ALC staff concur that farm infrastructure such as sheds, open sided animal shelters, barns, and fencing should be exempt from the recommended 7.2 meter flood construction elevation.

*****

The ALC strives to provide a detailed response to all referrals affecting the ALR; however, you are advised that the lack of a specific response by the ALC to any draft provisions cannot in any way be construed as confirmation regarding the consistency of the submission with the ALCA, the Regulations, or any decisions of the Commission.

This response does not relieve the owner or occupier of the responsibility to comply with applicable Acts, regulations, bylaws of the local government, and decisions and orders of any person or body having jurisdiction over the land under an enactment.

If you have any questions about the above comments, please contact the undersigned at 236-468-2026 or by e-mail (shannon.lambie@gov.bc.ca).

Yours truly,

PROVINCIAL AGRICULTURAL LAND COMMISSION

S. Lambie

Shannon Lambie, Regional Planner

46773m1

From:	King-Scobie,
To:	Tom.Pearce"; Marcin Pachcinski Salvaille, Alexandre
Cc:	FLNR:EX
Subject:	FW: Inspector of Dikes feedback on FCL study
Date:	May 10, 2021 12:52:19 PM
Attachments:	image001.png

Hello Marcin and Tom -

Alex Salvaille from our office forwarded your recent email to me for my consideration. I am the contact person for ongoing work with respect to the repeal of the *Drainage, Ditch, and Ditch Act* (DDDA). As you are likely aware, the DDDA has been scheduled for repeal for some time; the current deadline for the legislative repeal is December 31, 2025.

The DDDA repeal has several consequences that may be important for your current land use planning process on Barnston Island. First and foremost, the repeal will dissolve the Barnston Island Diking District as a corporate entity. Further, provincial policy does not allow the creation of orphan dike structures – thus, there will need to be a succession plan in place before December 2025. In most areas covered currently by DDDA corporate entities, we have successfully negotiated the transfer of responsibility for the assets and liabilities of these entities to a local authority such as a municipality. However, for any areas without a transfer of responsibility, the province will have to consider other options so that we are complying with the policy of not creating any new orphan structures. This may or may not include the consideration of dike decommissioning and other alternative strategies.

Should you wish to discuss this matter more fully, please let me know.

Sincerely,

Cher

Cher King-Scobie, Ph.D. (she/her)
Manager, Floods & Streams
Water Authorizations, South Coast Region
Ministry of Forests, Lands, Natural Resource Operations and Rural Development
200 – 10428 153 Street, Surrey, BC, V3R 1E1
Phone 778-572-2170

To: Electoral Area Committee

From: Tom Pearce, Planner, Regional Planning and Housing Services

Date: May 11, 2021 Meeting Date: June 3, 2021

Subject: **Community Works Fund – Barnston Island**

RECOMMENDATION

That the MVRD Board approve funding from the Electoral Area A Community Works Fund up to $12,100 for Barnston Island pump house and flood box gate improvements, as described in the report dated May 11, 2021, titled "Community Works Fund – Barnston Island".

EXECUTIVE SUMMARY

The Community Works Fund is delivered to all local governments in British Columbia through a direct annual allocation to support local priorities, and the Board directed that it be distributed to Electoral Area A communities based on population. Barnston Island represents 1.1% of the total population of Electoral Area A, which equates to $12,100 of the Electoral Area A Community Works Fund. The recently completed Barnston Island Flood Construction Level Study highlighted deficiencies with the pump house and flood box gates. Staff discussed potential improvements with the volunteer Barnston Island Diking Commission, who would coordinate the works and who identified electrical upgrades to the pump house and potential repairs to the flood box gate as priorities. These improvements are eligible costs under the Community Works Fund disaster mitigation category guidelines.

PURPOSE

To provide the Electoral Area Committee and MVRD Board the opportunity to approve funding for Barnston Island pump house and flood box gate improvements through the Community Works Fund.

BACKGROUND

The recently completed Barnston Island Flood Construction Level Study (February 2021) highlighted the need to address deficiencies in the pump station, as well as repair and maintenance requirements for the flood box gates. Staff met with members of the Barnston Island Diking Commission on April 21, 2021 to discuss improvement priorities. Funding from the Electoral Area A Community Works Fund would help the Barnston Island Diking Commission address these issues.

COMMUNITY WORKS FUND

The Community Works Fund is delivered to all local governments in British Columbia through a direct annual allocation to support local priorities. It is one of three program streams arising out of the Renewed Gas Tax Agreement between the Federal Government and Union of BC Municipalities, which delivers the monies to local governments. The Renewed Gas Tax Agreement, which took effect

April 1, 2014, specifies eligible projects (Reference 1) and grant amounts allocated to each local government (Reference 2).

At its April 29, 2016 meeting, the MVRD Board (then GVRD Board) passed the following resolution:

> *That the GVRD Board endorse the distribution of monies from the Community Works Fund to areas within Electoral Area A based on population, as described in the report titled "Distribution of Electoral Area A Community Works Fund Monies", dated March 29, 2016.*

Barnston Island represents 1.1% of the total population of Electoral Area A, which equates to $12,100 of the Electoral Area A Community Works Fund. To date, no Community Works Fund projects have been funded for Barnston Island.

PROJECT DESRCIPTION

Barnston Island is susceptible to flooding. The ten kilometer dike which surrounds the island is a non-standard dike that is managed by the volunteer Barnston Island Diking Commission, under the provincial *Drainage, Ditch, and Ditch Act*. The Barnston Island Diking Commission identified the need to make upgrades to the pump house and flood gates in order to mitigate potential impacts associated with overland flooding. The pump house is supplied by electricity from BC Hydro, however during a major flooding event the pump house could be without power. Therefore, the proposed project would fund an electrical upgrade to the pump house to enable a backup generator to be easily plugged in to ensure the continuous pumping of water during a critical event.

In addition, work to repair the flood gates has also been identified as a need to mitigate flooding. The extent of the repair work would be determined based on how much funding remained after the electrical upgrades to the pump house were completed and may be supplemented by funds from the Barnston Island Diking Commission.

ALTERNATIVES

1. That the MVRD Board approve funding from the Electoral Area A Community Works Fund up to $12,100 for Barnston Island pump house and flood box gate improvements, as described in the report dated May 11, 2020, titled "Community Works Fund – Barnston Island".

2. That the Electoral Area Committee receive for information the report dated May 11, 2020, titled "Community Works Fund – Barnston Island", and provide alternate direction to staff.

FINANCIAL IMPLICATIONS

A portion of the 2021 grant revenue received from the Federal Gas Tax Community Works Fund would be used to fund the Barnston Island improvements. There would be no tax increase implications for Electoral Area A. $12,100 represents the total apportioned amount of the Electoral Area A Community Works Fund for Barnston Island through 2021. The 2021 Electoral Area Services budget can accommodate these costs.

CONCLUSION

Improvements to the pump house and flood box gates have been identified as a community need on Barnston Island. The proposed works will be coordinated by the volunteer Barnston Island Diking Commission. These improvements are eligible costs under the Community Works Fund disaster mitigation category guidelines. Staff recommend Alternative 1.

References

1. Community Works Fund - Eligible Projects List
2. Community Works Fund – Allocations by Local Government

45627694

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 homeless 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



DRAFT

Metro 2050

4730 Kingsway, Burnaby, BC, V5H 0C6
metrovancouver.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.



West Vancouver

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.



Port Coquitlam

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.



Surrey

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).

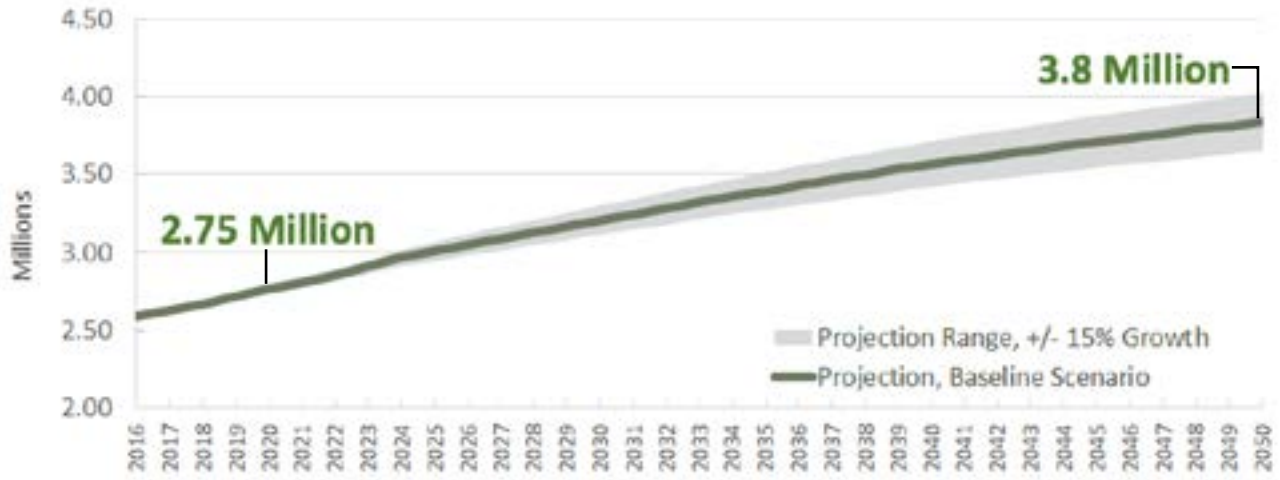
Similar to the majority of Canadian cities, Metro Vancouver's population is aging. While the percentage of seniors (aged 65 and over) comprised 14.7% of the total population in 2016, this is projected to increase to 22% by 2050. The aging population will have a significant impact on the demand for services 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

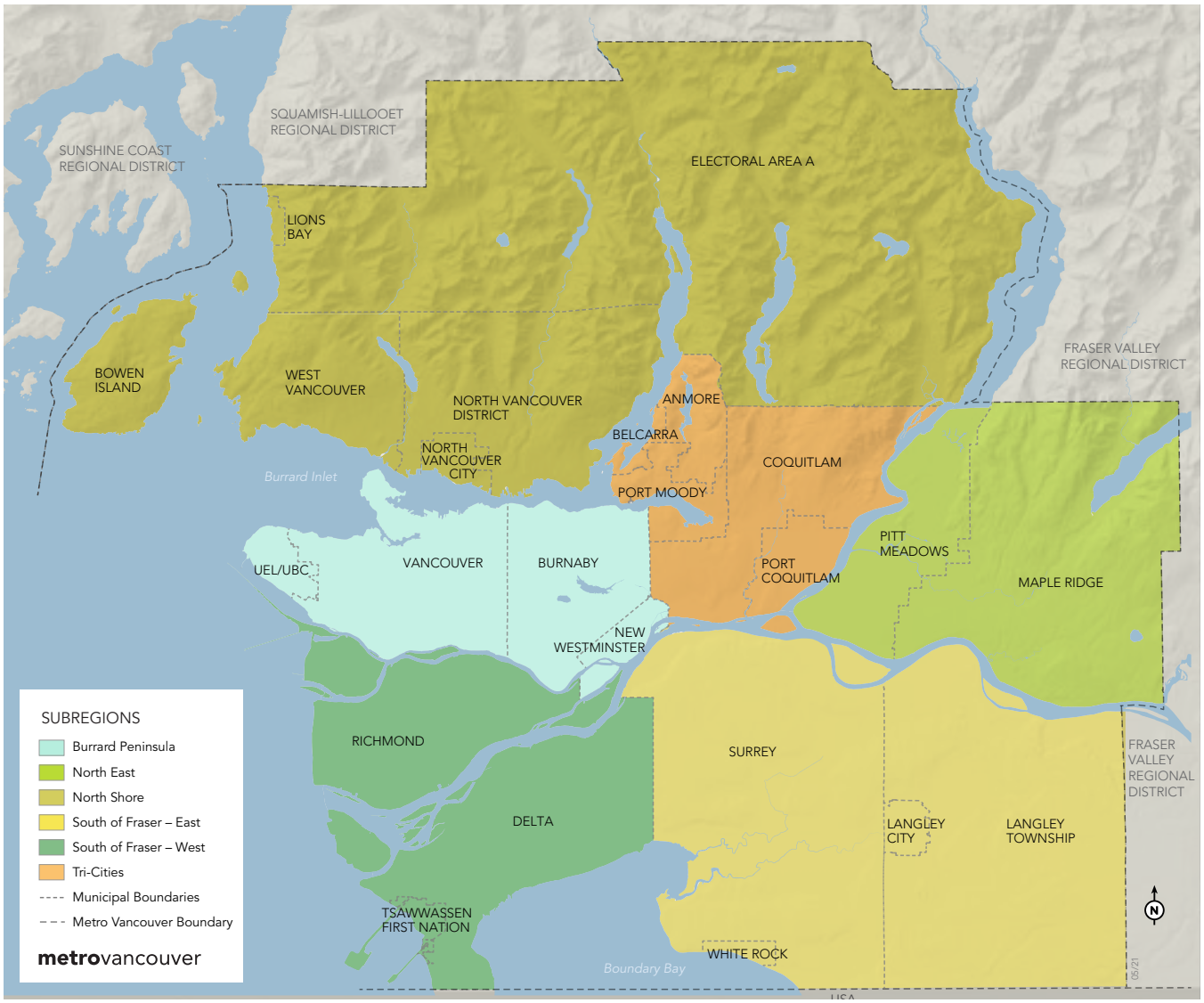


TABLE 1. REGIONAL AND SUB-REGIONAL PROJECTIONS BY DECADE TO 2050

	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%**
Urban Centre Type Breakdown	
• 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%**
Urban Centre Type Breakdown	
• 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 FTDAs and Station Area FTDAs

***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



Langley Township

North Vancouver City

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.



Langley Township

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.



Port Moody

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

CENTRE TYPE	FUNCTION	GENERAL EXPECTATIONS	LOCATION
Urban Centre - All *(applies to Metro Core, Surrey Metro Centre, RCCs, HG-MTCs, and MTCs)*	Primary hubs of activity. Accommodates significant regional residential and employment growth. Provides a range of amenities and services. Major Road Network access. Primary locations for Major Trip Generating Uses.	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.	Locations identified on Map 4
Metro Core - Vancouver	The Region's downtown. Region-serving uses (central business district). Accommodates significant levels of regional employment and residential growth. Principal centre of business, employment, cultural, and entertainment activity for the region.	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.	Vancouver
Metro Centre - Surrey	Centre of activity South of the Fraser River. Accommodates significant levels of regional employment and residential growth.	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.	Surrey
Regional City Centre	Sub-regional hub of activity. Accommodates significant levels of residential and employment growth.	Sub-region serving uses (hospital, post-secondary). Office uses. Existing frequent transit services. 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. Minimum density of 60-350 Jobs + People/ hectare.	Any location on the Major Transit Network.
High Growth Municipal Town Centre	Centre of activity for a member jurisdiction. Locations for significant levels of regional employment and residential growth.	Previously a Municipal Town Centre. High Regional Accessibility. Existing Major Transit Network service. Higher density commercial Uses. High density residential uses. Minimum density of 60-200 Jobs + People/ hectare.	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.	Municipally-serving shops, services, uses, and amenities. Medium to high density forms of residential uses. 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. Minimum density of 20-150 Jobs + People/ hectare.	Any location on the Major Transit Network.
Frequent Transit Development Area (FTDA) – All *(applies to both Corridor FTDAs and Station Area FTDAs)*	Location for additional medium and higher density transit-oriented development forms and mixed uses in alignment with the Major Transit Growth Corridors. Location for additional employment growth. Location for affordable rental housing. Location for Major Trip Generating Uses.	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.	Linear shaped. Minimum density of 35-80 Jobs + People/ hectare.	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.	Restricted parking supply. Nodal shaped. Minimum density of 60-350 Jobs + People/hectare.	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 *(applies to Corridor FTDAs and Station Area FTDAs)*	*Required for reclassification to any FTDA types:* 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 FTDAs, 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 FTDAs, 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 *(applies to all Urban Centre types)*	*Required for reclassification to any Urban Centre type:* 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 disproportionally 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.



Tsawwassen First Nation

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



Coquitlam

Surrey

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



White Rock

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.



Richmond

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;

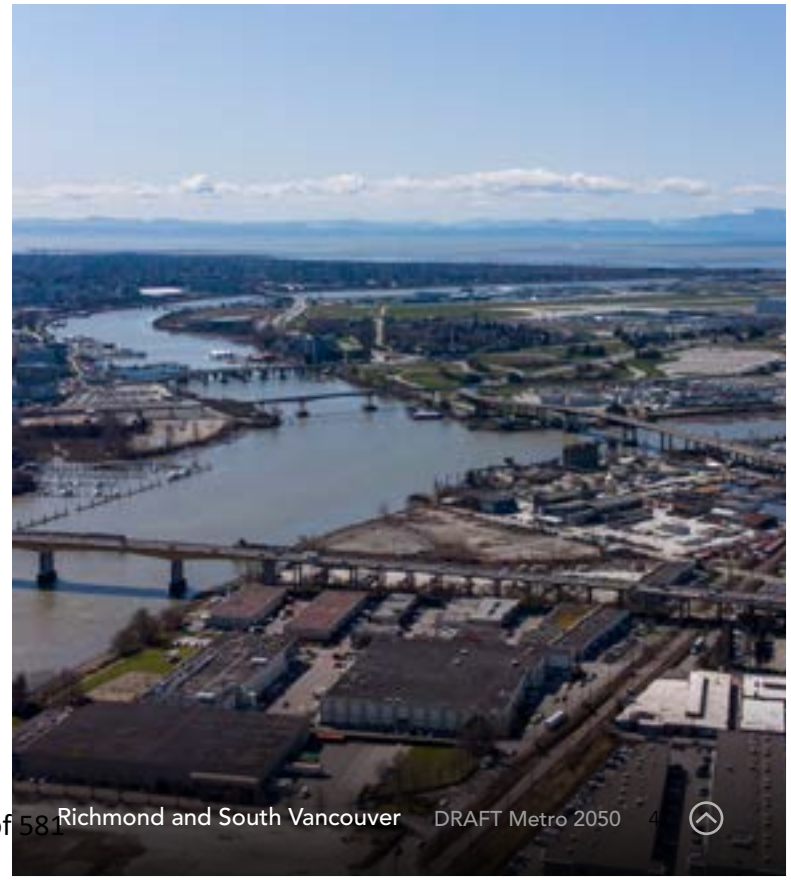
v) do not permit residential uses, except for an accessory caretaker unit;

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).


Delta


Richmond and South Vancouver

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;



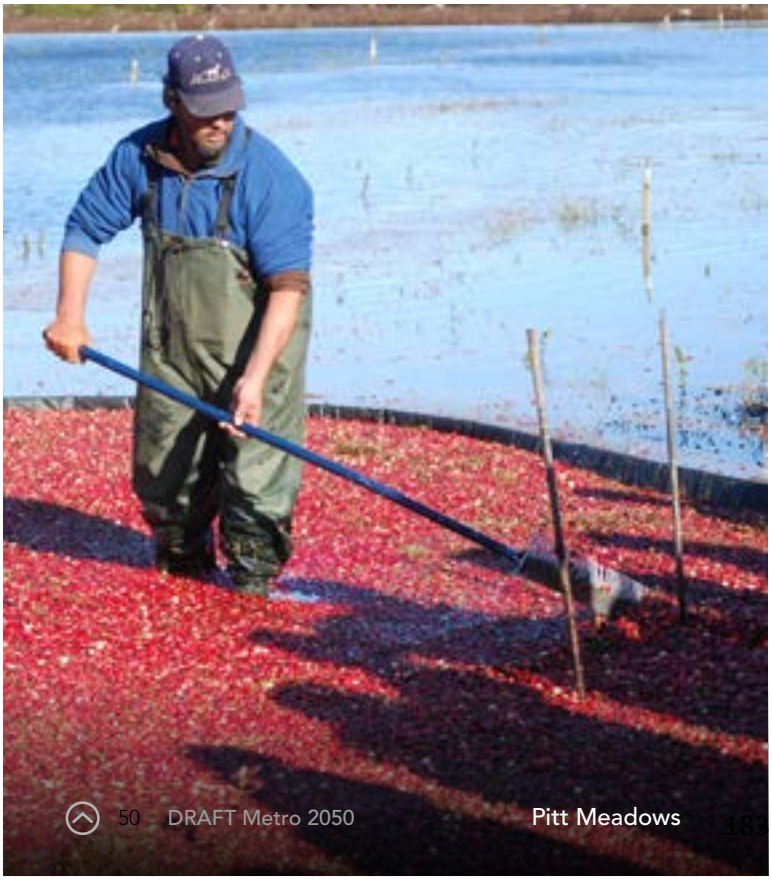
Delta

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.



Pitt Meadows

GOAL 3

Protect the Environment and Respond to Climate Change and Natural Hazards



Langley Township

Electoral Area A

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 heathier 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


Coquitlam

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.



Belcarra

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 geoexchange 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.



Vancouver

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.



West Vancouver

GOAL 4

Provide Diverse and Affordable Housing Choices



Maple Ridge

New Westminster

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



Port Moody

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.



Vancouver

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.



Burnaby

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:

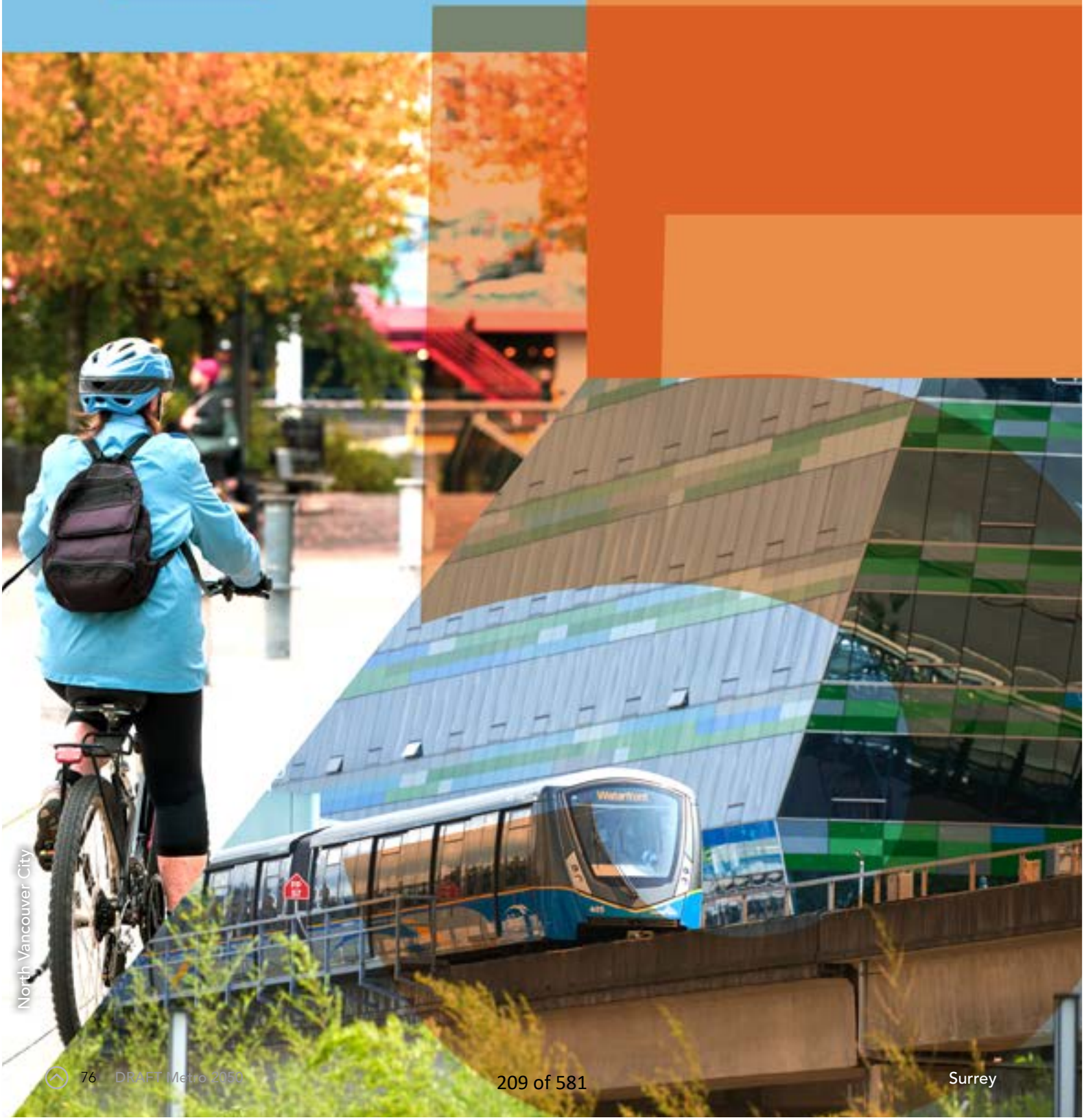
a) identify opportunities to participate in programs with other levels of government to secure additional housing units to meet the housing needs of lower income households;

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

Surrey

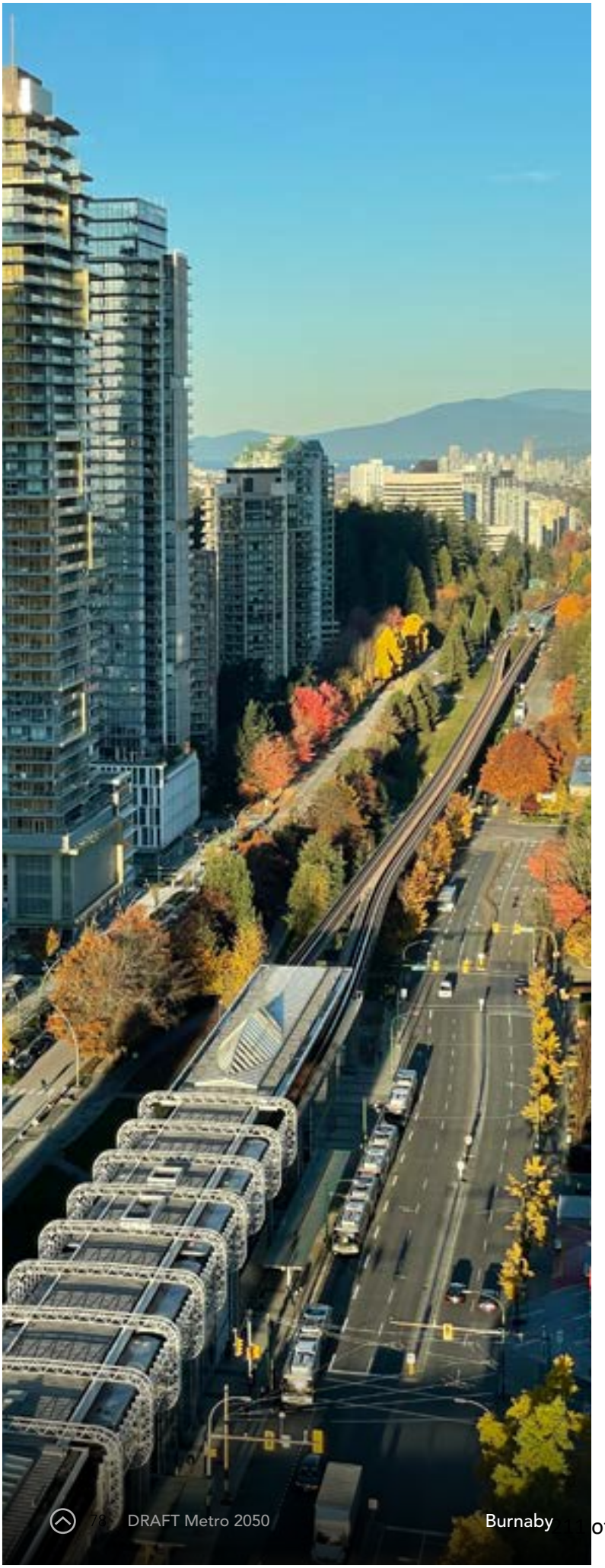
Goal 5: Support Sustainable Transportation Choices

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.



Burnaby

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, polices, 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;

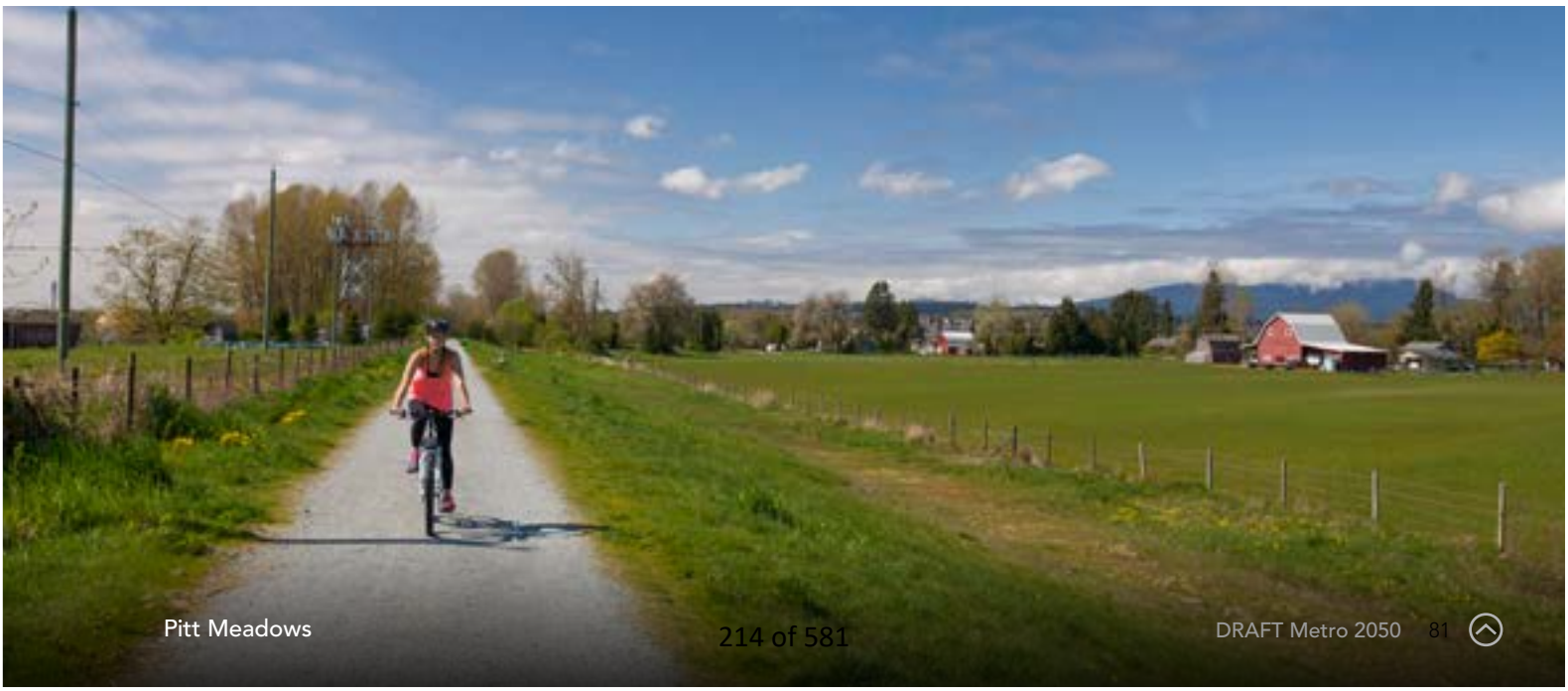
f) work with the Province, the Integrated Partnership for Regional Emergency Management, and member jurisdictions to evaluate the potential impacts of climate change and known unmitigated natural hazards on rapid transit alignments, station locations, and associated transportation infrastructure;

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.



Pitt Meadows

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



Port Coquitlam



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.



Lions Bay

TABLE 6: REGIONAL GROWTH STRATEGY IMPLEMENTATION FRAMEWORK*

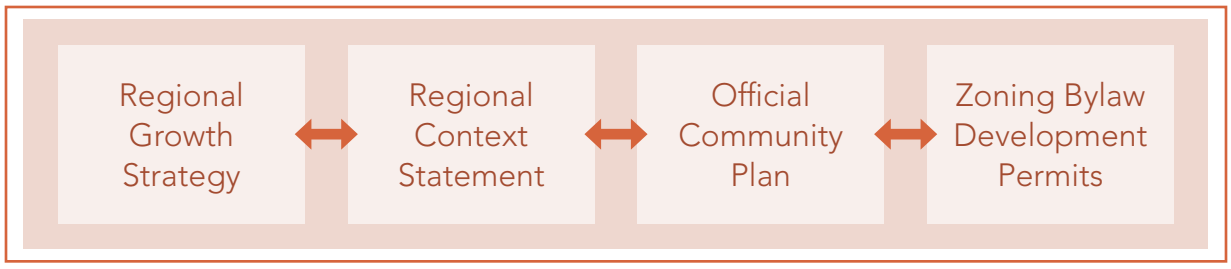
PRINCIPLES	EXAMPLES	PROCEDURES
Fundamental change to core goals or strategies	Amend the goals or strategies; delete an entire goal; change the amendment process	Type 1: 50% + 1 Board vote and acceptance by all affected local governments
Region-wide significance for non-urban designations	Change Urban 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.



New Westminster

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.

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 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.

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.



White Rock

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.



Anmore

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.



Electoral Area A

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).

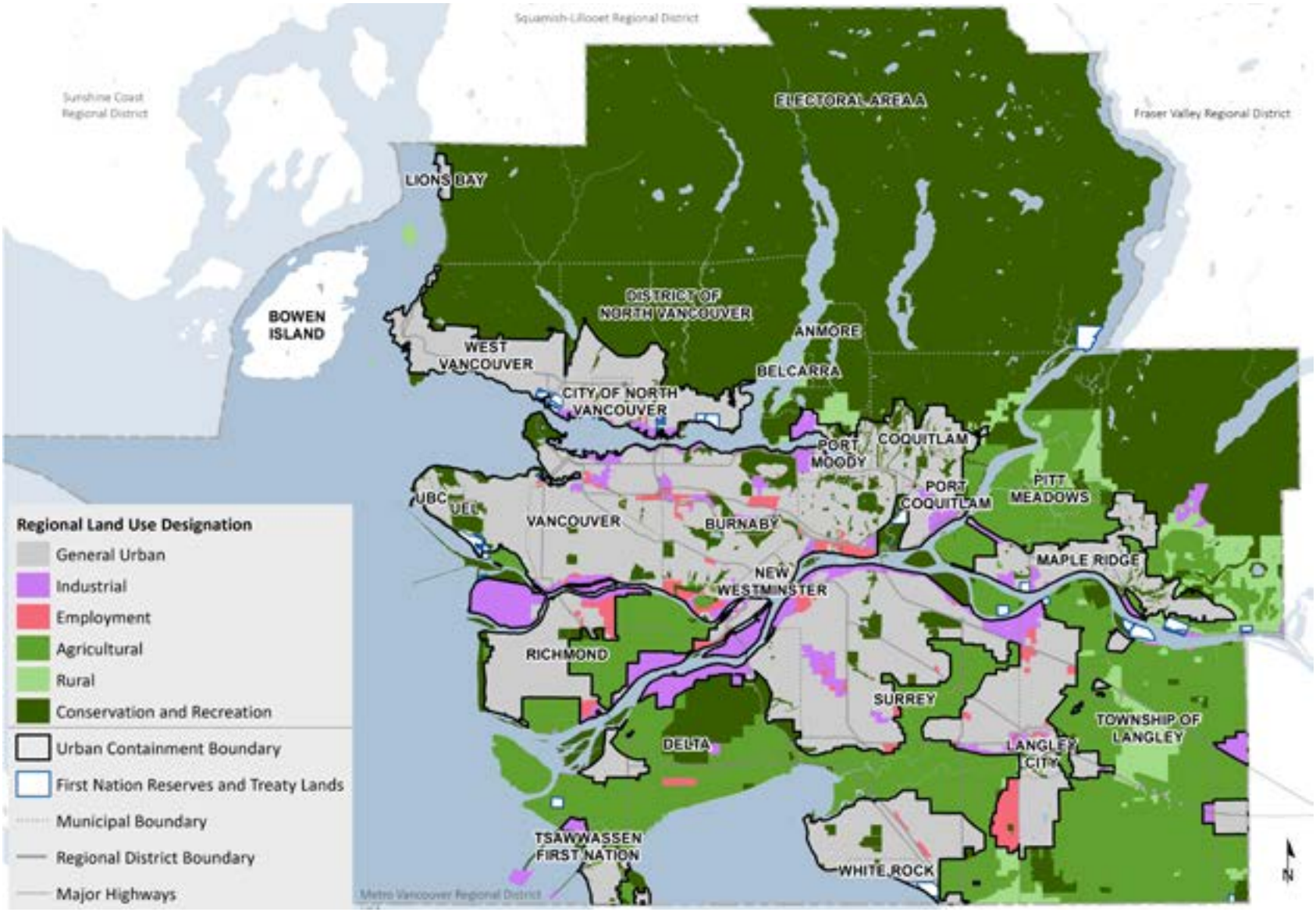
I. Maps

Map 1: Metro Vancouver Region



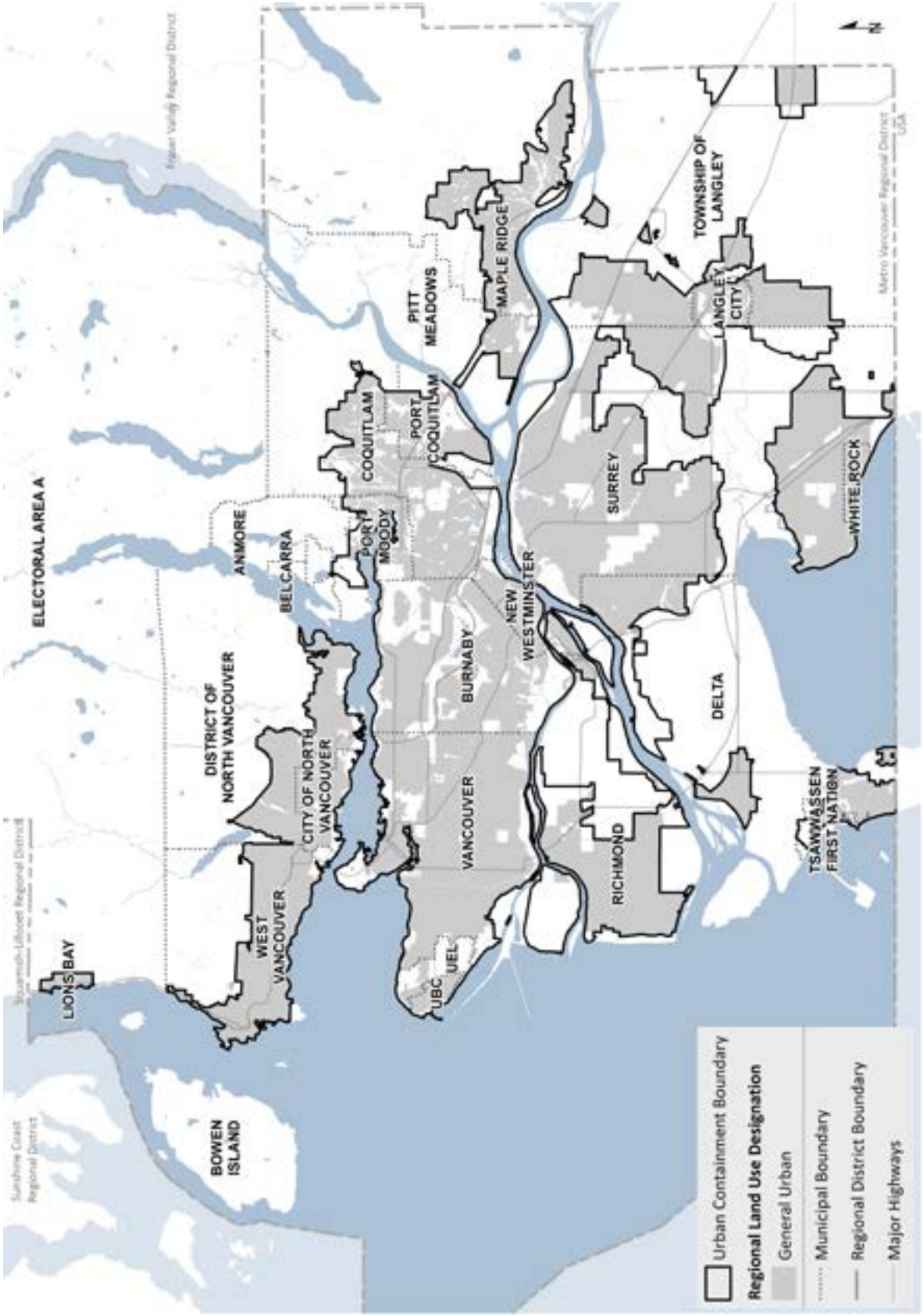
Map for reference only.

Map 2: Regional Land Use Designations

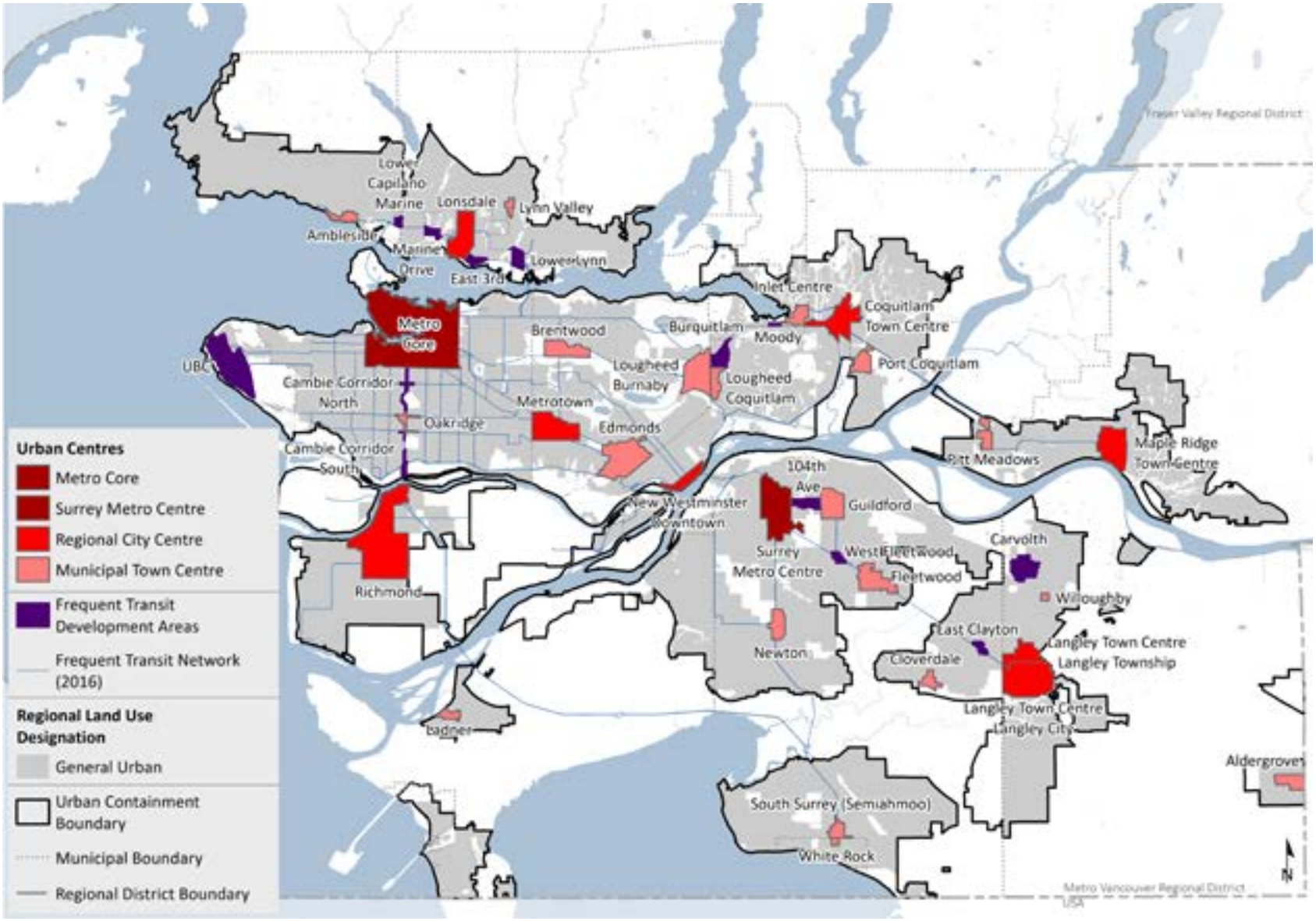


This map is a small scale depiction of the Regional Land Use Designation Map that Metro Vancouver maintains as the basis for defining land use designation boundaries. The official Regional Land Use Designation Map can be viewed on the Metro Vancouver website.

Map 3: Urban Containment Boundary and General Urban Lands

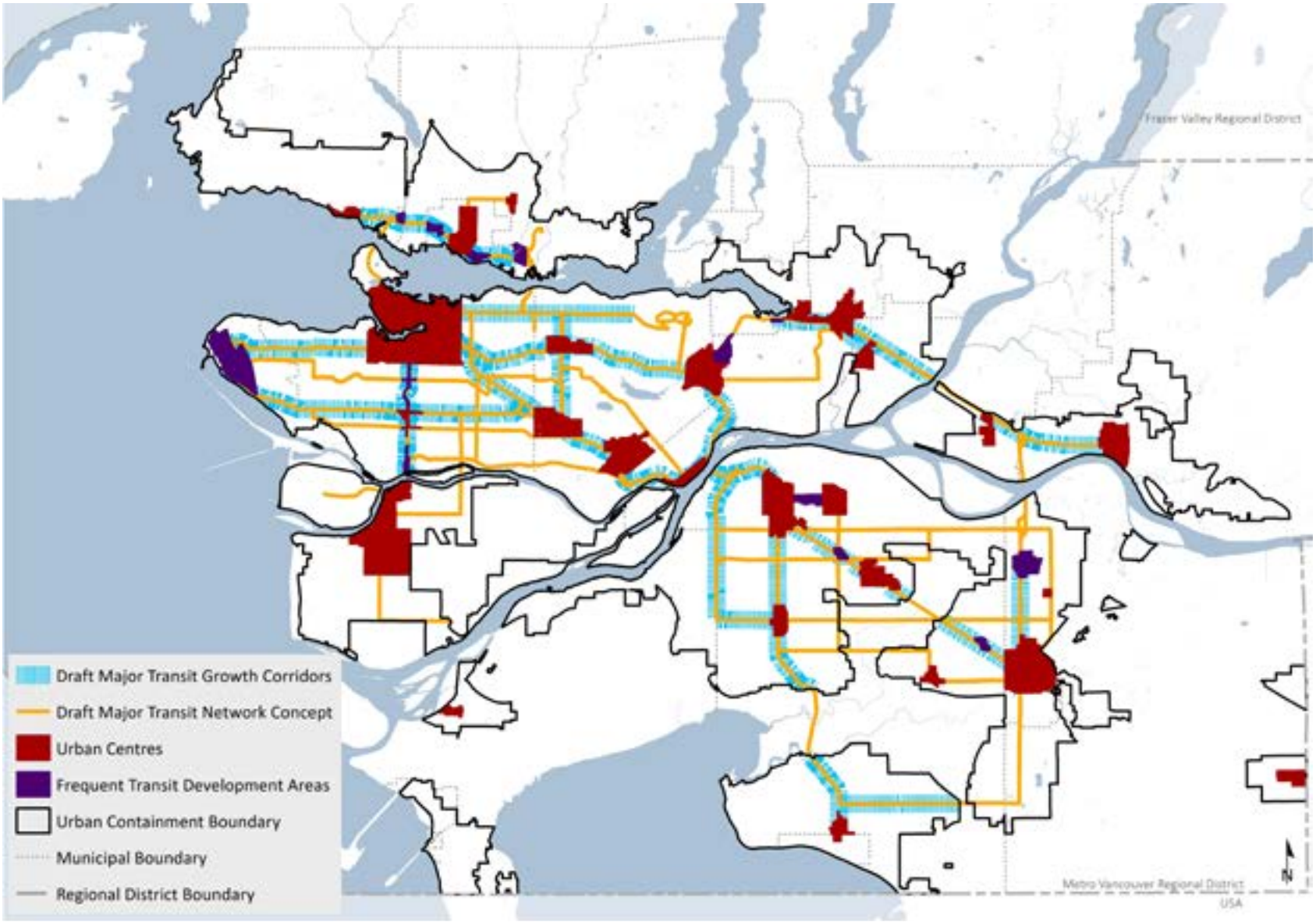


Map 4: Urban Centres and Frequent Transit Development Areas



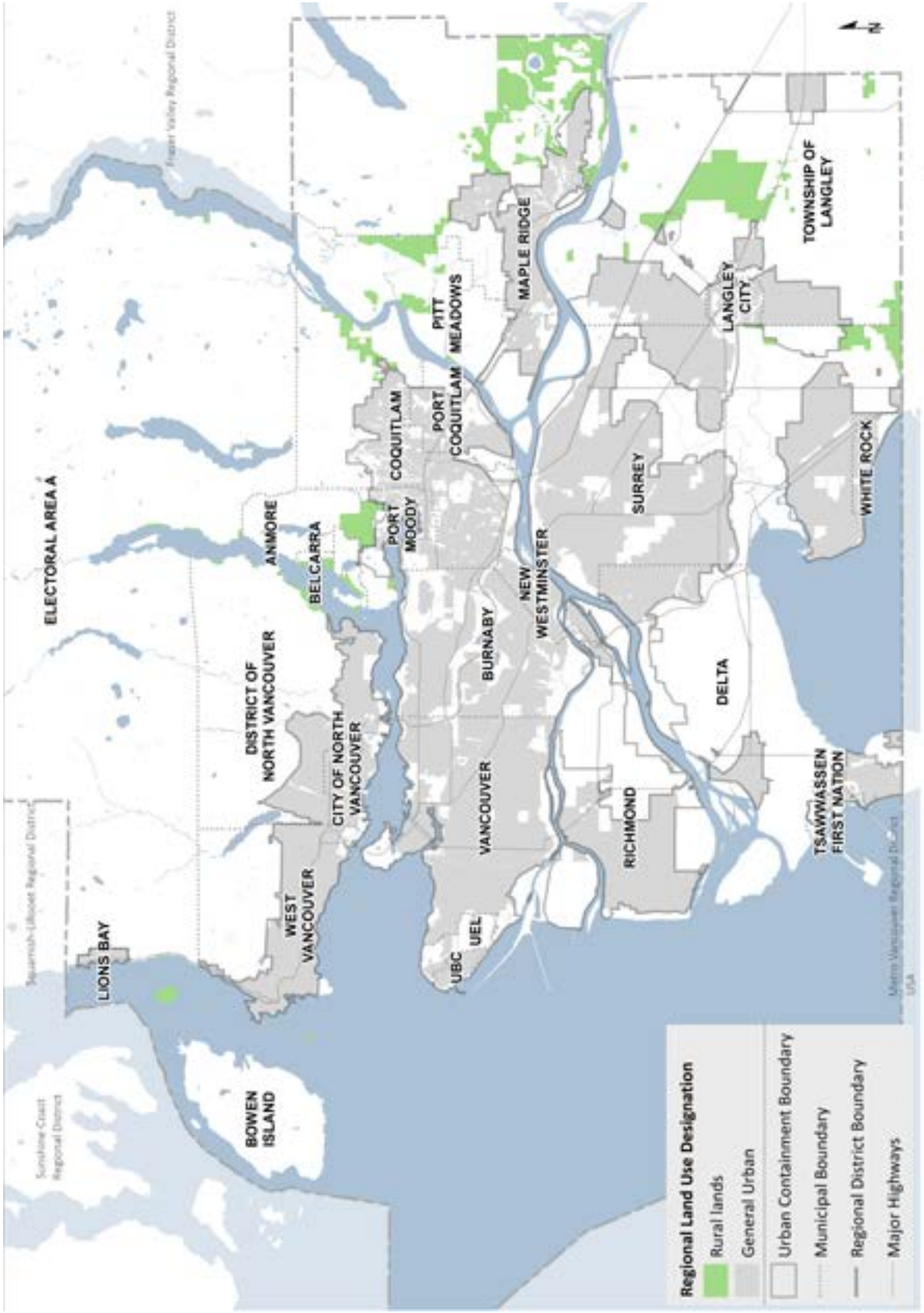
Urban Centers and FTDAs are overlays for structuring residential and employment growth. The boundaries are identified by member jurisdictions.
Where overlays cover ares other than General Urban or Mixed Employment, the intent and policies of the underlying regional land use designations still apply.

Map 5: Major Transit Growth Corridors and Major Transit Network

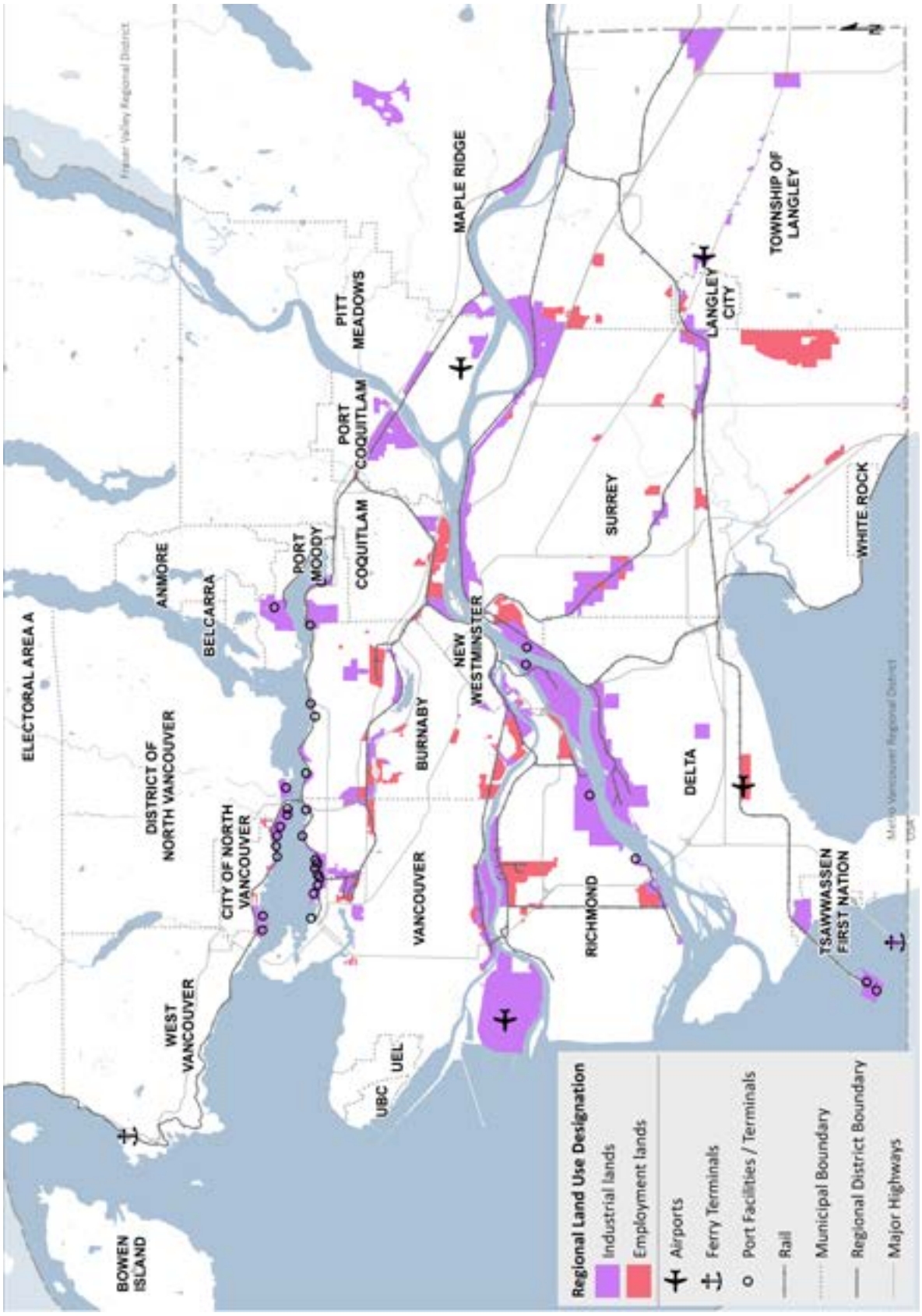


The Major Transit Growth Corridors are preliminary and subject to review and confirmation. The Draft Major Transit Network comprises both Transport 2050 Concepts A and B, which are also to be confirmed and are shown on this map for illustrative purposes only.

Map 6: Rural Lands

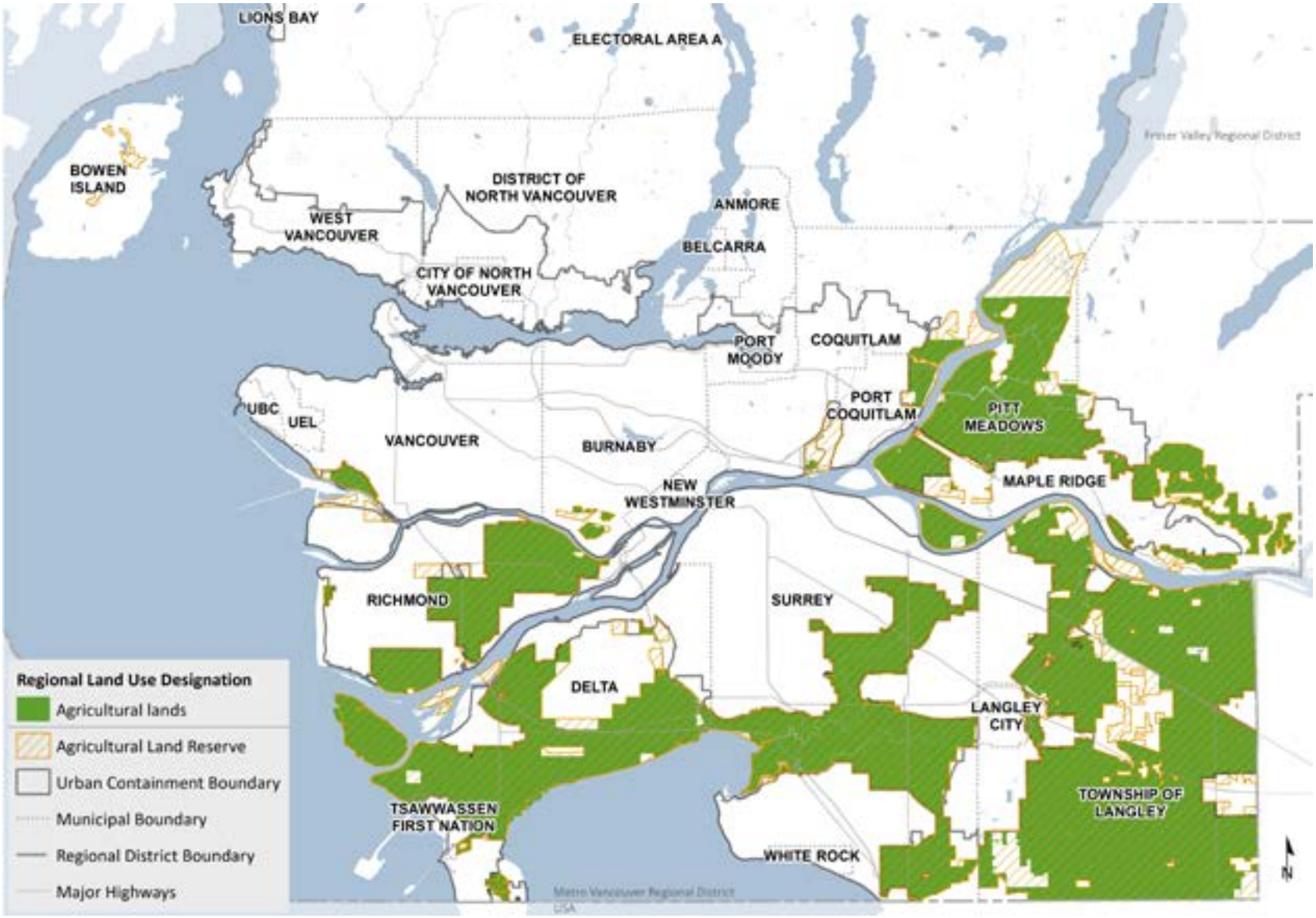


Map 7: Industrial and Employment Lands



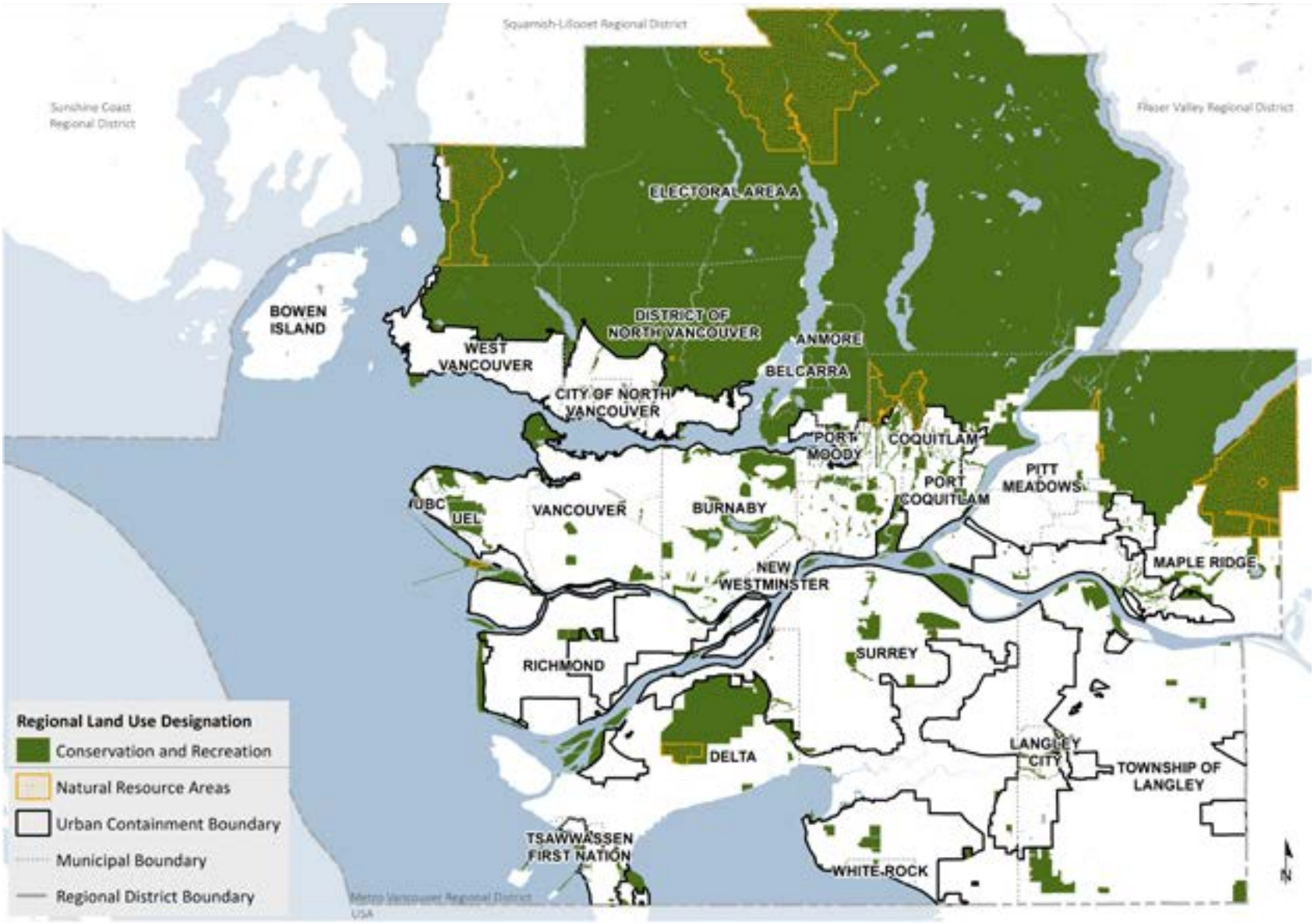
The depicted highway network, rail lines, and port / airport transportation facilities are shown for reference only.

Map 8: Agricultural Lands



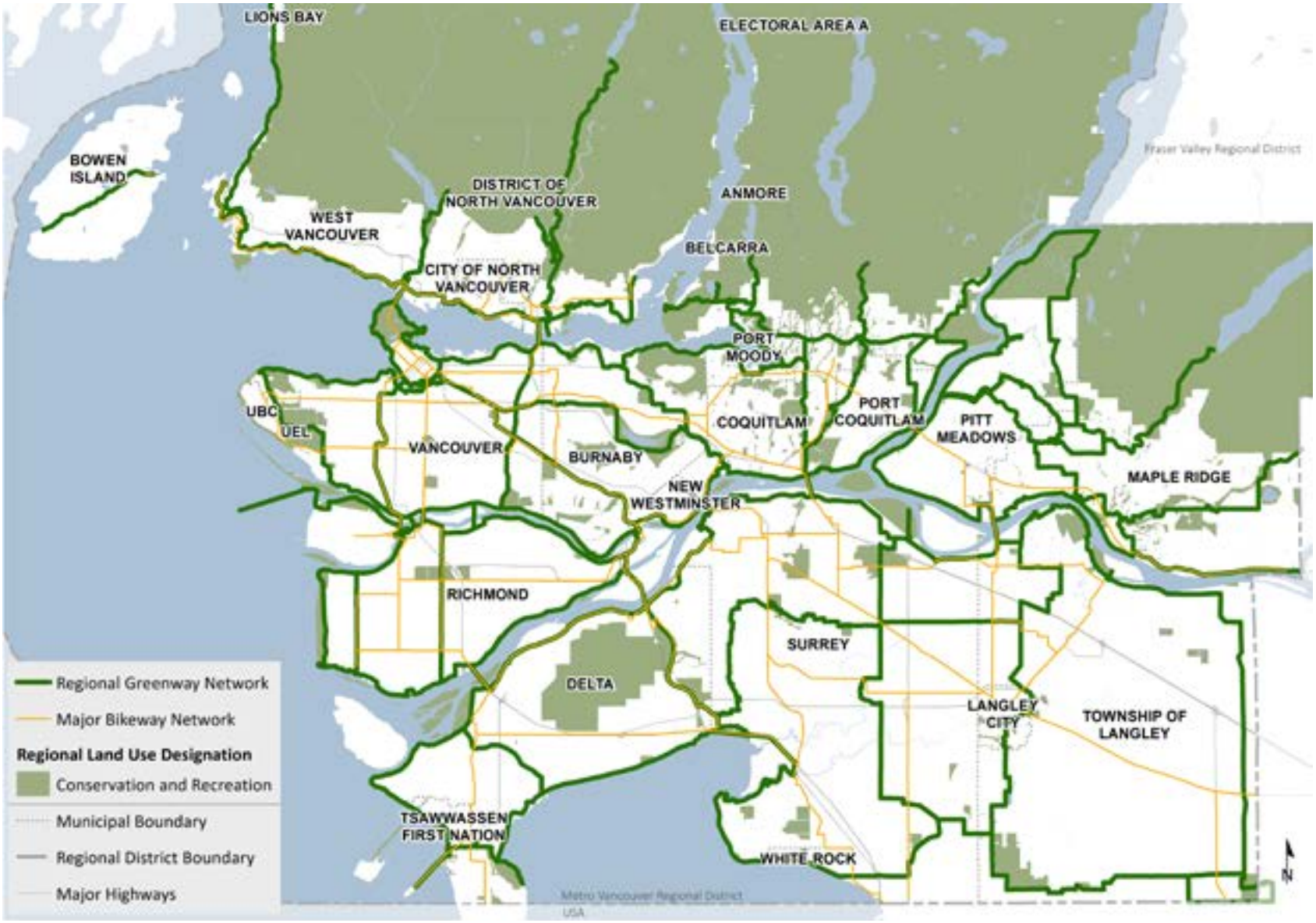
For the latest ALR geography, please visit the Agricultural Land Commission website at www.alc.gov.bc.ca

Map 9: Conservation and Recreation Lands



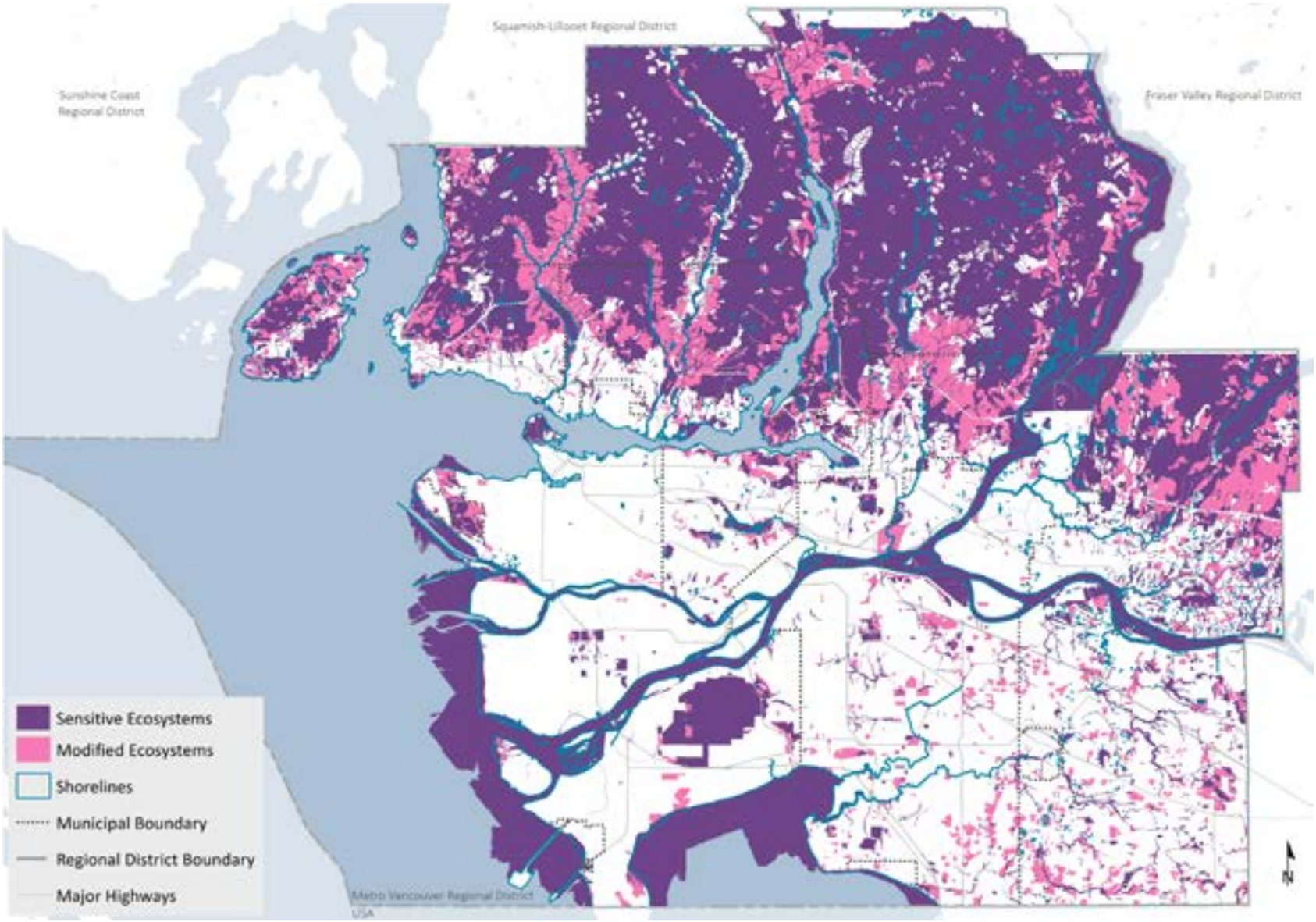
The Natural Resource Areas Overlay was collated by Metro Vancouver from several data sources including:
Active managed forest tenure licenses, relevant OCPs, GVS&DD, and GVWD

Map 10: Regional Greenway Network and Major Bikeway Network



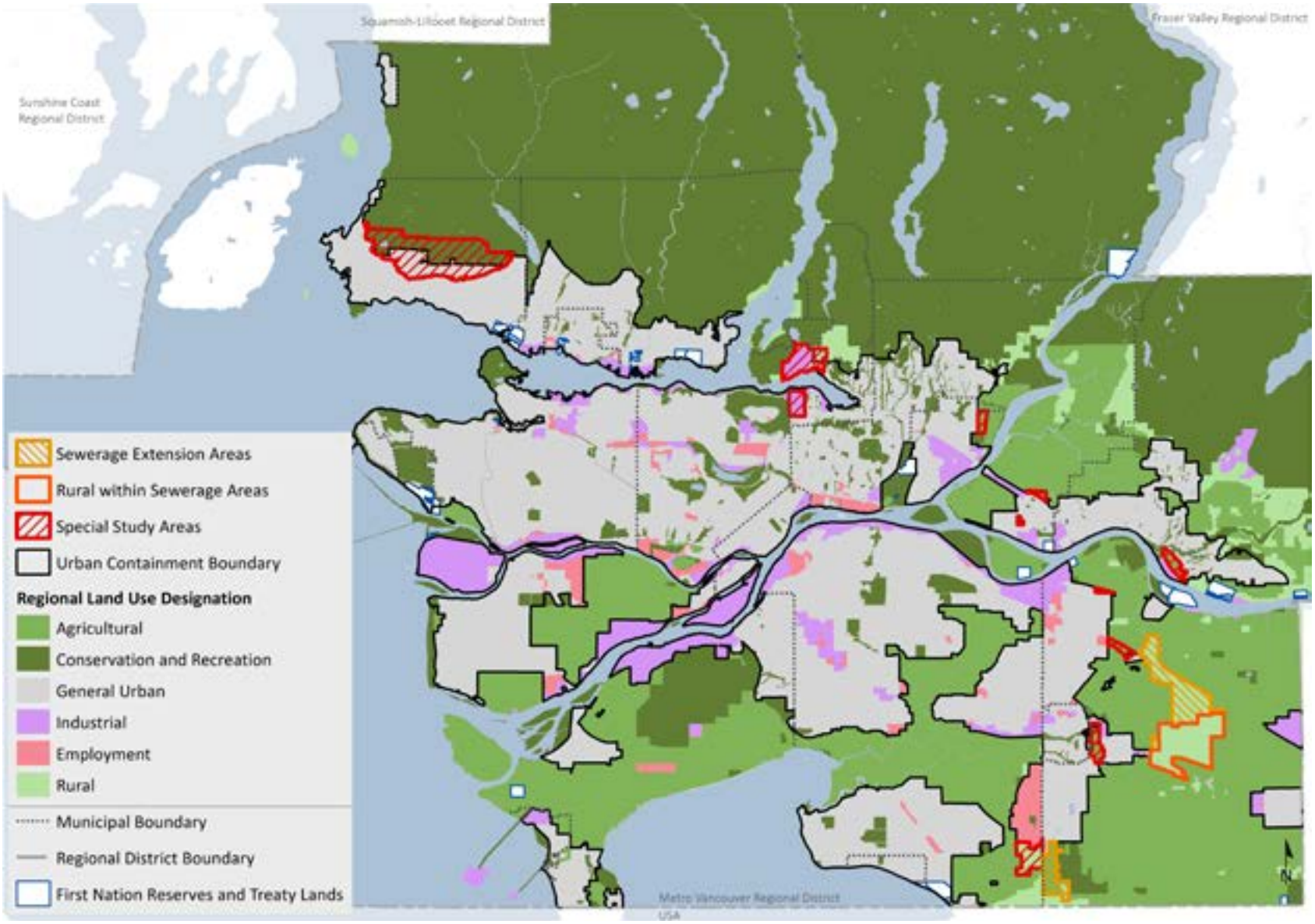
The Regional Greenway Network and Major Bikeway Network (MBN) are concepts illustrating existing and planned active transportation corridors of regional significance. The MBN is being developed through TransLink's Transport 2050 process and will be updated following the identification of a preferred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

45668884

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 Heath 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 VisAdventures.com

DIAMOND HEAD

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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.

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 Vancouver[1]

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 *ssp. fannini*	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.

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. Conifer 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 disproportionally 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 importance[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, 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.

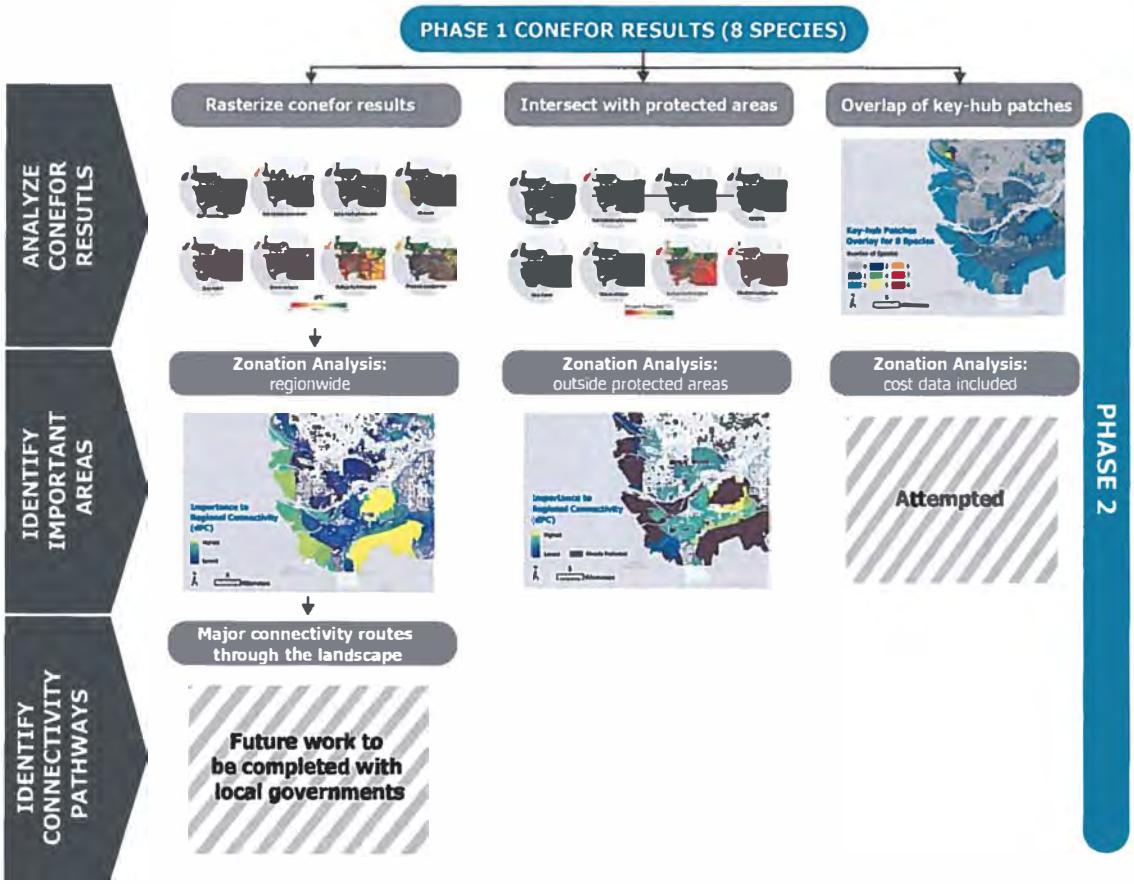


Figure 1. Methodology workflow for Phase 2 of the Metro Vancouver Connectivity study.

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. This 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.

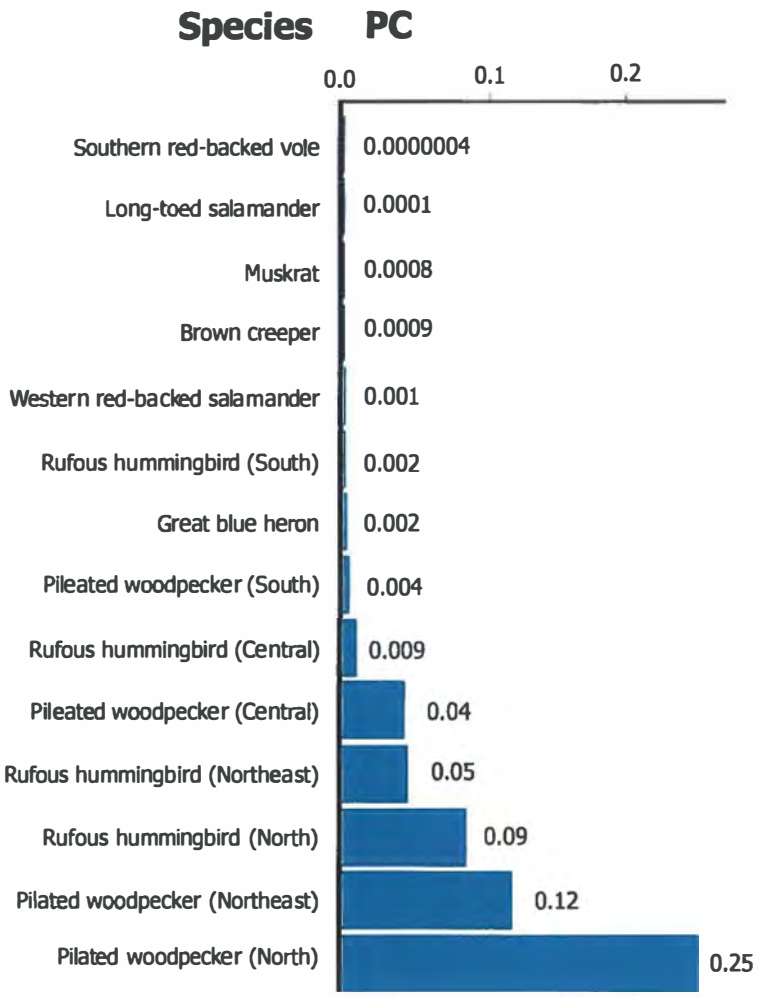


Figure 2. PC values, representing how well the landscape is connected for the eight focal species in Metro Vancouver.

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.

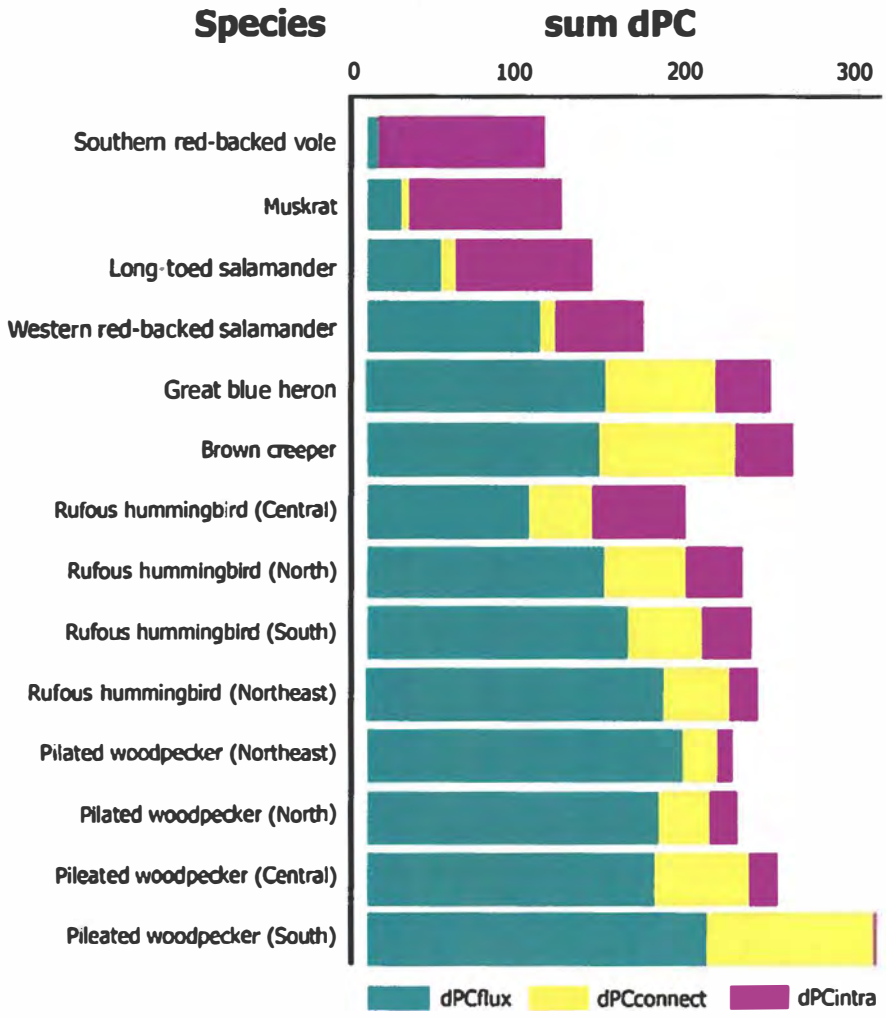


Figure 3. Sum of node importance for 8 species in Metro Vancouver. The length of each bar represents sum dPC which is comprised of patch connectedness (dPCflux), stepping stones (dPCconnect), and intra patch connectivity (dPCintra).

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).

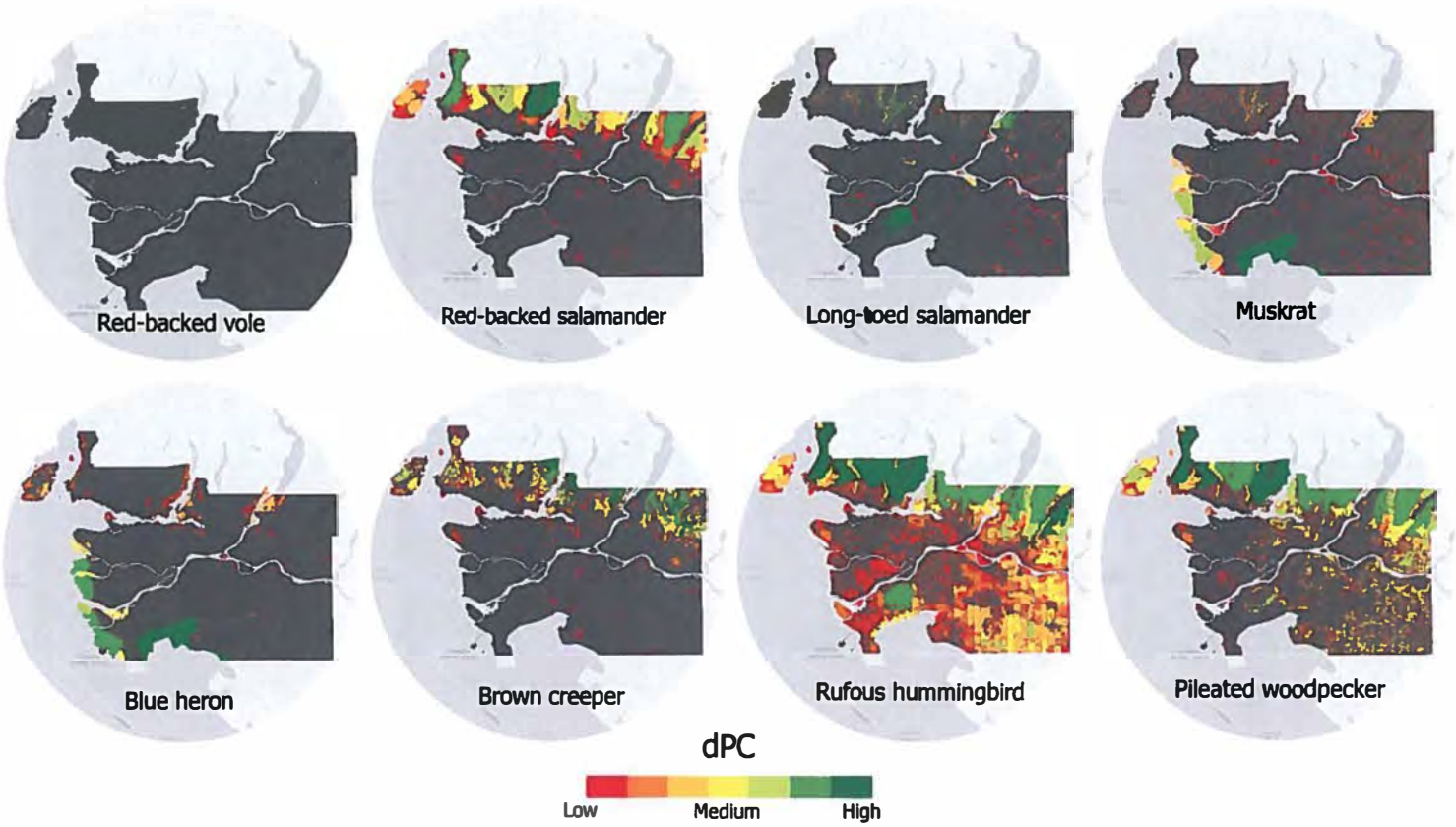


Figure 4 dPC values mapped for all 8 species. A geometric interval was used to classify values due to the large number of small DPC values. Low dPC values are shown in red, while high dPC values are green.

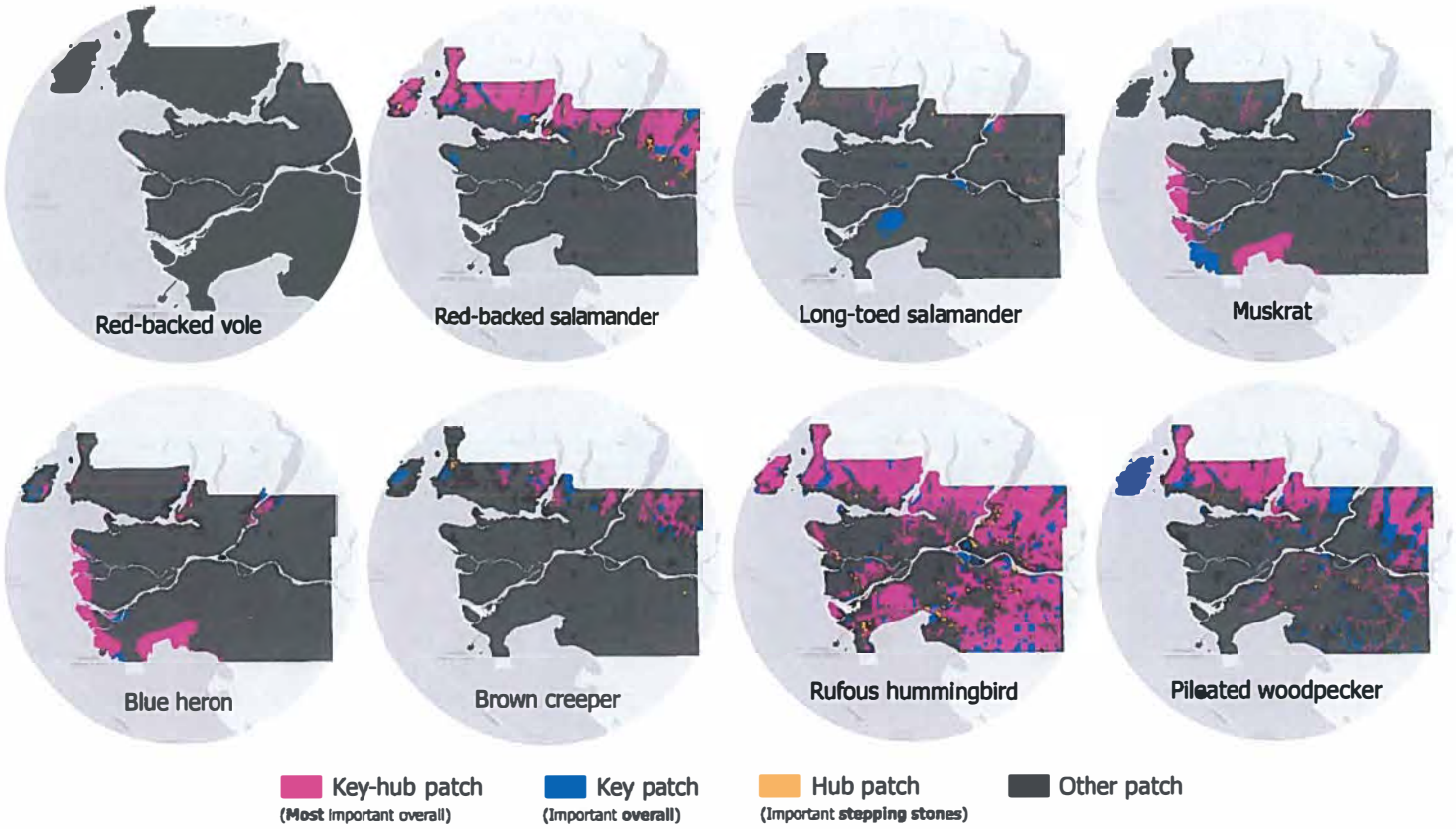


Figure 5. Key and hub patches for all 8 species modelled. Key patches are shown in blue, hubs in orange, and overlap in pink. Patches that are neither key nor hub are black.

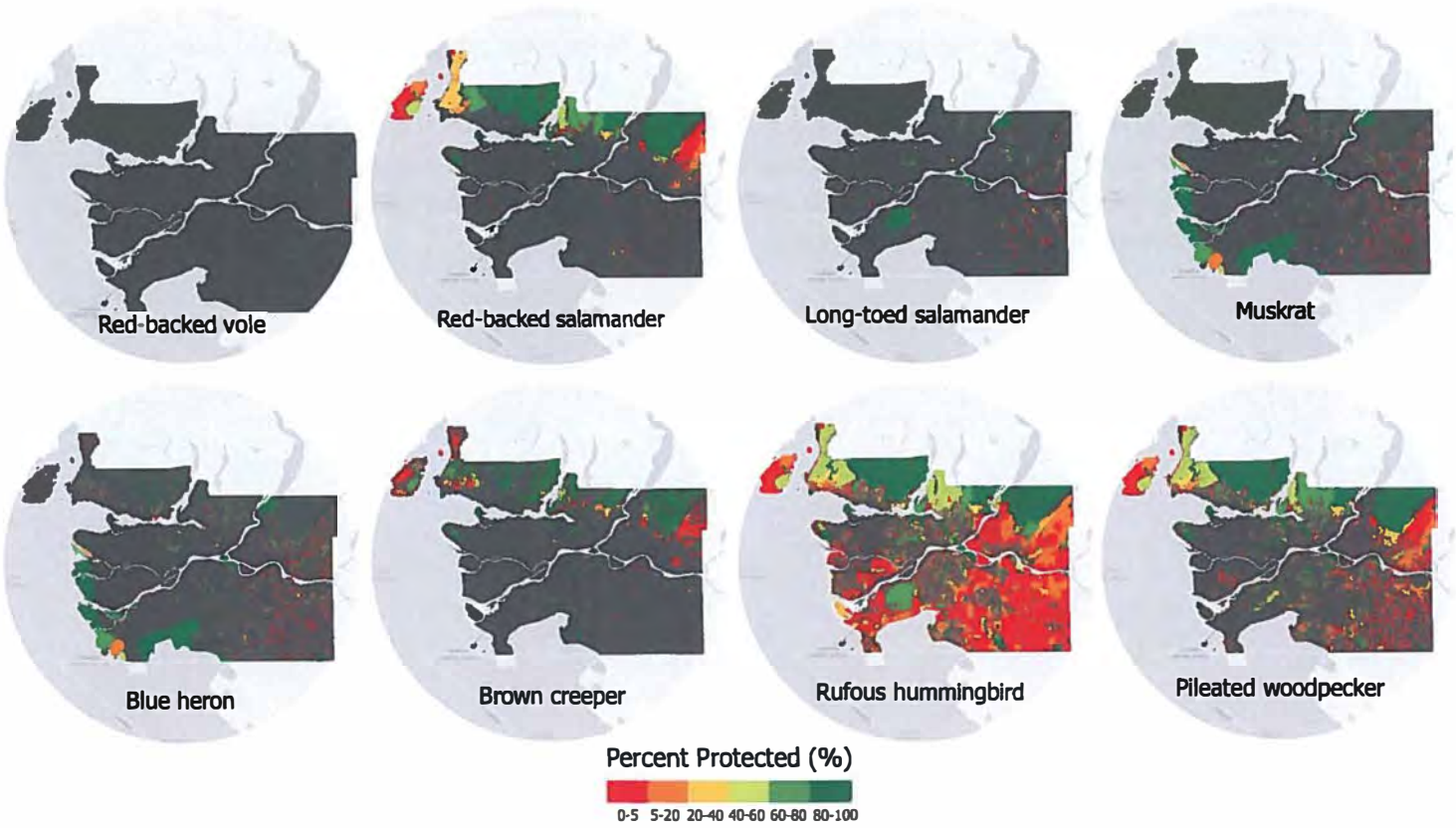


Figure 6. Habitat patches for all 8 species displayed by percent protected area. Protected Areas include those being protected through a land use designation as municipal, regional, or provincial park along with any other areas that municipalities included in their open data parks/protected area GIS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

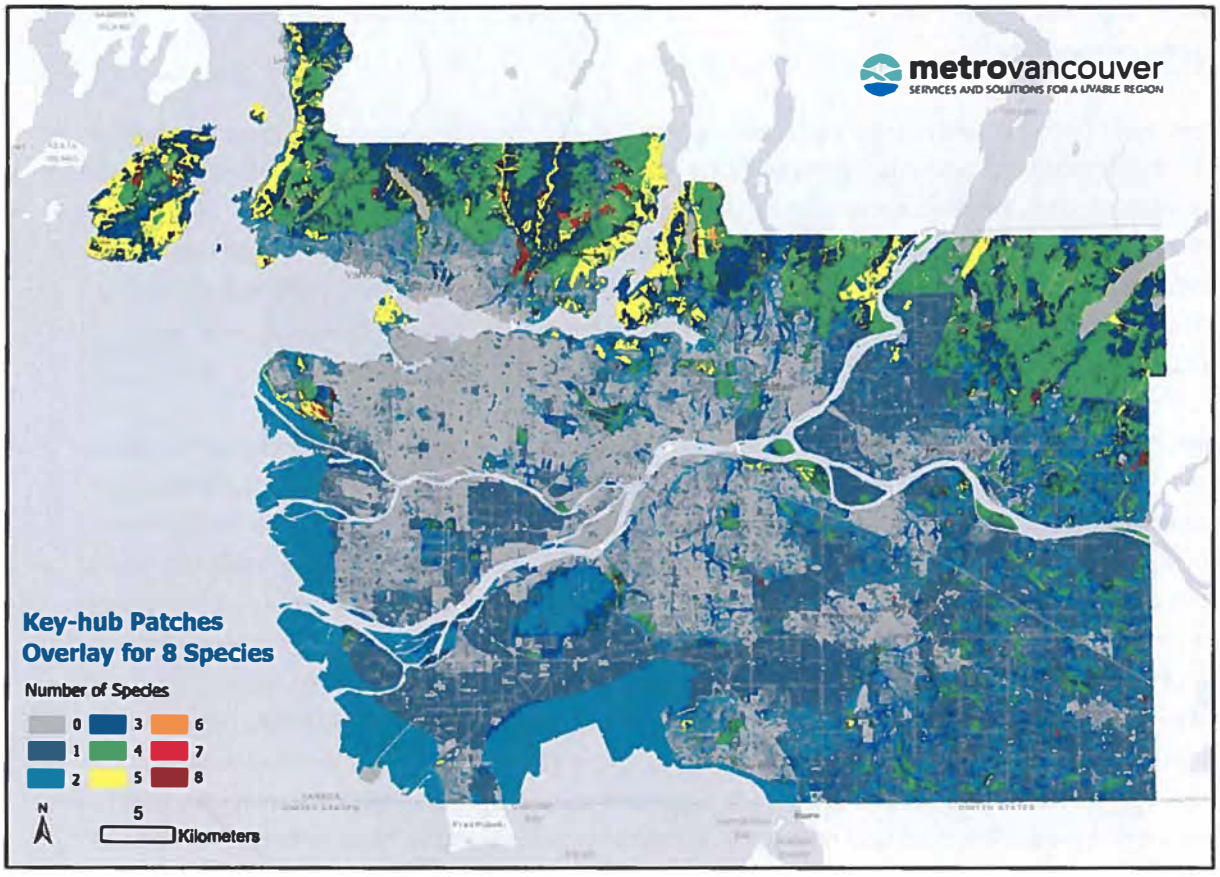


Figure 7. Overlap of key-hub patches for all 8 species modelled.

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 affect 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 if 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.

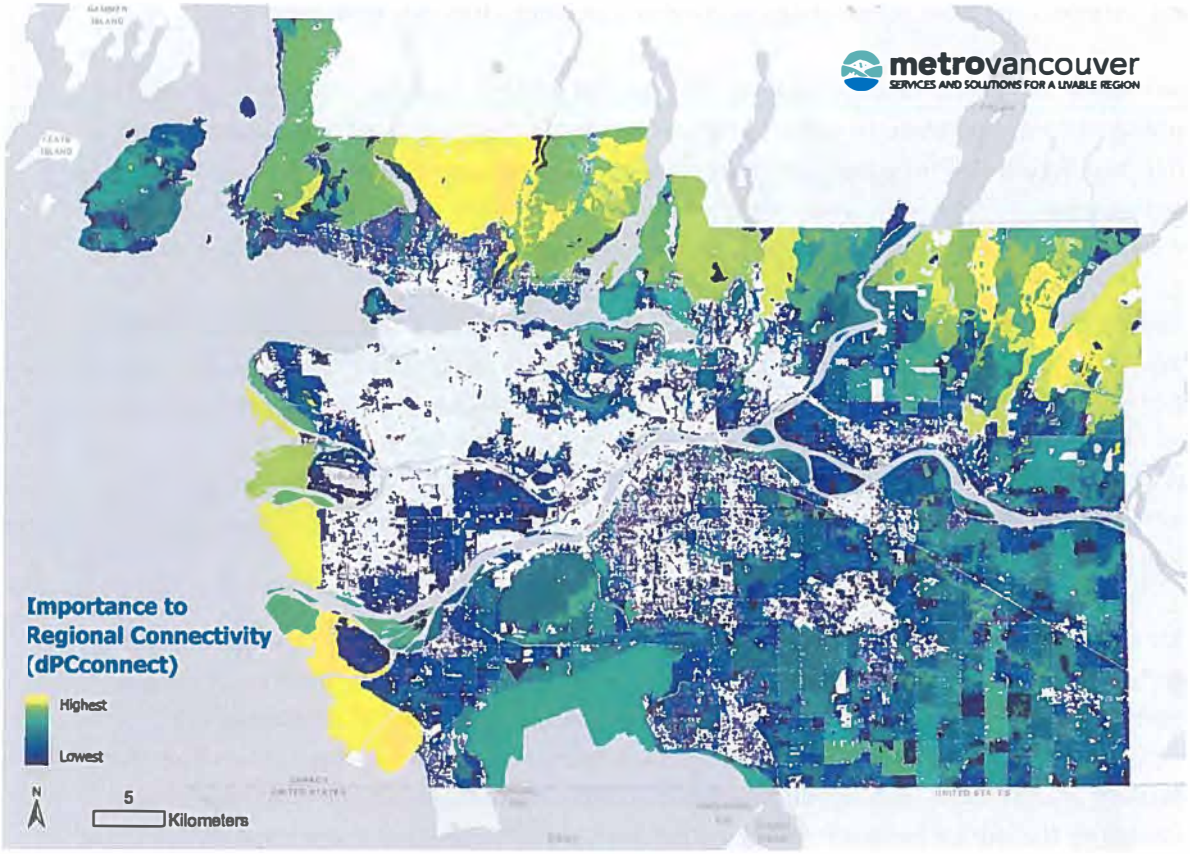


Figure 8 Spatial conservation prioritization based on stepping stone importance (dPCconnect), with all patches with the same weighting.

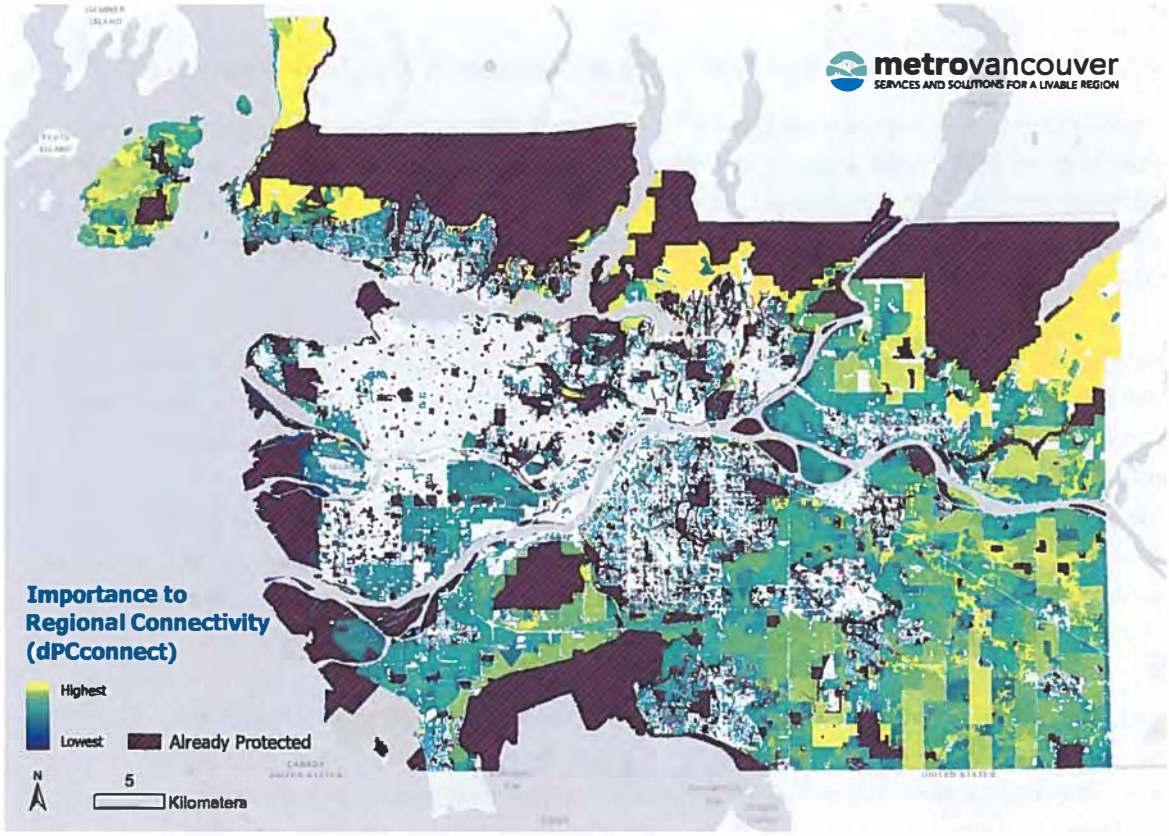


Figure 9 Spatial conservation prioritization based on stepping stone importance (dPCconnect), with lower weight to the already protected areas.

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 disproportionally 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)	$PC = \frac{\sum_{i=1}^{n}\sum_{j=1}^{n} a_i \cdot a_{ij} \cdot p_{ij}^*}{A_L^2} = \frac{PCnum}{A_L^2}$	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, *a*, is the area-weighted quality of a patch.
dPC	$dPC(\%) = \frac{PC - PC'}{PC} \times 100$ *and* $dPC = dPCintra + dPCflux + dPCconnector$	**Measures the effect of node removal on overall network connectivity (PC).** dPC is the percent contribution of a node (*k*) to PC. The value of PC after removing node *k* (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 (k) itself: $a_i \times a_j$ *when* $i = j = k$ (a_k^2). Where *a* 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 (k) 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 *other nodes* together, but rather how connected an individual node is itself to the rest of the network.
dPCconnector (Stepping Stone Importance)	Contribution of patch *k* 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 and j,* around a given patch *k*. Patch *k* must be part of the best path between *i* and *j*.	**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 *best* path for dispersal (i.e. when $p_i \times p_j$ is highest).
NL (Degree)	e_k where *e* is the number of links for a given patch, *k*.	**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., 2017[3]), and the Regional Greenspace Connectivity User Guide (Nicoletti & Clark, 2018[4]). 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_SelectionCritiera.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 natal[5] 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 *ssp. fannini*	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.

Forested Types	Landcover	All Forest (LC and Age Class)
		Mixed
		Coniferous
		Deciduous
	Age (C = condition modifier, R = restrictive, I = inclusive)	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	*Certhia americana*	mature and old forest only, condition modifiers for woodland, riparian and wetland sites	y		
Great Blue Heron ssp. *fannini*	*Ardea herodias fannini*	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

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.

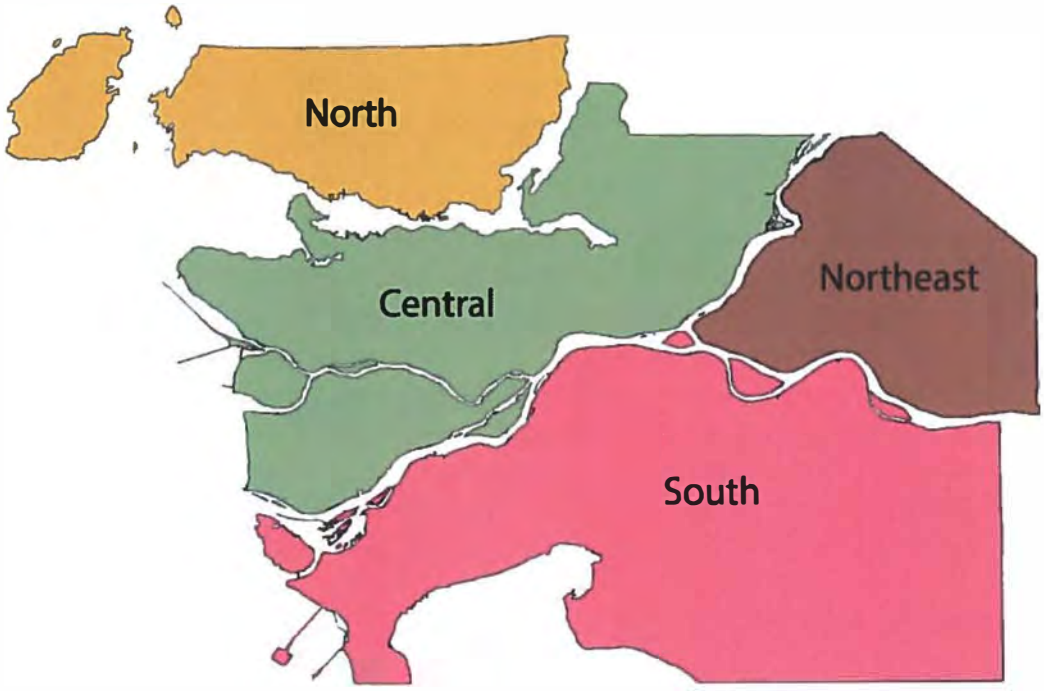


Figure 10 Subset landscapes used for the pileated woodpecker and Rufous hummingbird. Overlaps exist among the landscapes for some islands in the Fraser and Pitt Rivers as well as Indian Arm. Divisions between landscapes are major water bodies to choose the most realistic landscape borders possible. Patches 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_L does not affect EC(PC) values or individual patch importances (e.g. dPC). For this expanded analysis, A_L 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: d*PCintra,* which measures within-patch connectivity; *dPCflux,* which measures how connected a patch is to the rest of the network; and *dPCconnector,* 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 dPCconnector*) 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.

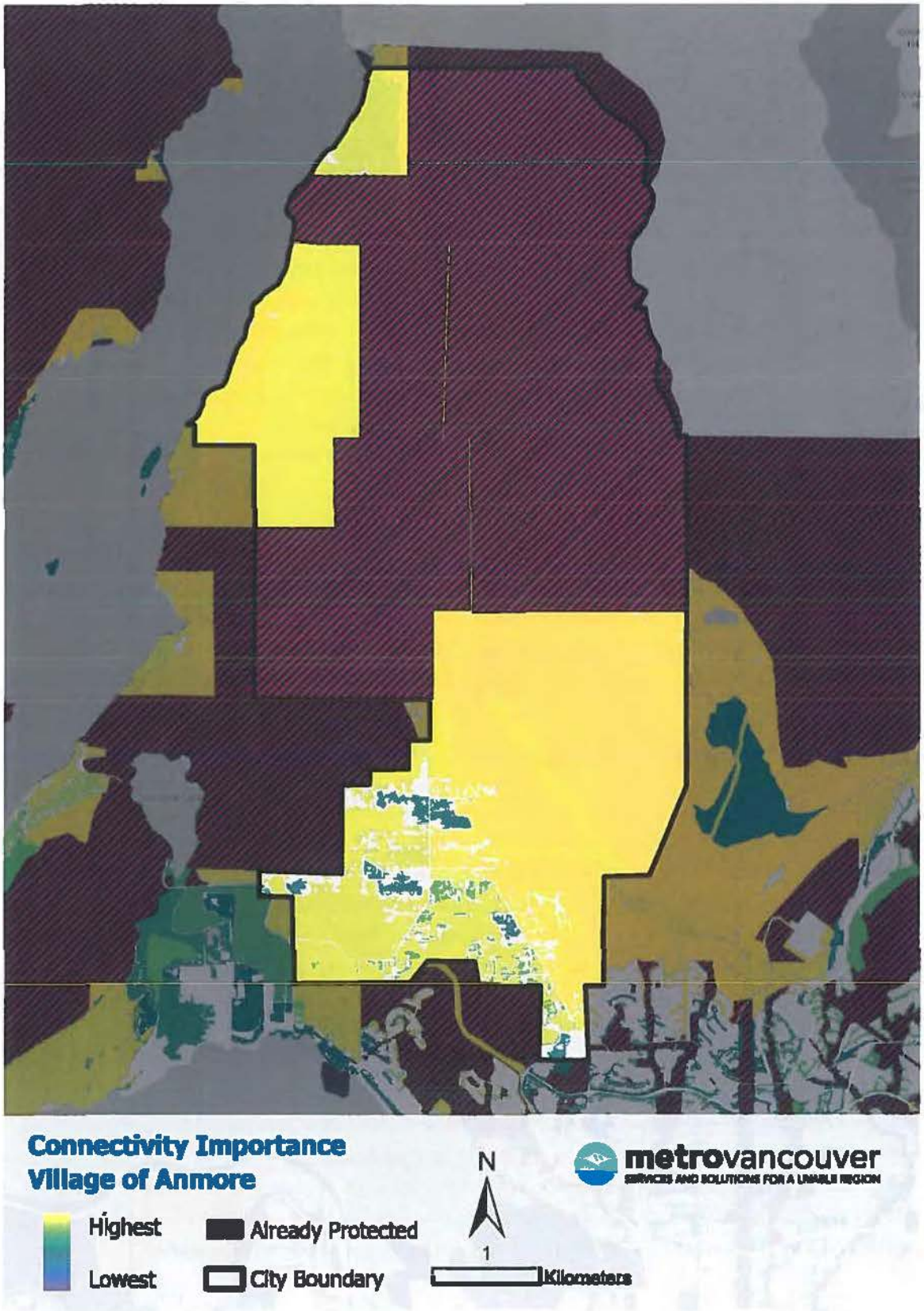
Task 3 – Review results and identify key areas for connectivity and 'stepping-stone' habitat patches

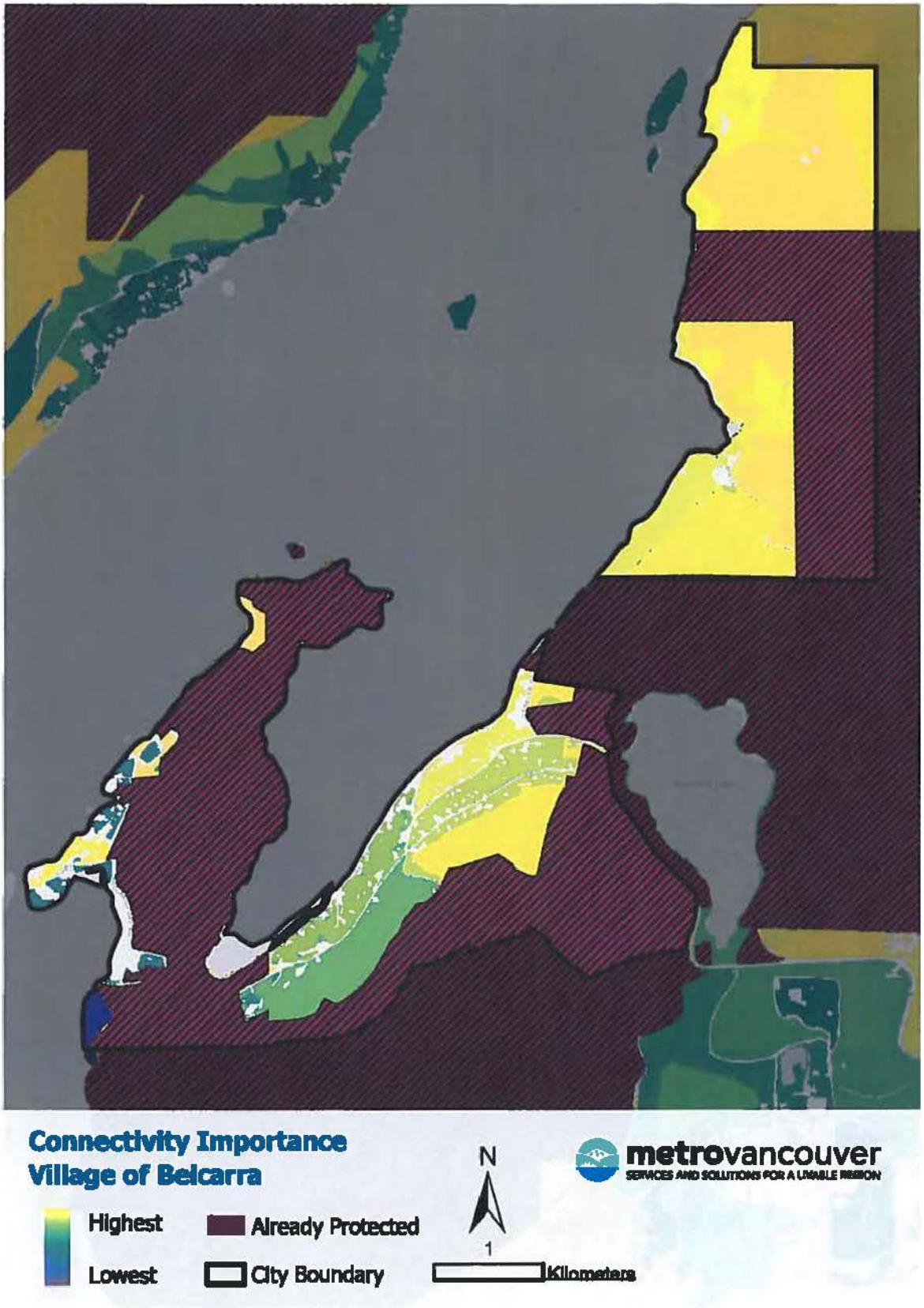
Using the results of the zonation analysis, an attempt was made to identify important regional connectivity corridors throughout Metro Vancouver. In some cases, clear, high value routes were evident. In many cases, particularly in the agricultural areas, they were not clear enough to definitively identify 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.

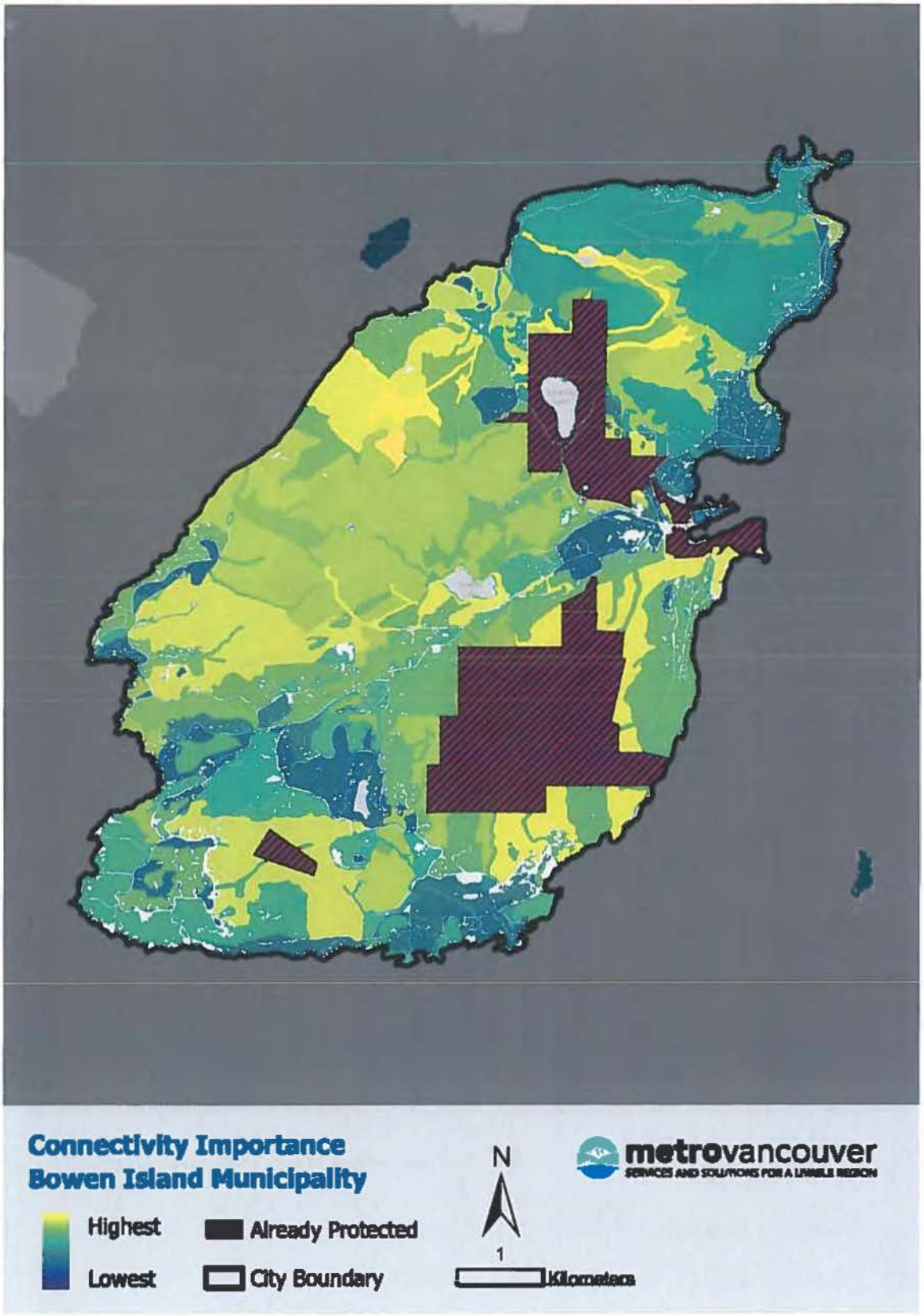
Appendix 4 Municipal Maps

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.).

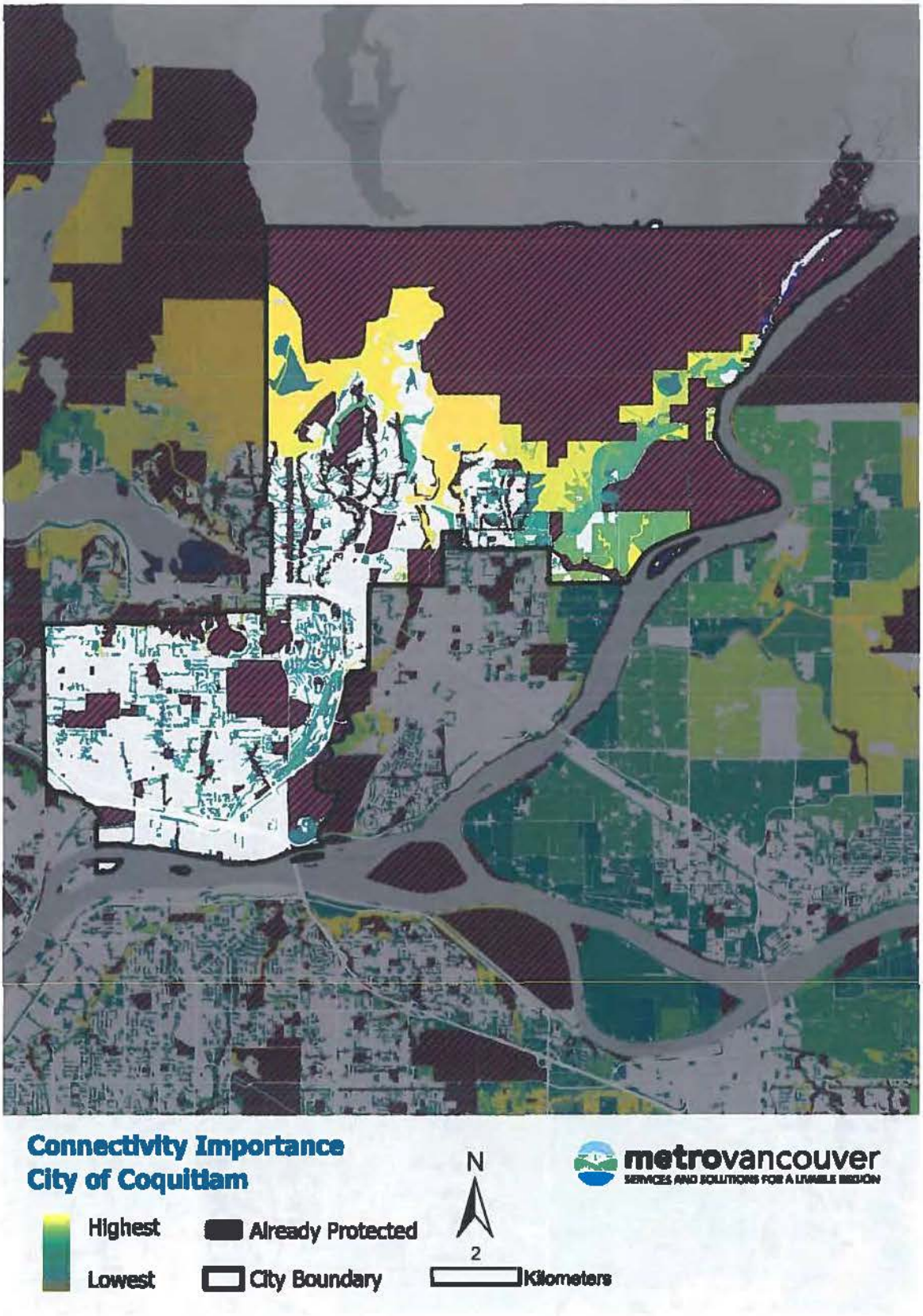
The regional raster layer was clipped to each municipal boundary, and retain the original importance ranking generated by the Zonation analysis. The clipped municipal raster was then displayed using the same color scheme as the regional Zonation maps. The final municipal maps provide additional insight 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).

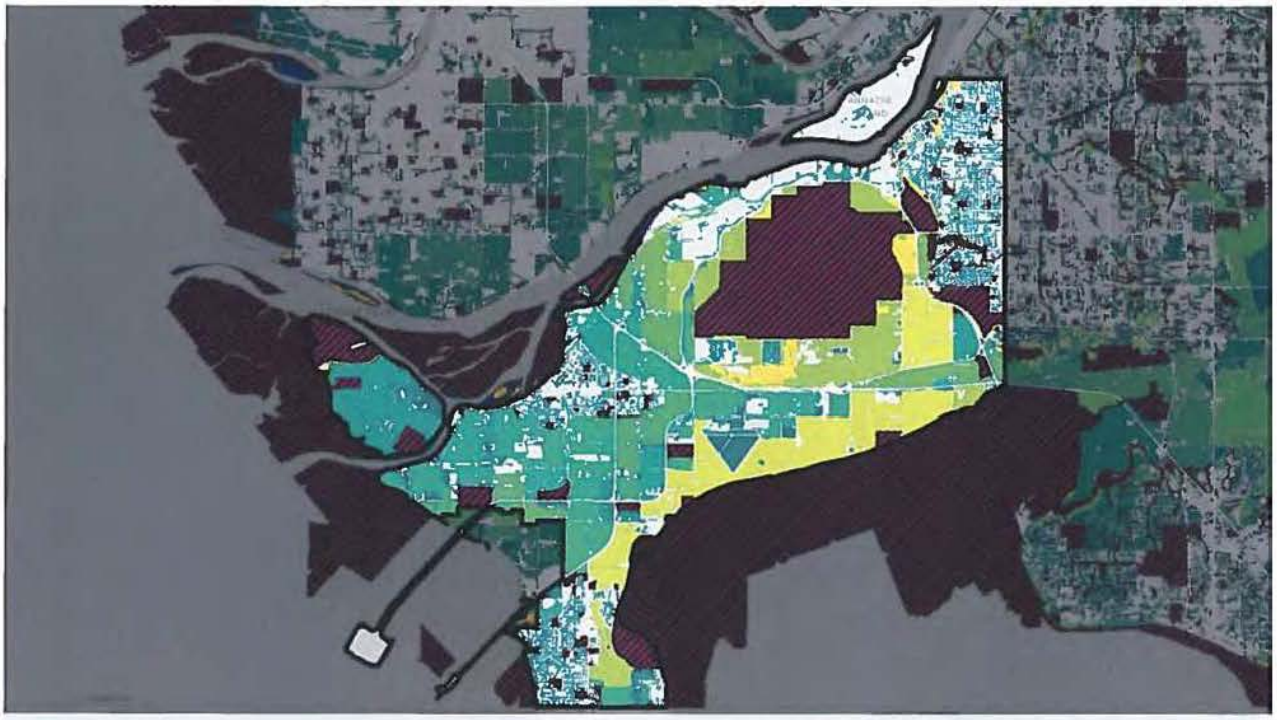

Connectivity Importance
Village of Anmore
Highest
Lowest
Already Protected
City Boundary
N
1
Kilometers
metrovancouver
SERVICES AND SOLUTIONS FOR A LIVABLE REGION

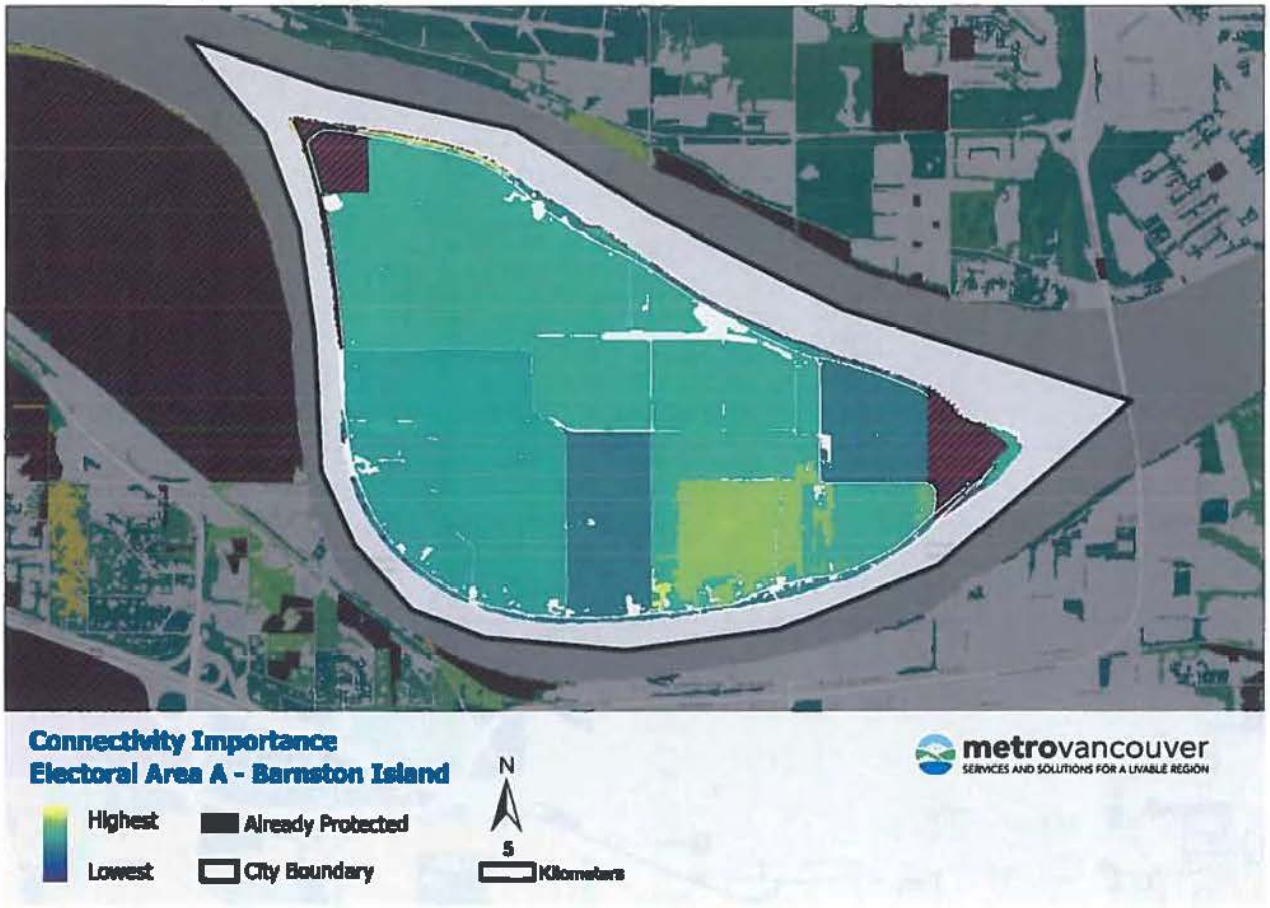

Connectivity Importance
Village of Belcarra
Highest
Lowest
Already Protected
City Boundary
N
1
Kilometers
metrovancouver
SERVICES AND SOLUTIONS FOR A LIVABLE REGION


Connectivity Importance
Bowen Island Municipality
Highest
Lowest
Already Protected
City Boundary
N
1
Kilometers
metrovancouver
SERVICES AND SOLUTIONS FOR A LIVABLE REGION

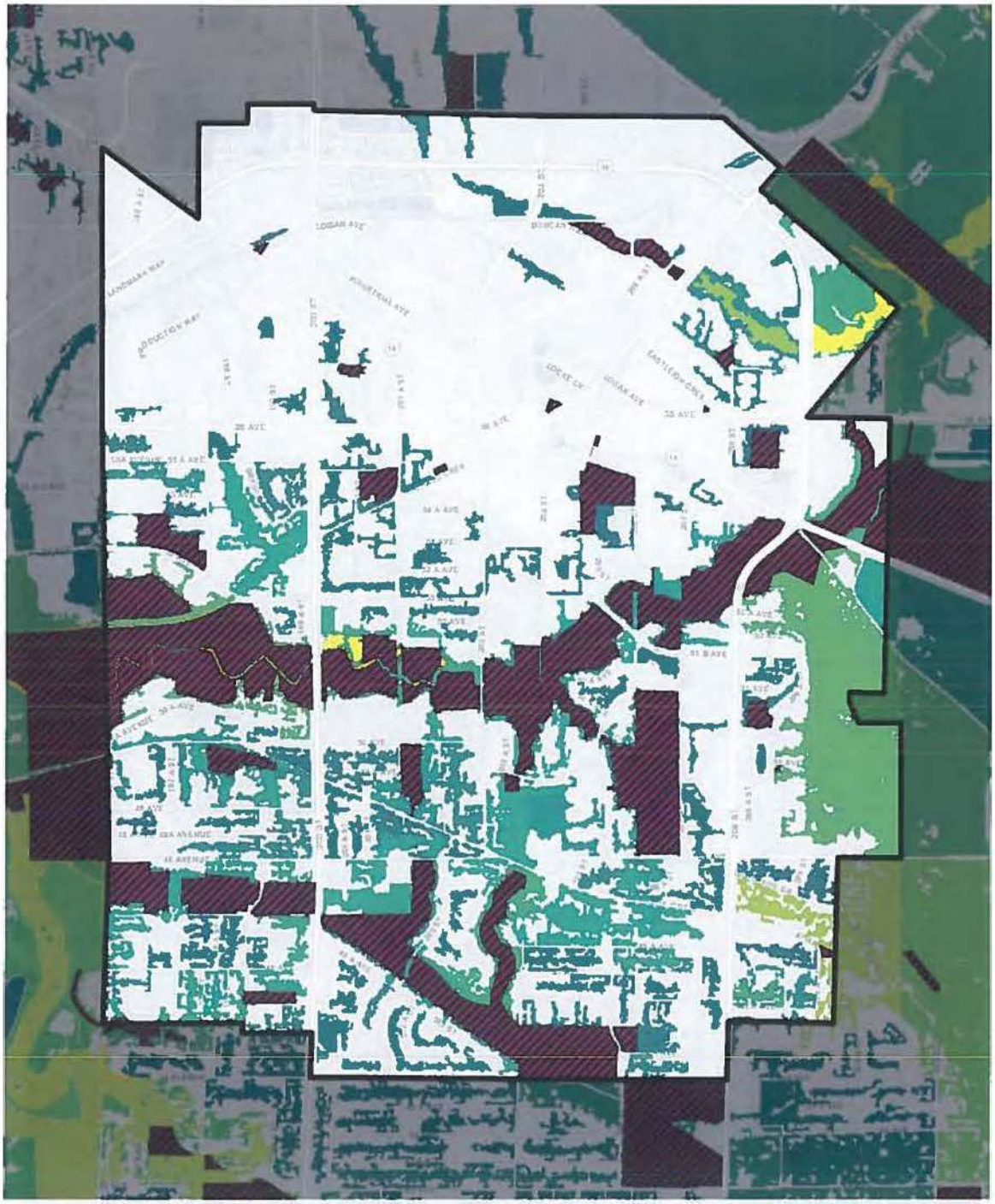

Connectivity Importance
City of Burnaby
Highest
Lowest
Already Protected
City Boundary
N
2
Kilometers
metrovancouver
SERVICES AND SOLUTIONS FOR A LIVABLE REGION

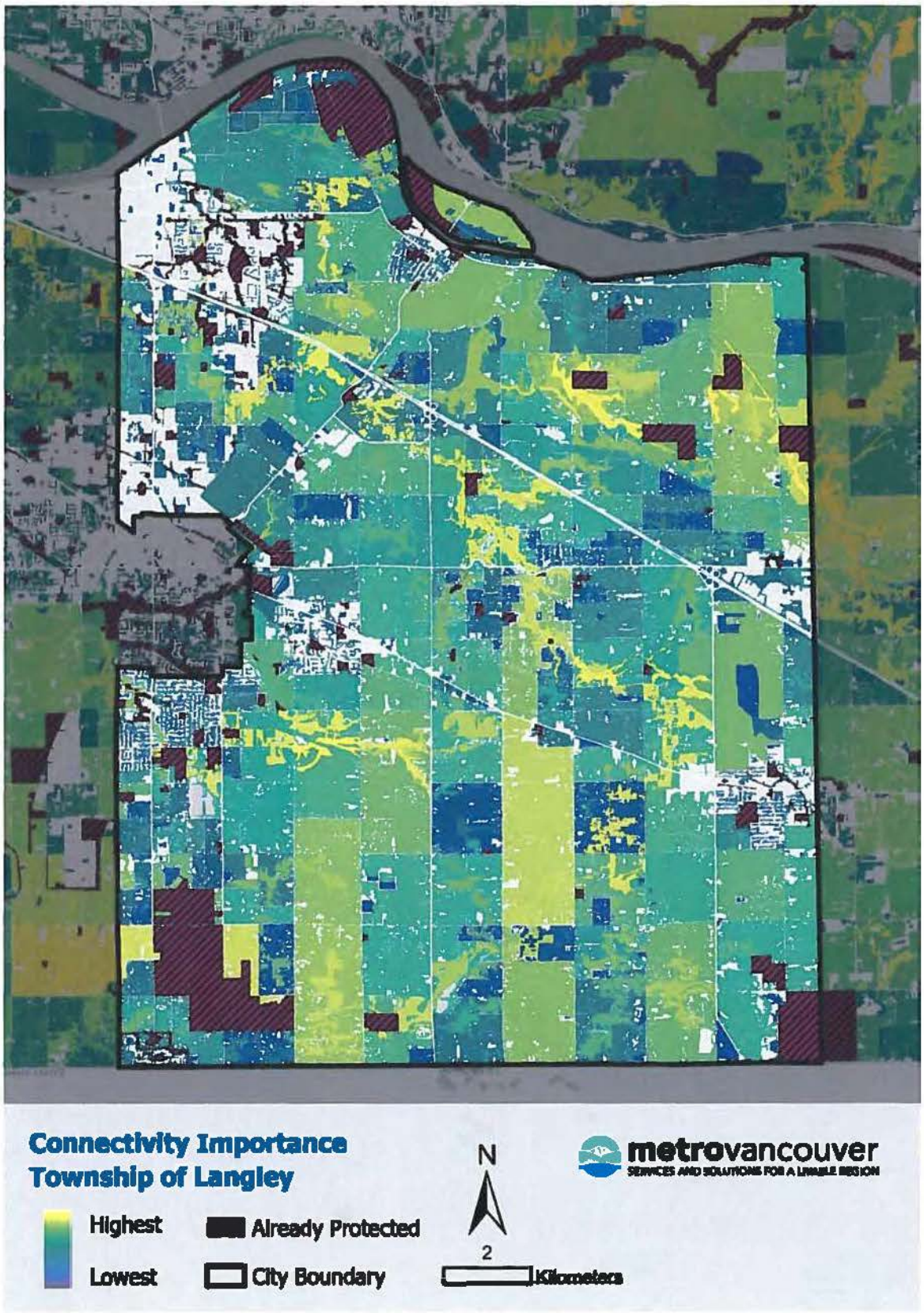

Connectivity Importance
City of Coquitlam
Highest
Lowest
Already Protected
City Boundary
N
2
Kilometers
metrovancouver
SERVICES AND SOLUTIONS FOR A LIVABLE REGION

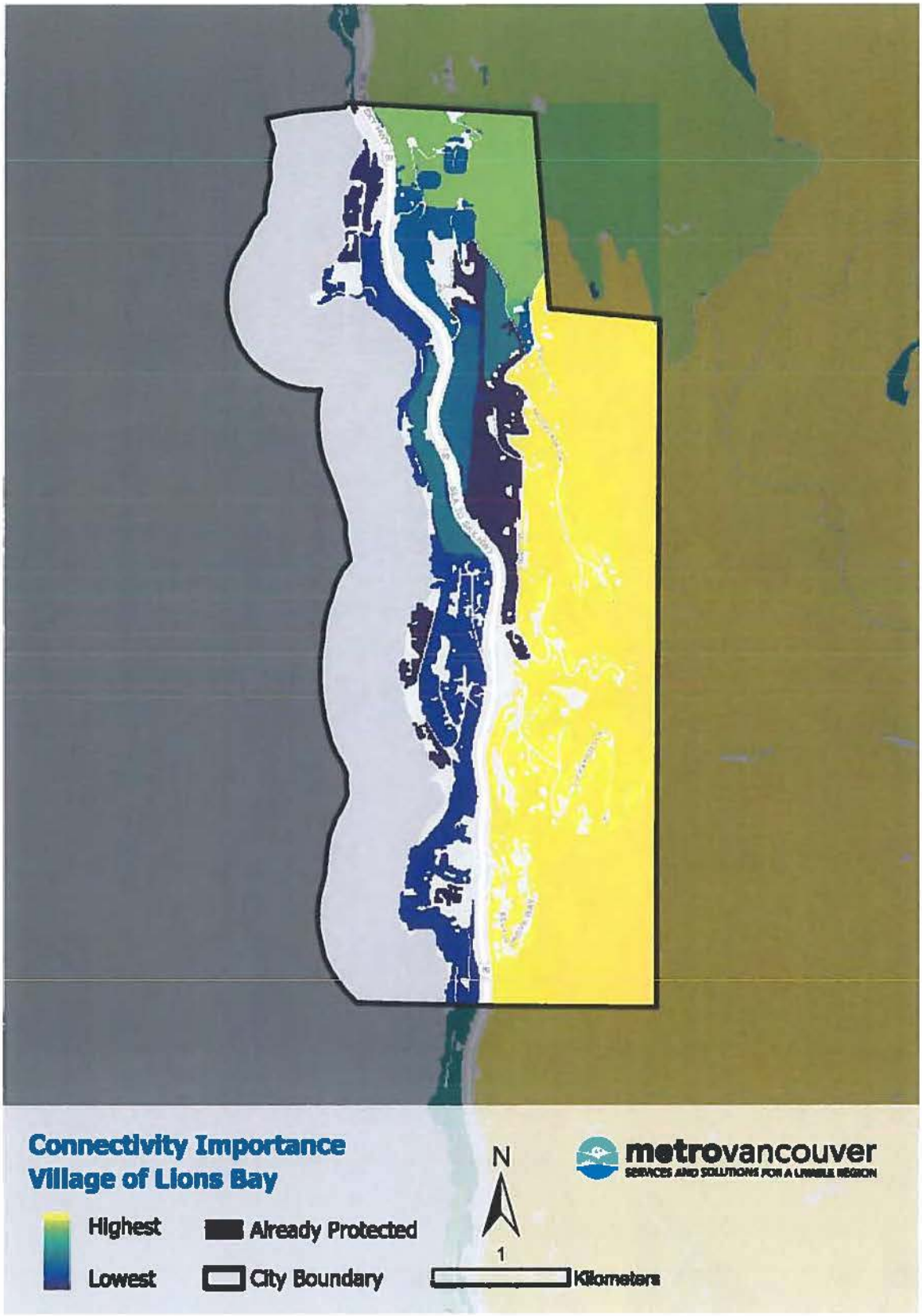

Connectivity Importance
City of Delta
Highest
Lowest
Already Protected
City Boundary
N
1
Kilometers
metrovancouver

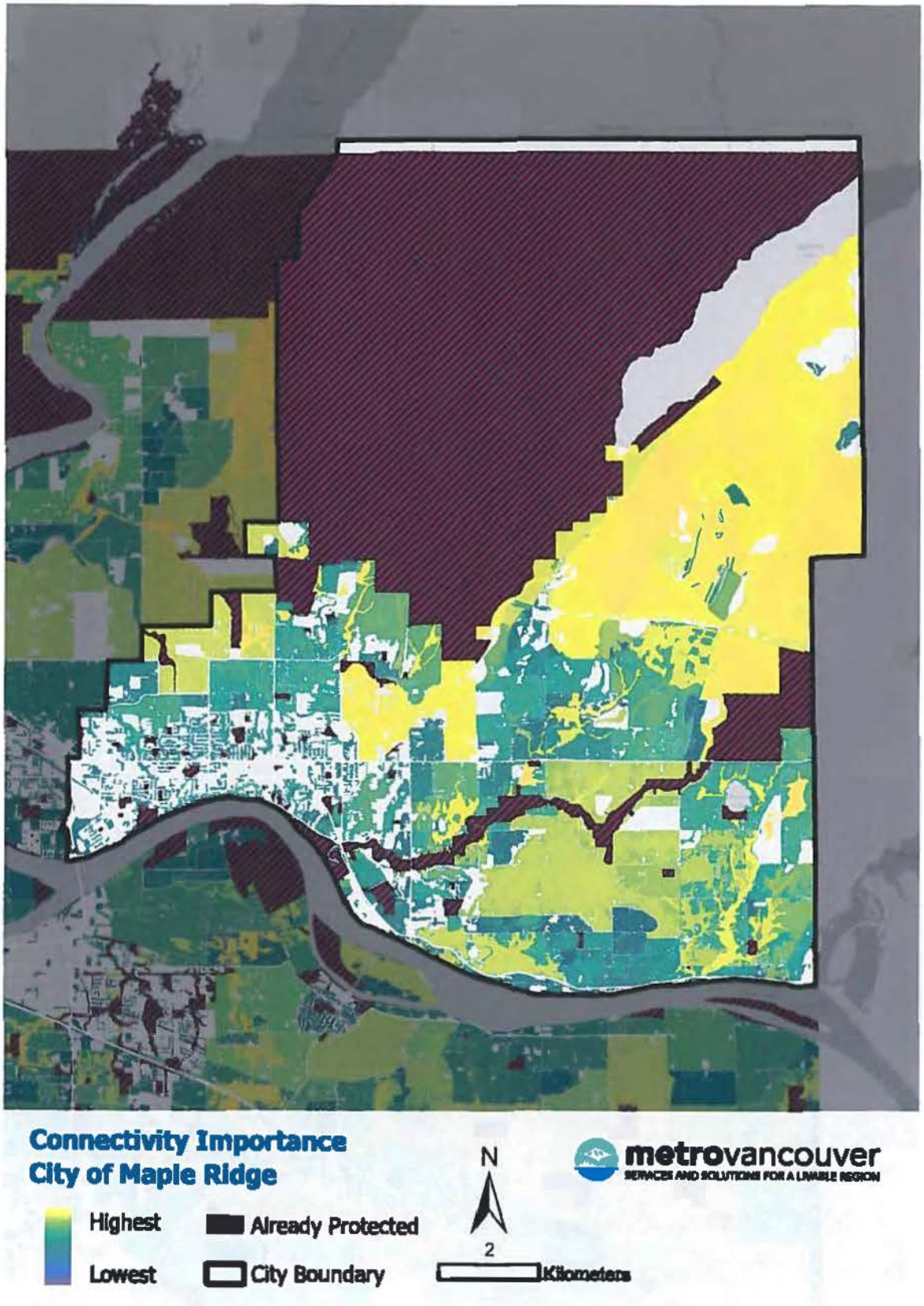

Connectivity Importance
Electoral Area A - Barnston Island
Highest
Lowest
Already Protected
City Boundary
N
5
Kilometers
metrovancouver
SERVICES AND SOLUTIONS FOR A LIVABLE REGION

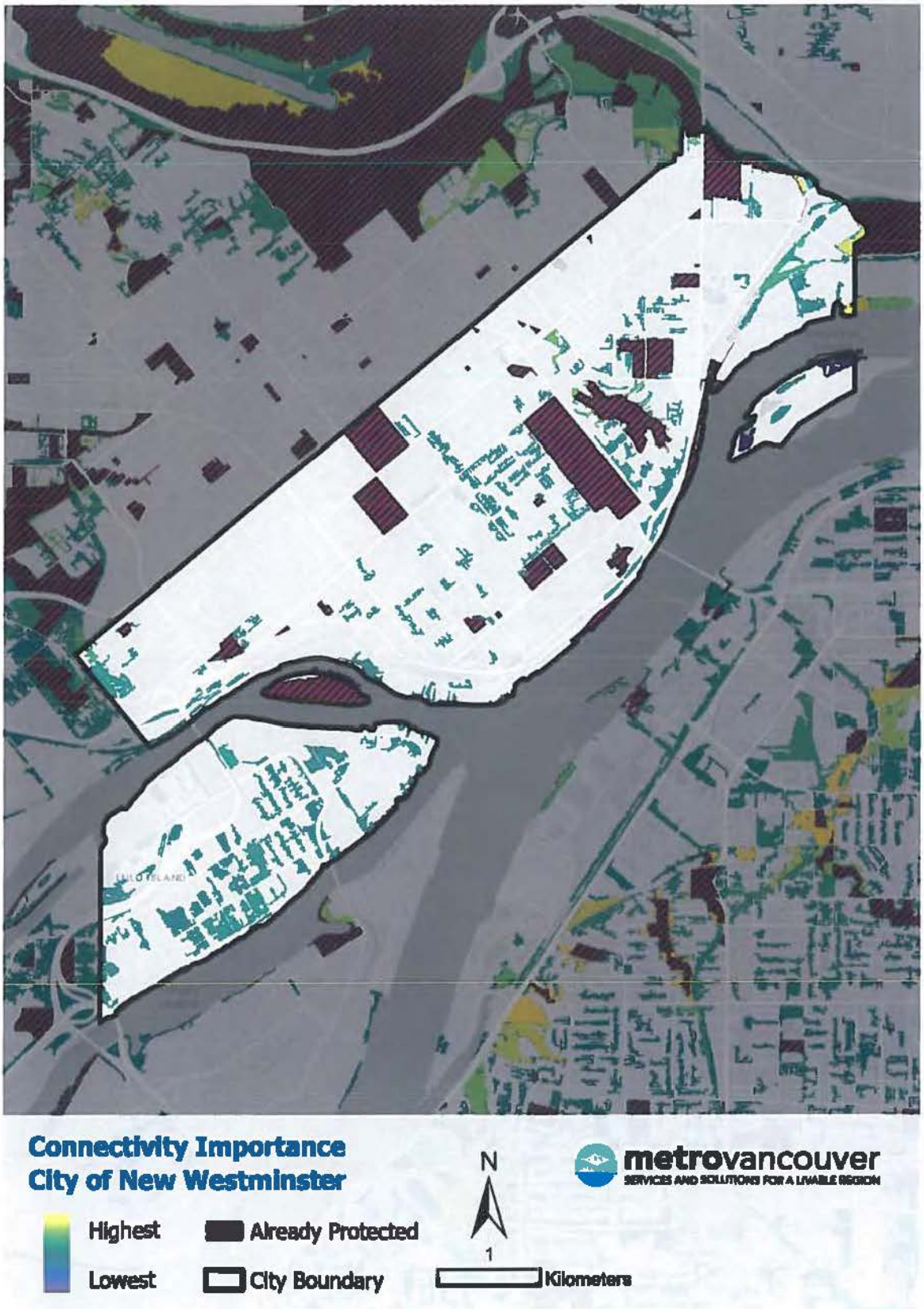

Connectivity Importance
Electoral Area A - UBC and UEL
Highest
Lowest
Already Protected
City Boundary
N
1
Kilometers
metrovancouver
SERVICES AND SOLUTIONS FOR A LIVABLE REGION


Connectivity Importance
City of Langley
Highest
Lowest
Already Protected
City Boundary
N
1
Kilometers
metrovancouver
SERVICES AND SOLUTIONS FOR A LIVABLE REGION

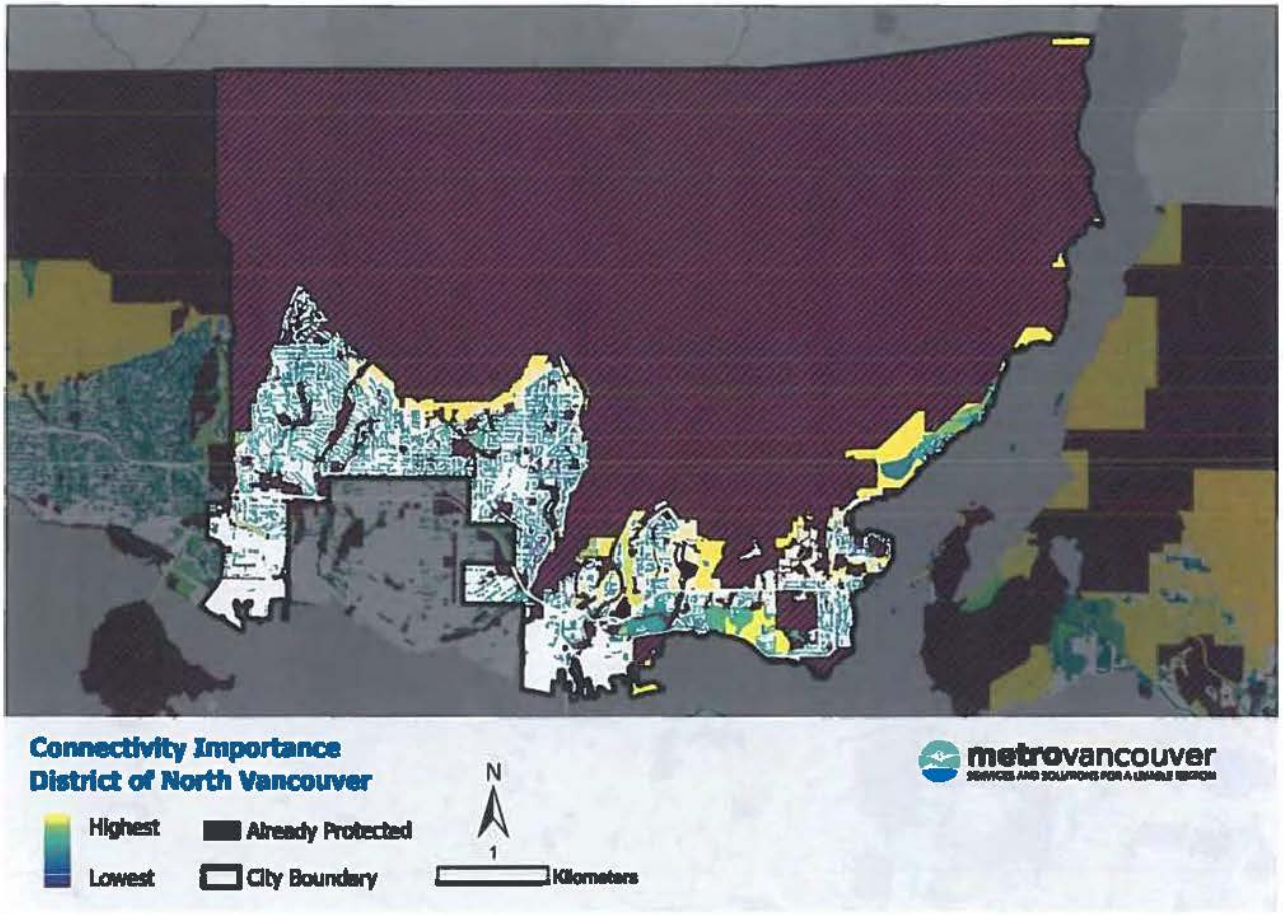

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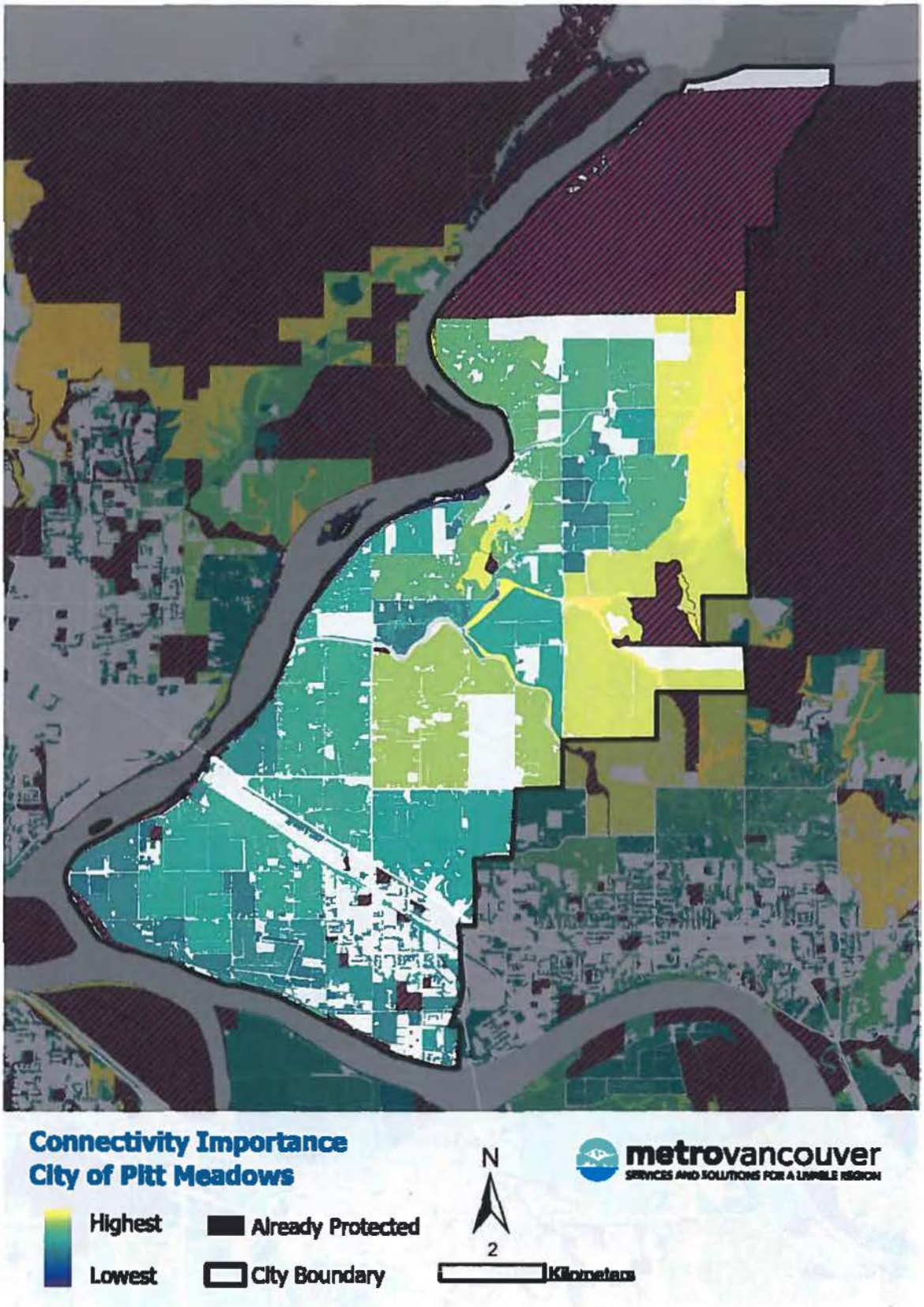

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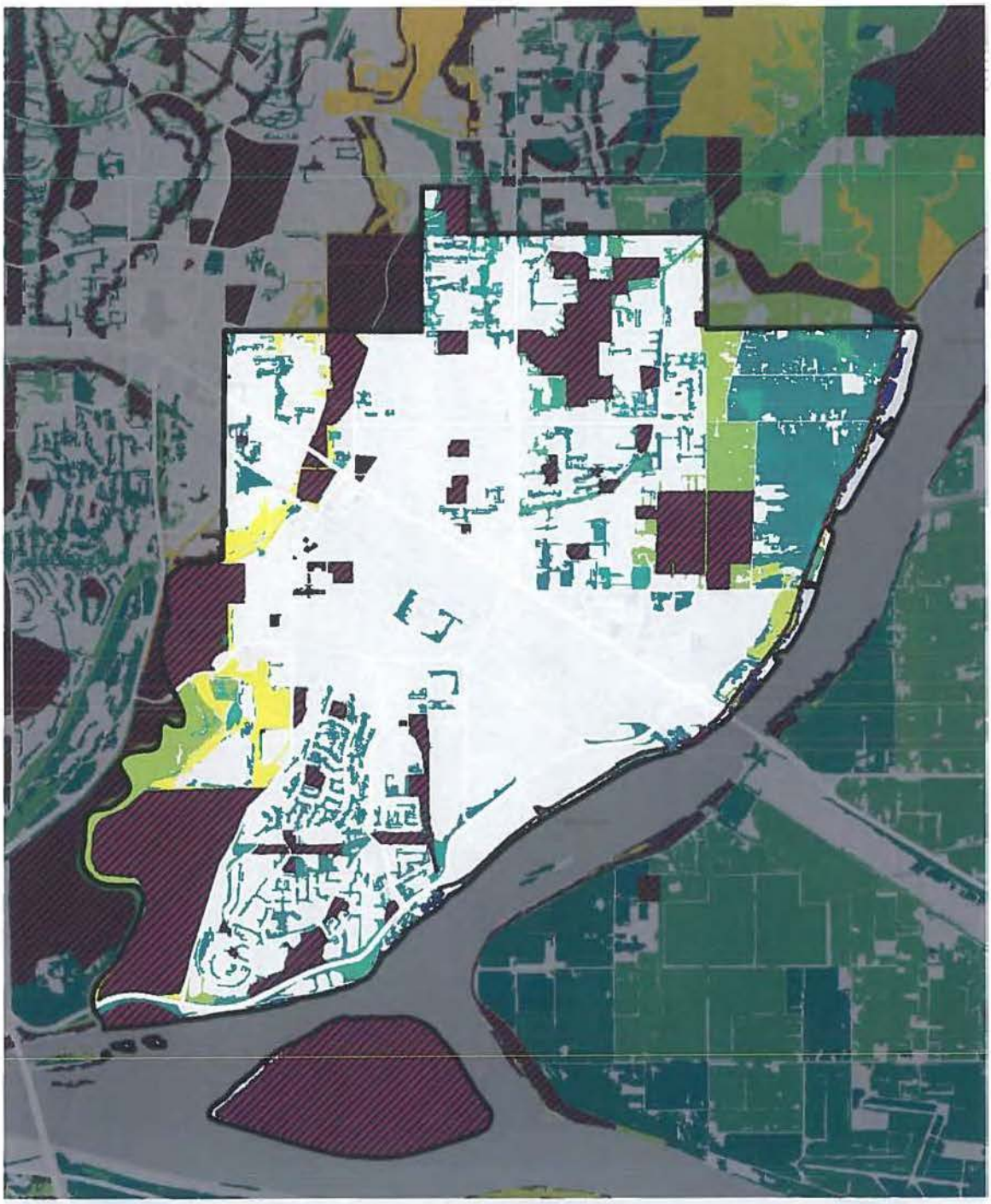

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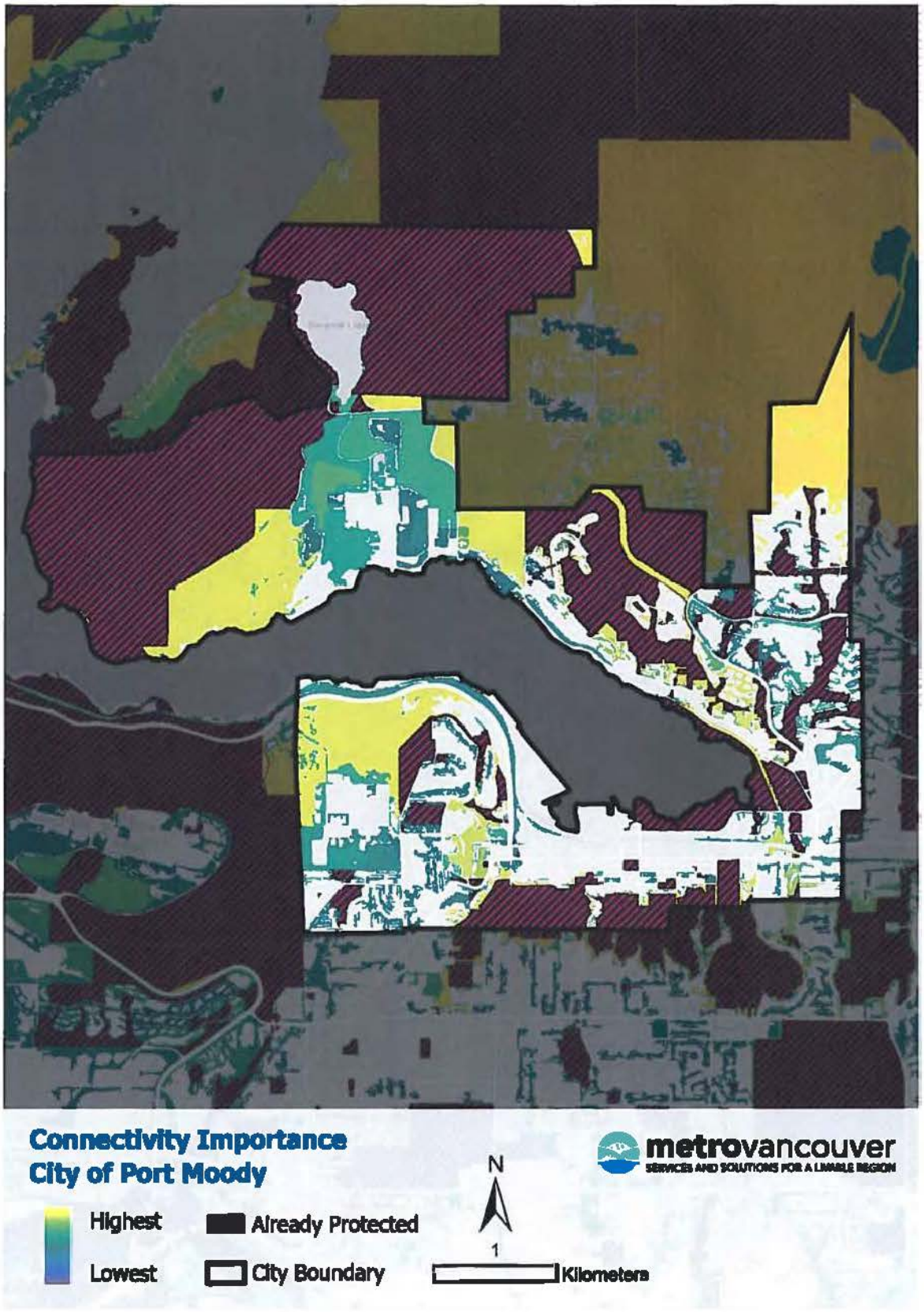

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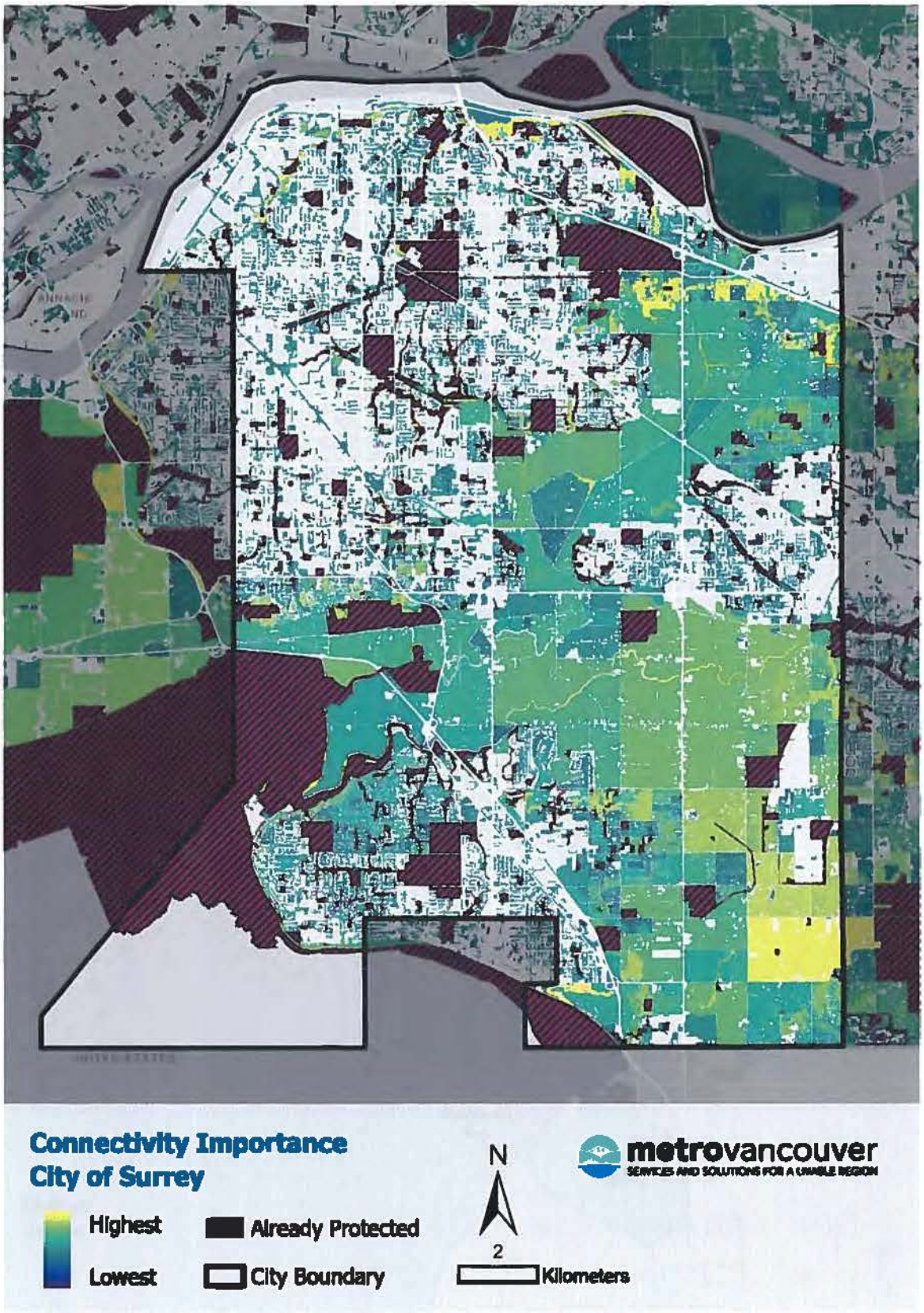

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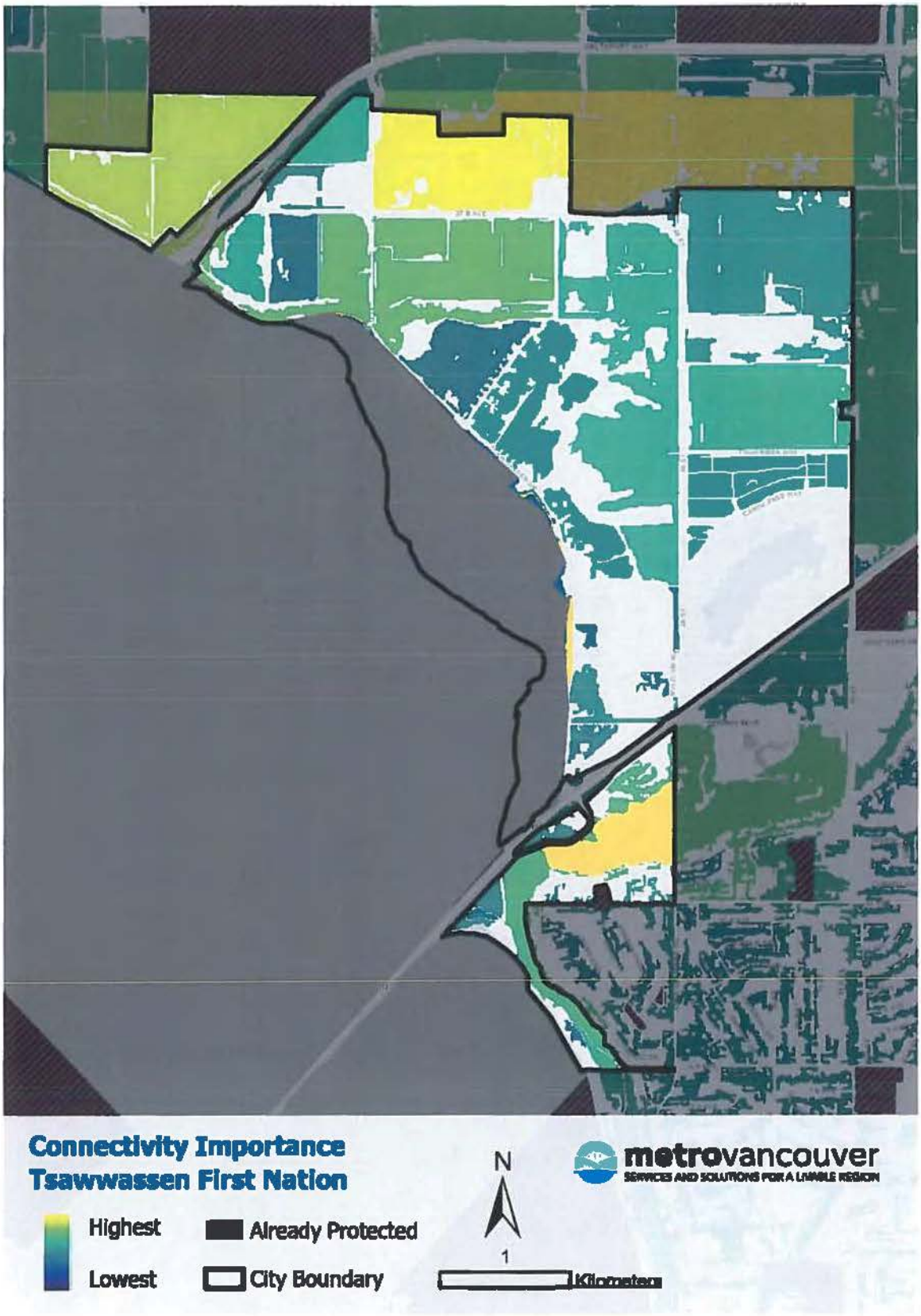

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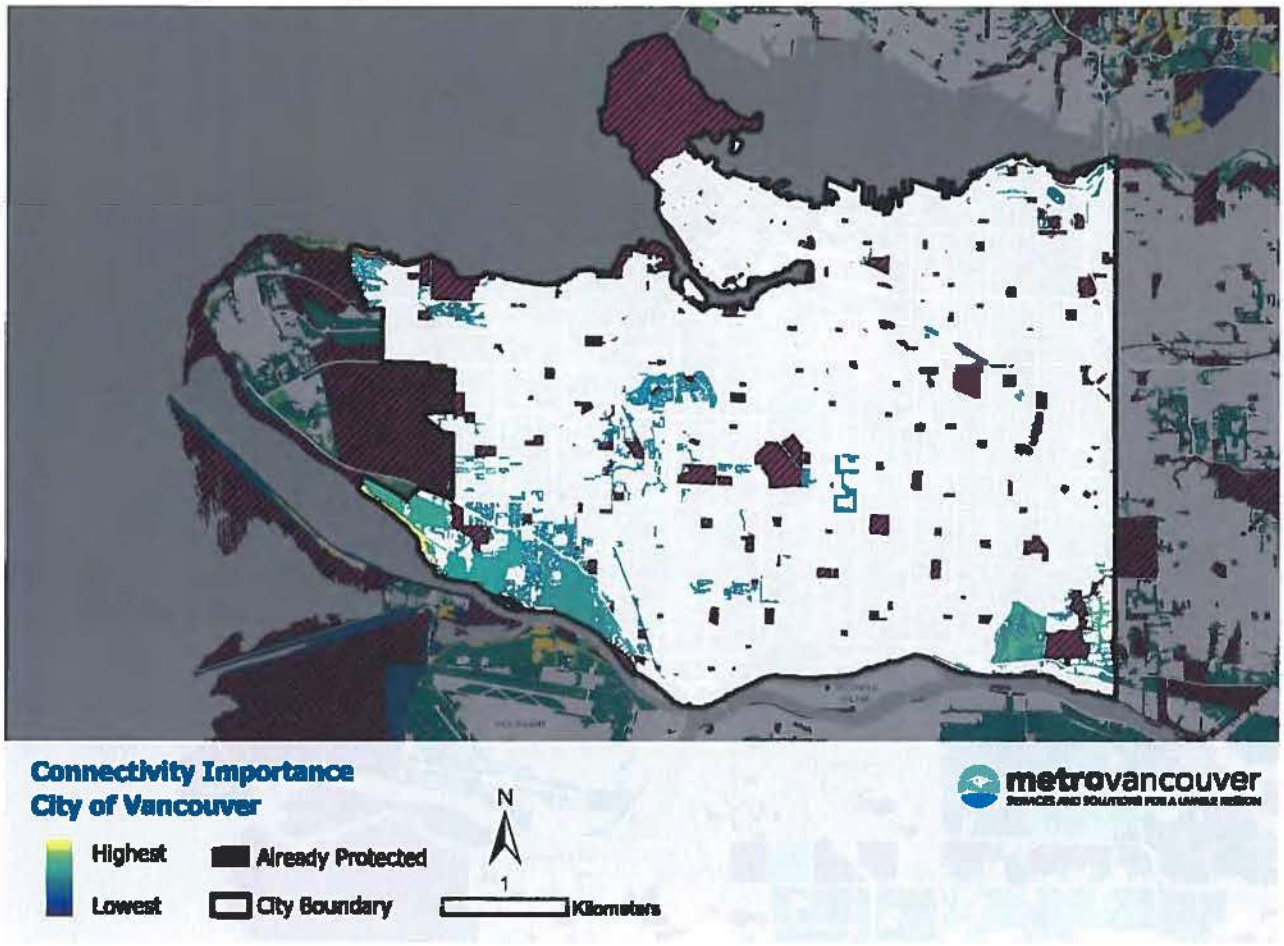

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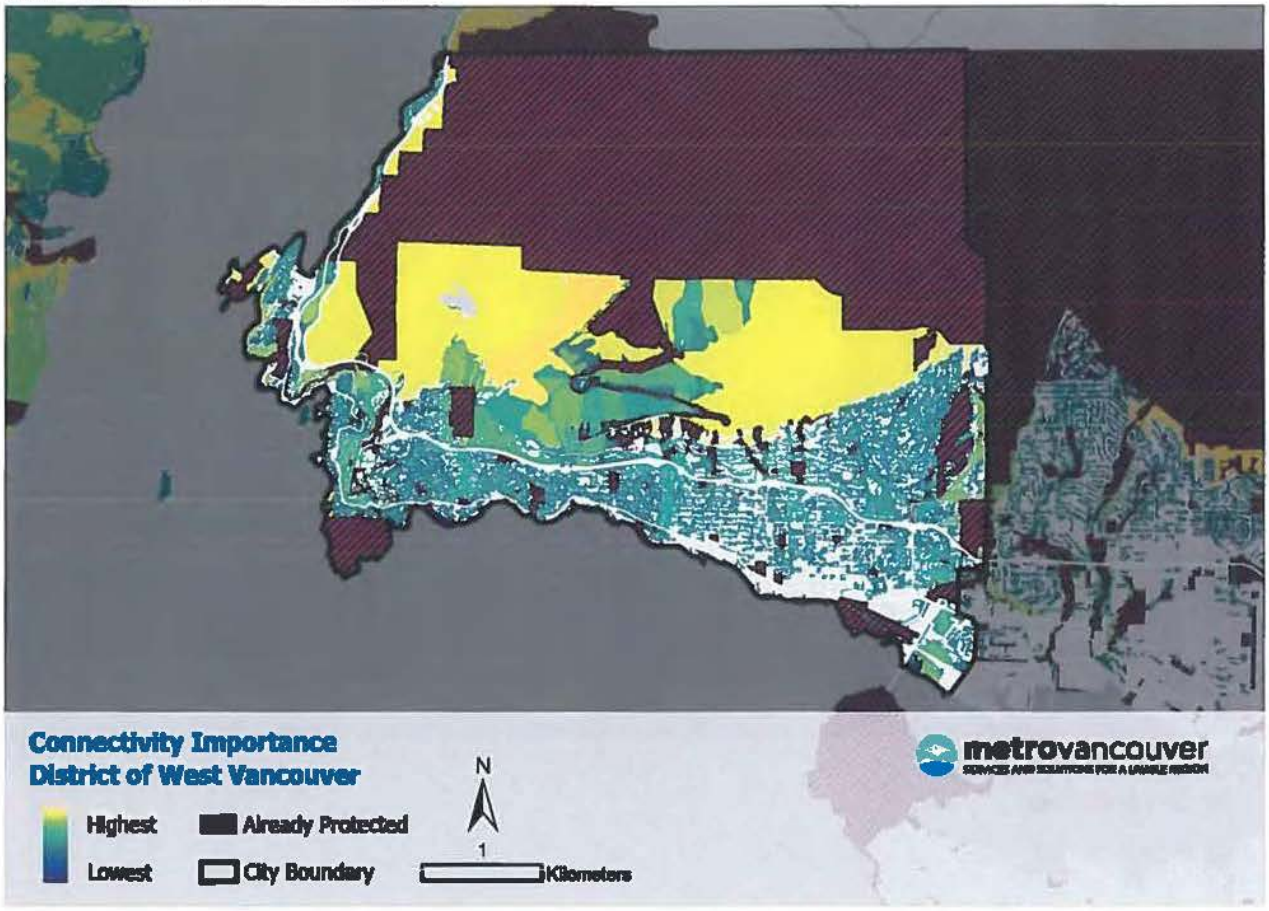

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SERVICES AND SOLUTIONS FOR A LIVABLE REGION
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City Boundary
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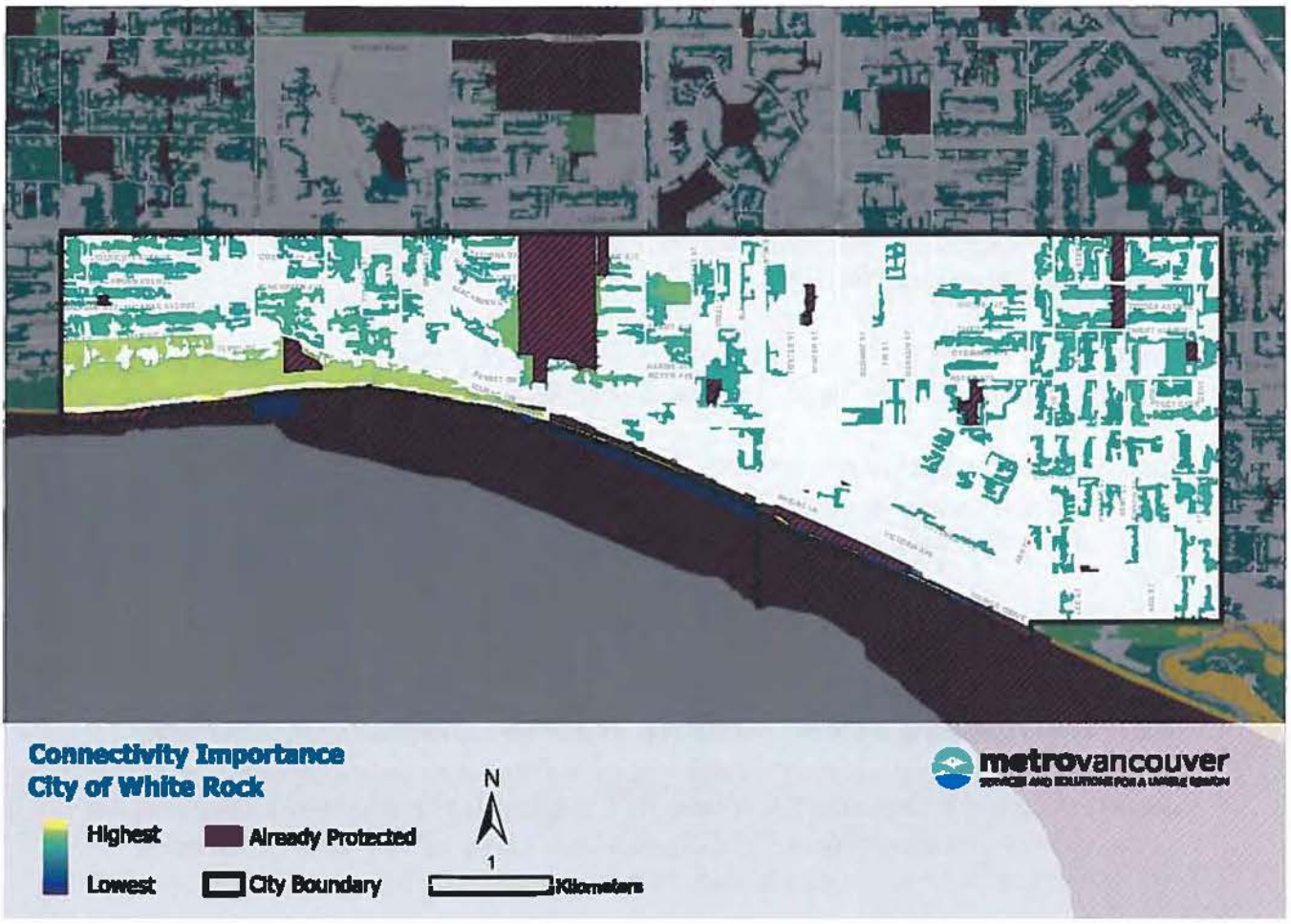

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Connectivity Importance
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Connectivity Importance
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City Boundary
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Connectivity Importance
Tsawwassen First Nation
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City Boundary
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SERVICES AND SOLUTIONS FOR A LIVABLE REGION


Connectivity Importance
City of Vancouver
Highest
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Connectivity Importance
District of West Vancouver
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Kilometers
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Connectivity Importance
City of White Rock
Highest
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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:

DIAMOND HEAD

Commissioned by Metro Vancouver

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SERVICES AND SOLUTIONS FOR A LIVABLE REGION



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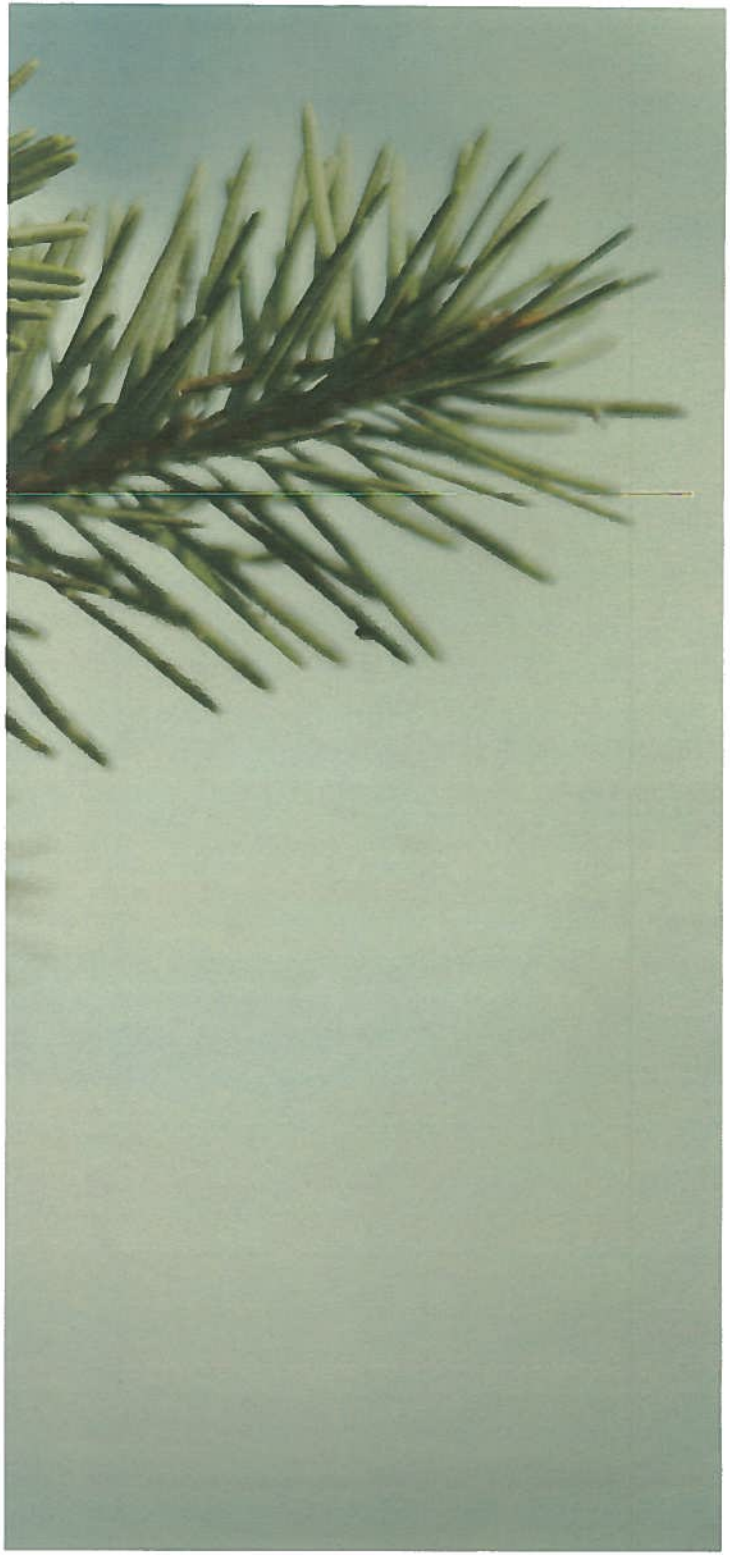
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Acknowledgements

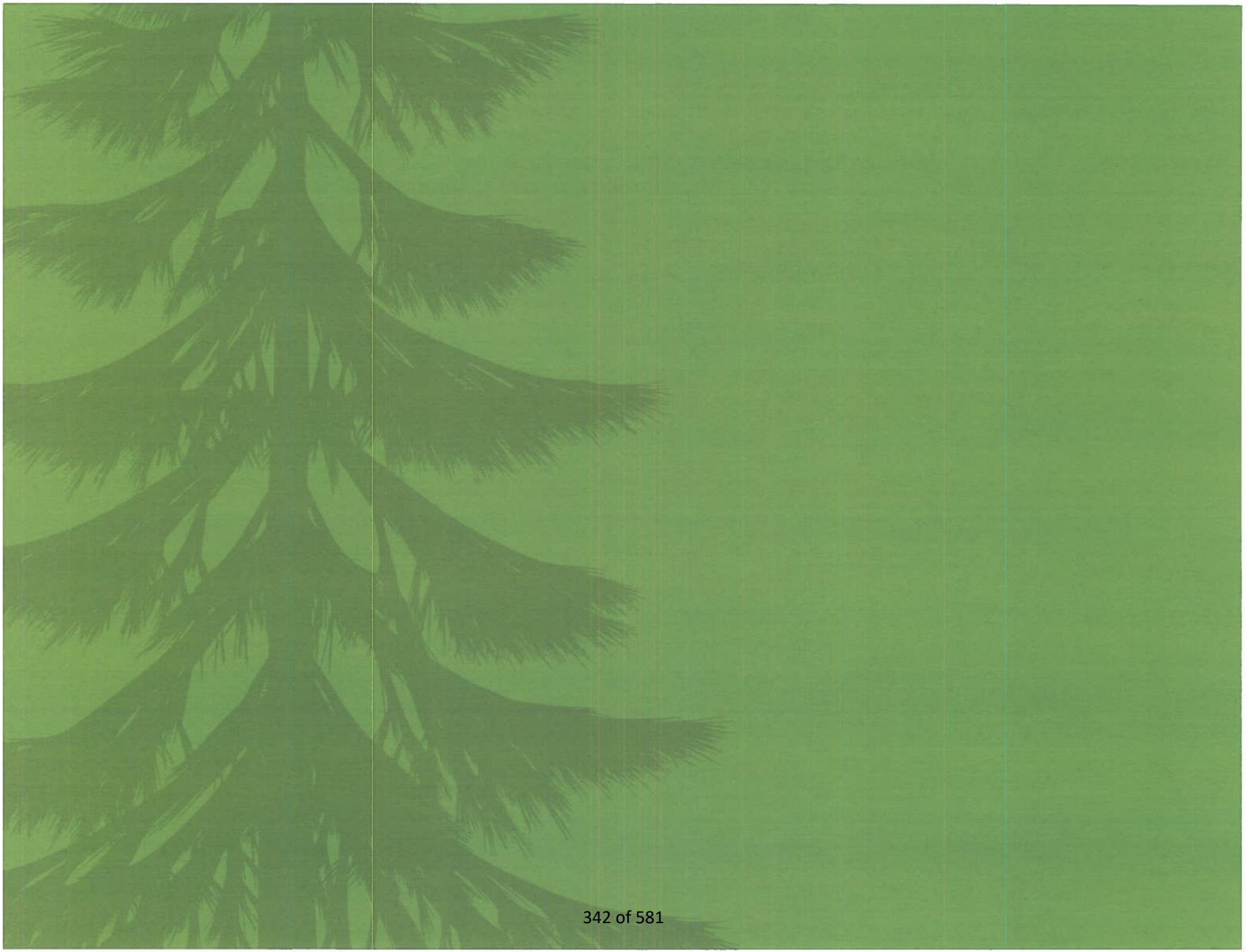
Thank you to all the municipal staff and consulting arborists who answered our surveys in the fall of 2020. Thank you also to Edward Nichol and Marcin Pachcinski of Metro Vancouver, and Dr. Julian Dunster for their thorough review and comments on this Toolkit. The *Metro Vancouver Tree Regulations Toolkit* benefited from your input, guidance, and care.

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Mike Coulthard

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 framework. 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 development 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 Strategies' 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



	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.	DPAs 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	PRIVATE YARD TREES	PRIVATE TREE IN A DEVELOPMENT
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.	Policies supporting the treed character of new landscaping in land uses and neighbourhoods.	Policies and targets supporting tree and canopy retention, protection and enhancement.
At rezoning, negotiate amenity contributions for new parkland. Require setbacks of above and below ground structures, signage and weather protection favourable for street trees.	Require lot sizes, trees per lot, impermeable/ permeable cover, off-street parking, screening | and landscaping, favourable to yard trees.	IMPORTANT: The tree bylaw may not apply to the extent necessary to allow a permitted use or density.
Set standards for boulevard trees, spacing, soil volume, planting standards, access, utilities favourable for street trees.	Set standards for access and utilities placement favourable to yard trees.	Set standards for access and utilities placement favourable to retaining private trees.
	Promote energy conservation, water conservation and reduction of greenhouse gas emissions using trees.	
		Protect trees or tree groups on developing properties, place maintenance requirements and restrict actions that could damage the protected features.
Regulate all municipal trees. Specify assessment, protection, compensation standards.	Regulate certain trees and require a minimum number of trees/canopy per lot. Specify assessment and replacement standards.	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 targets[1] 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.



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 and 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, & Thurau, 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 m^3 of soil and preferably 0.6 m^3 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 m^2 for a small tree and 35 m^2 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).

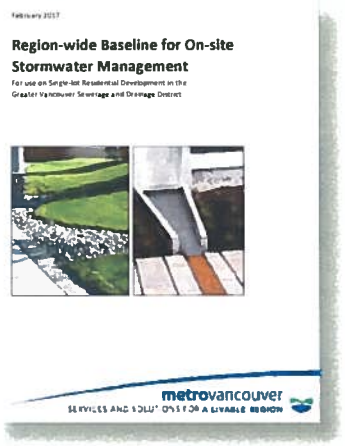
More examples can be found on Deeproot's website.

- **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.

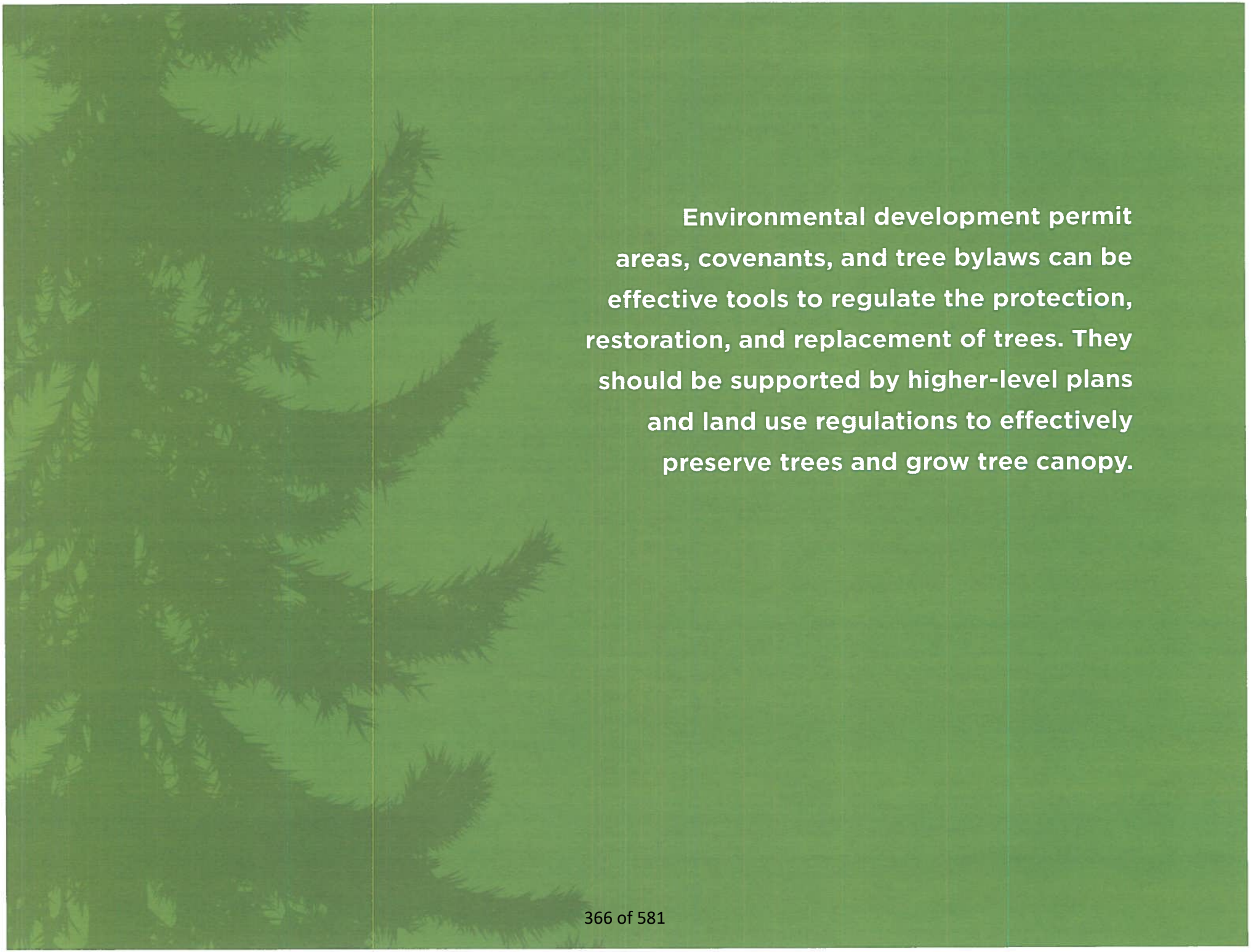
ALIGNING CANOPY COVER GOALS WITH STORMWATER MANAGEMENT INITIATIVES

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

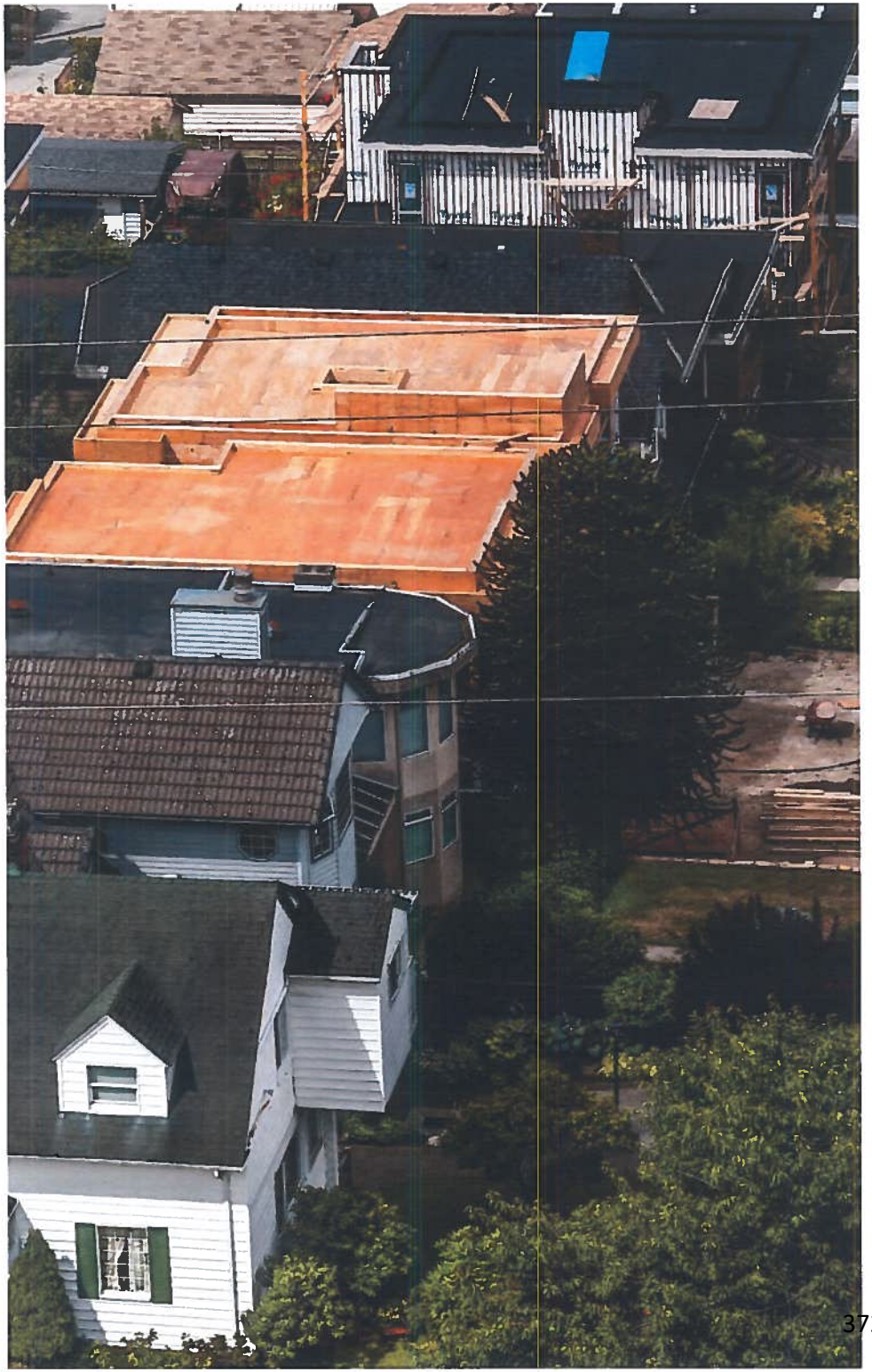
Where existing ecosystems are degraded or damaged, environmental DPAs can require measures to return the environmentally sensitive area to its natural state:

- **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



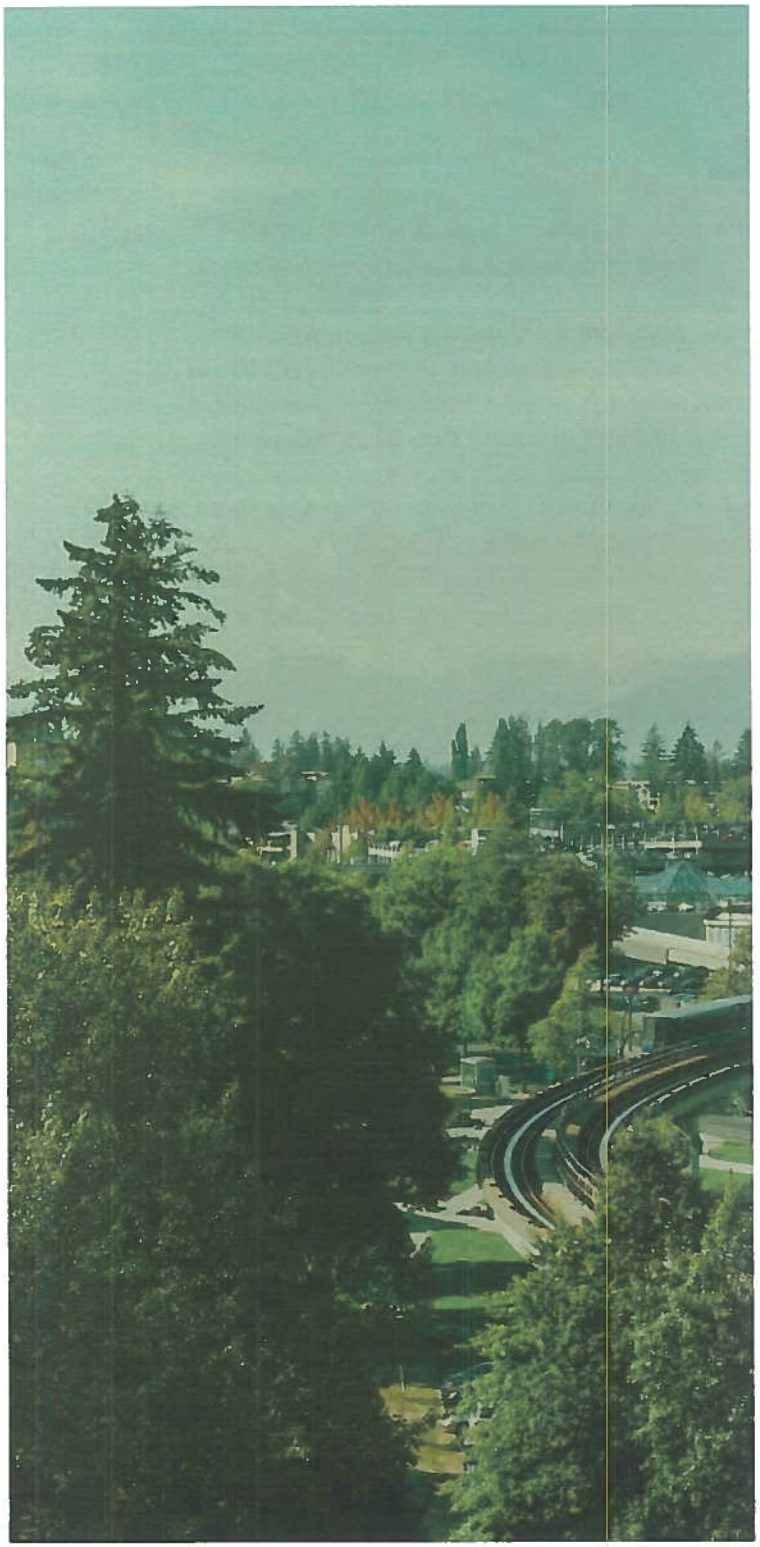
Covenants are a tool local governments use to regulate trees on individual land parcels, usually with rezoning, subdivision, or development permits. The Province of British Columbia's Land Title Act, section 219 allows covenants (sometimes also called conservation covenants) to be registered on title. 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 municipality 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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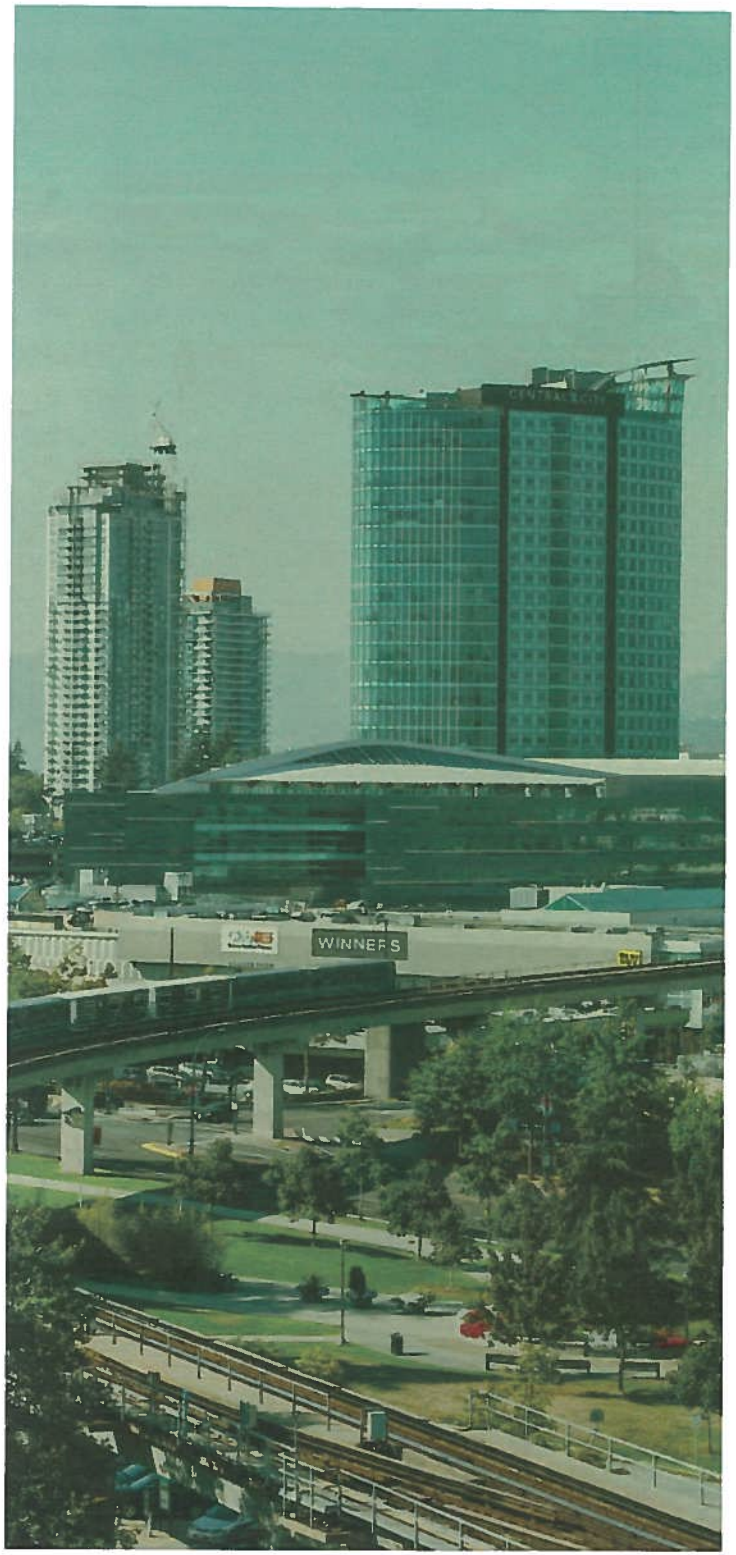
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6.3 TREE BYLAWS

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.



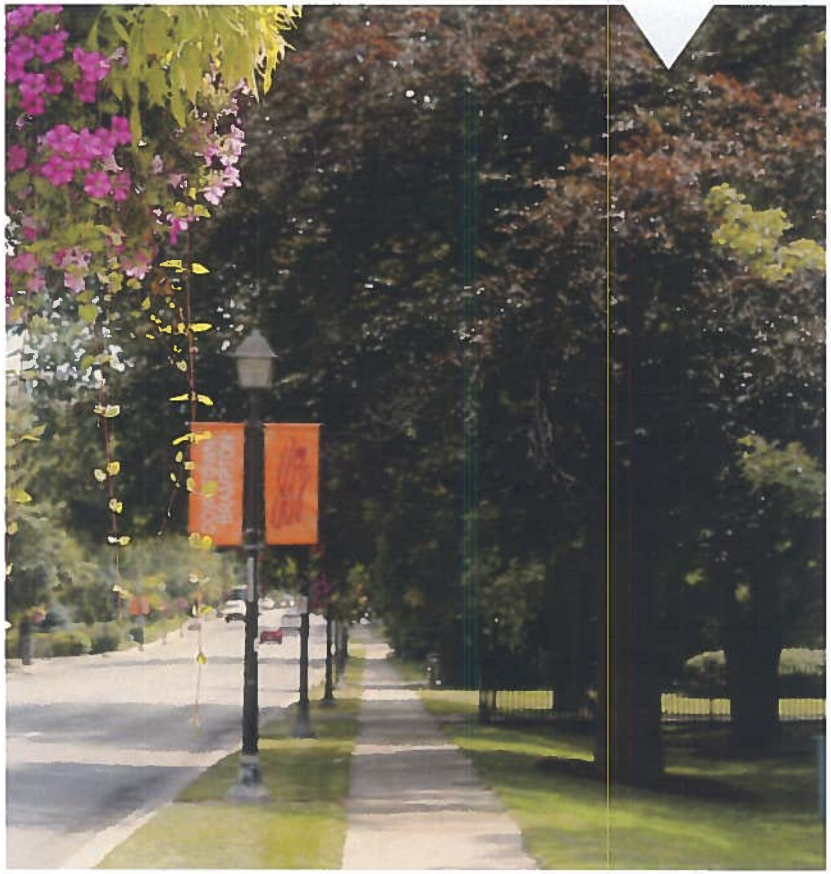
In practice

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

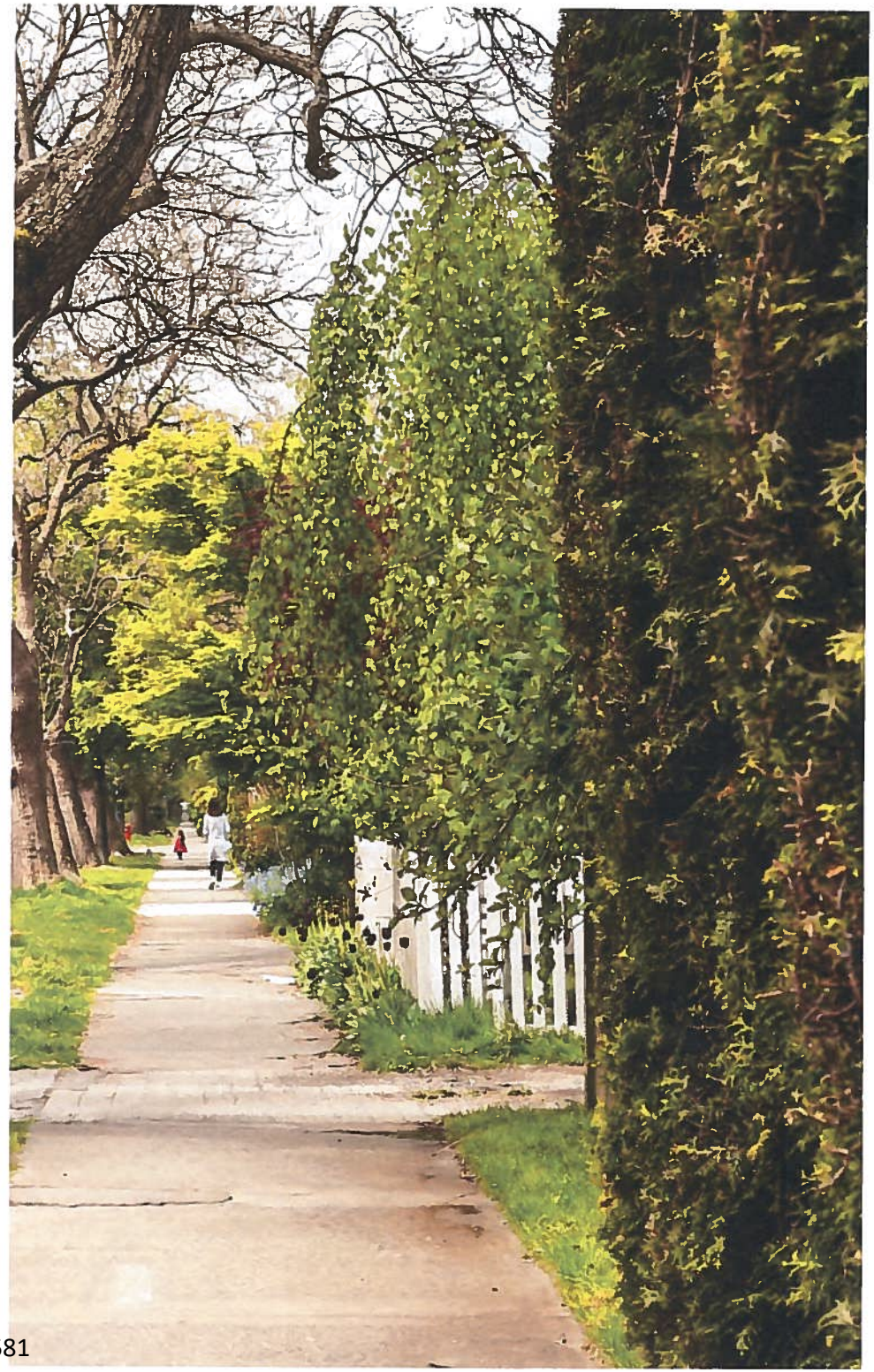
***Places where this approach is found**: Maple Ridge, New Westminster, Surrey, Mississauga (ON)*

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 ground[2]
- 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 x 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 x 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

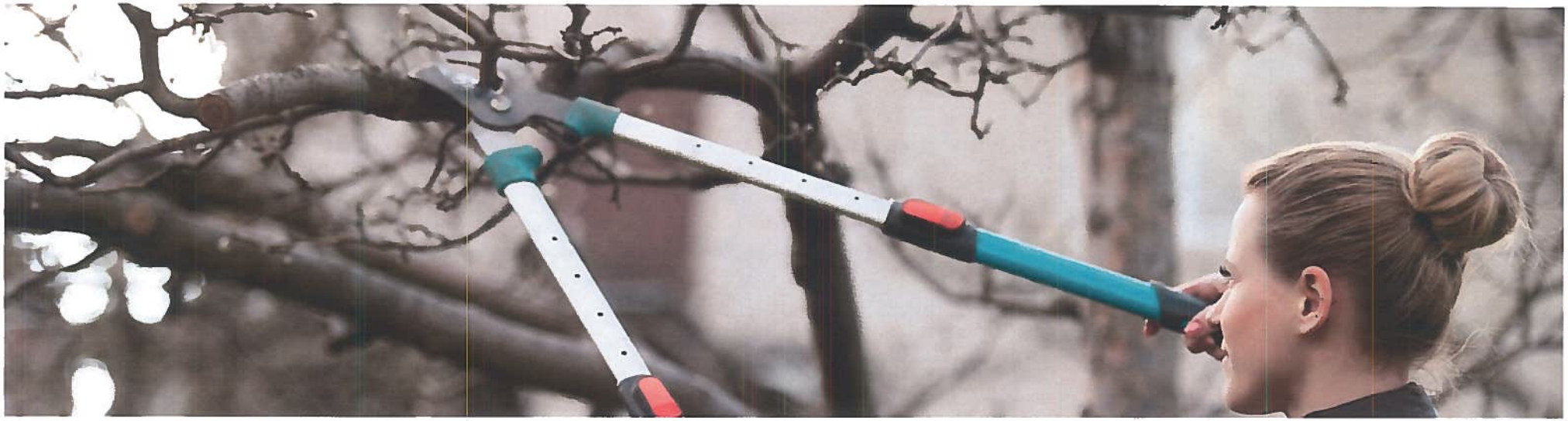
PURPOSE | A definition of different types of applicants or applications is used when the requirements of the bylaw need to be differentiated.

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.



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
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: • Option 1: **Tree density target** • Option 2: **Canopy cover target**

Option 1: Tree density target

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.

Context

A municipality might choose tree density target when:

- 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)

Found in: *Maple Ridge, Courtenay, Gatineau (QC)*

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.
- Can establish a relationship between tree density and canopy using tree canopy data

Cons

- 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

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.

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

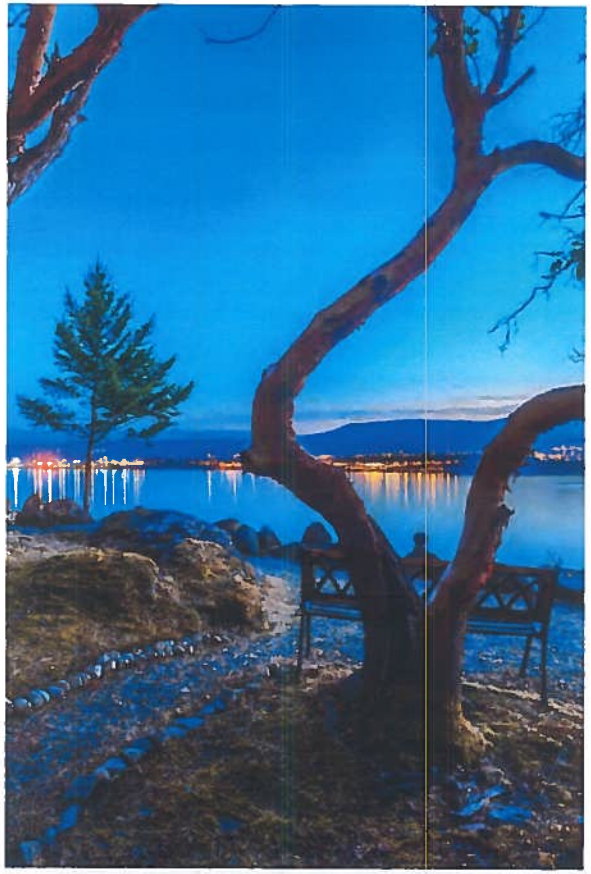
Best implemented with differentiation for meeting the requirements during development versus non-development contexts. If an annual removal allowance is in place, it may be necessary to protect trees that are of particular importance to the community such as species of special interest, significant or 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

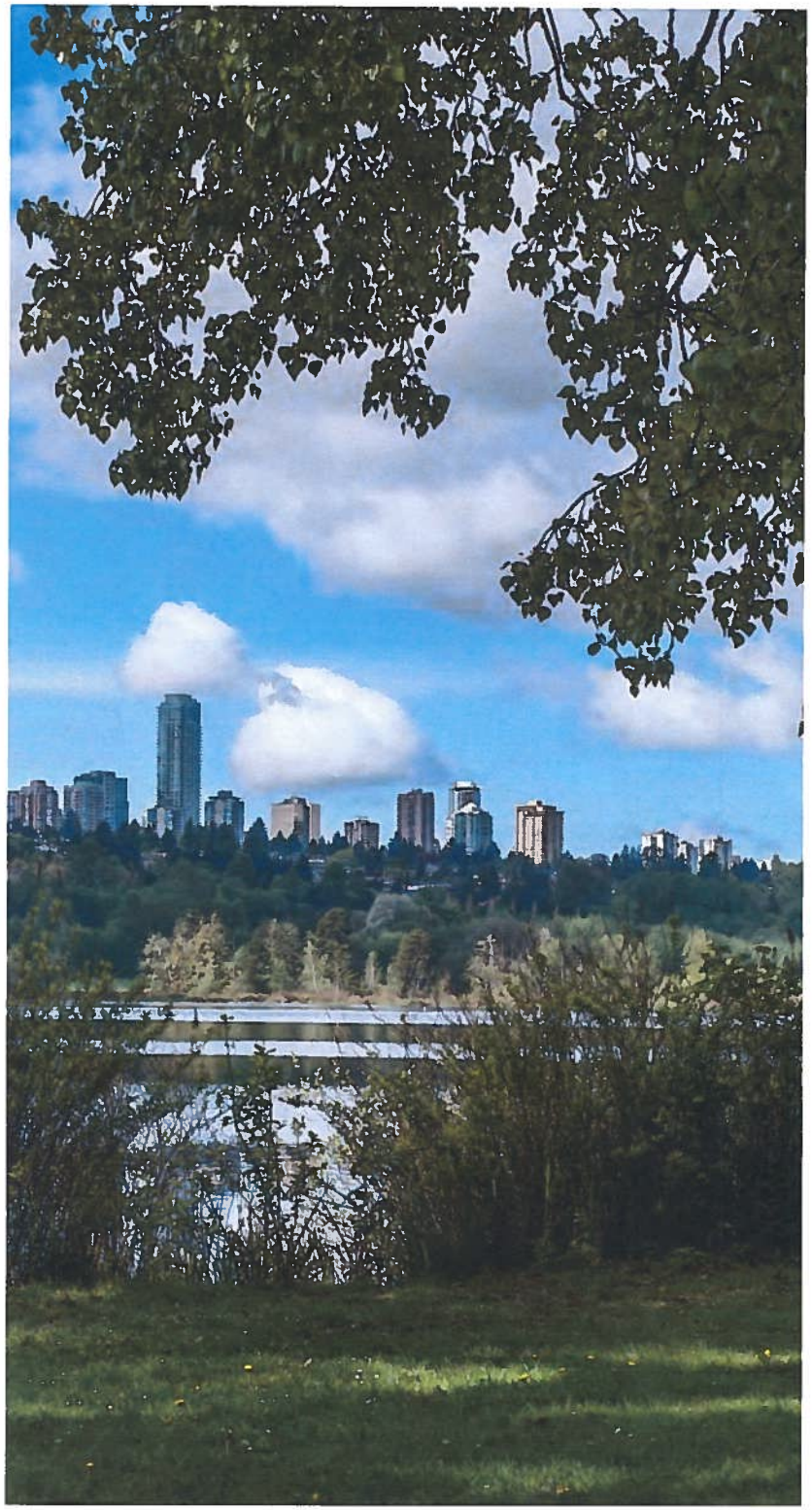
Incentives for tree retention

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)[4]	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

[4]0.3 m^3 minimum soil per 1 m^2 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

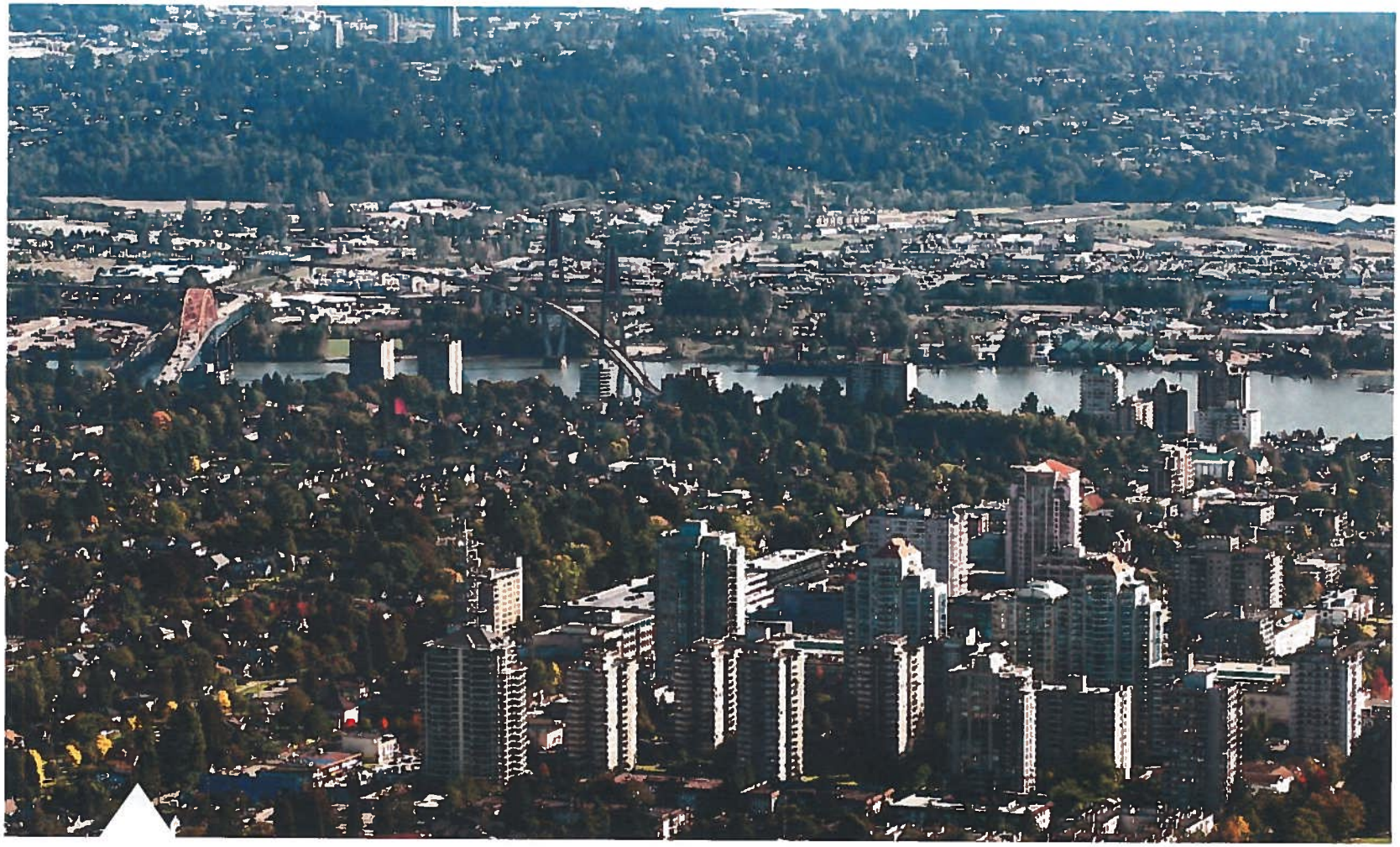
Cons

- 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

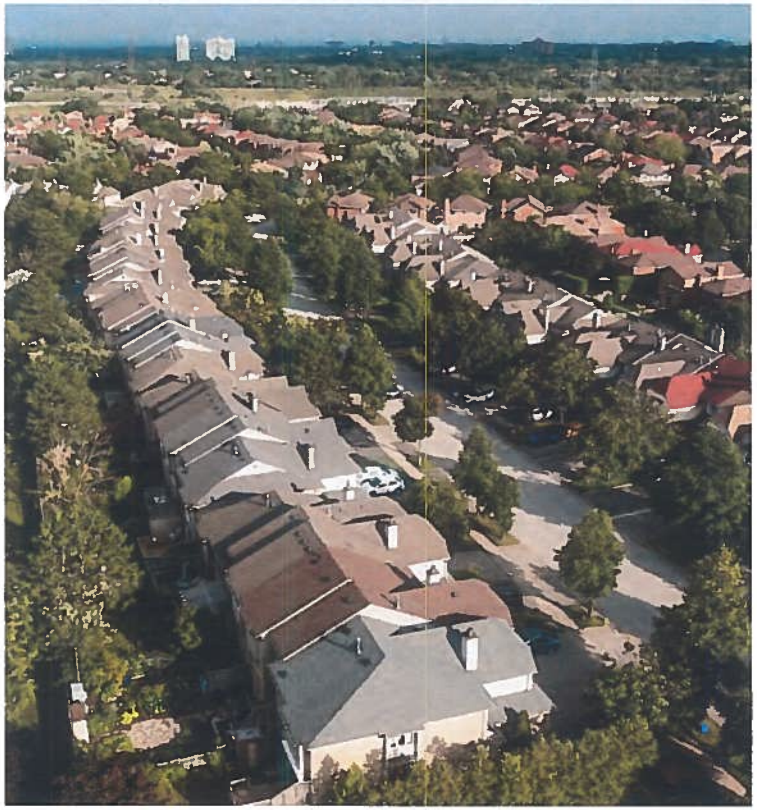
New Westminster's retained tree securities vary by size; the security for a protected tree is $2500 and greatly increases for a retained specimen tree, which is set at $10,000.

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)*

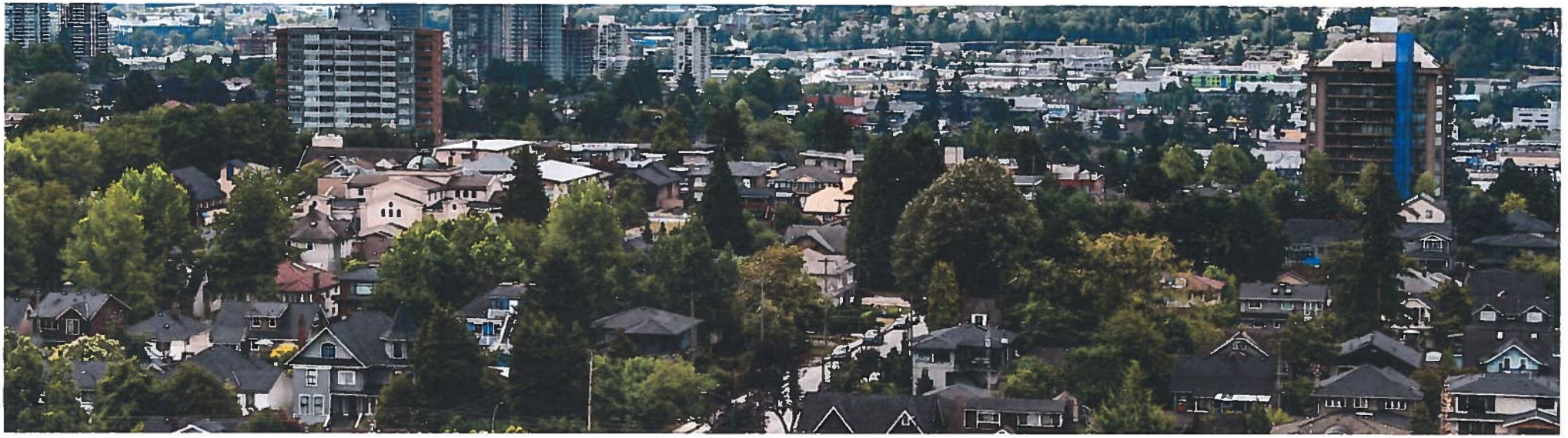
Pros

- 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 where 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

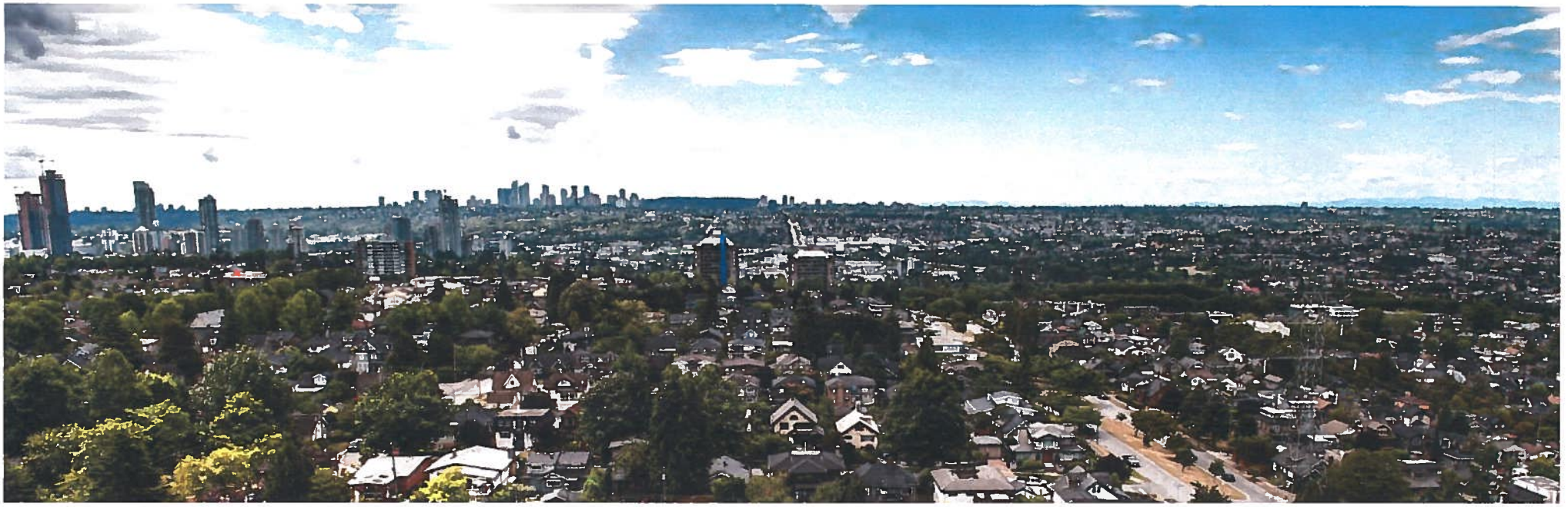
Municipalities can use stop work orders to interrupt work that is causing damage to retained trees until remediation measures are taken. This measure should only be used in situations where irremediable damage is being caused, where it may offer an effective solution to stop such damage when it is occurring.

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 tying 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.

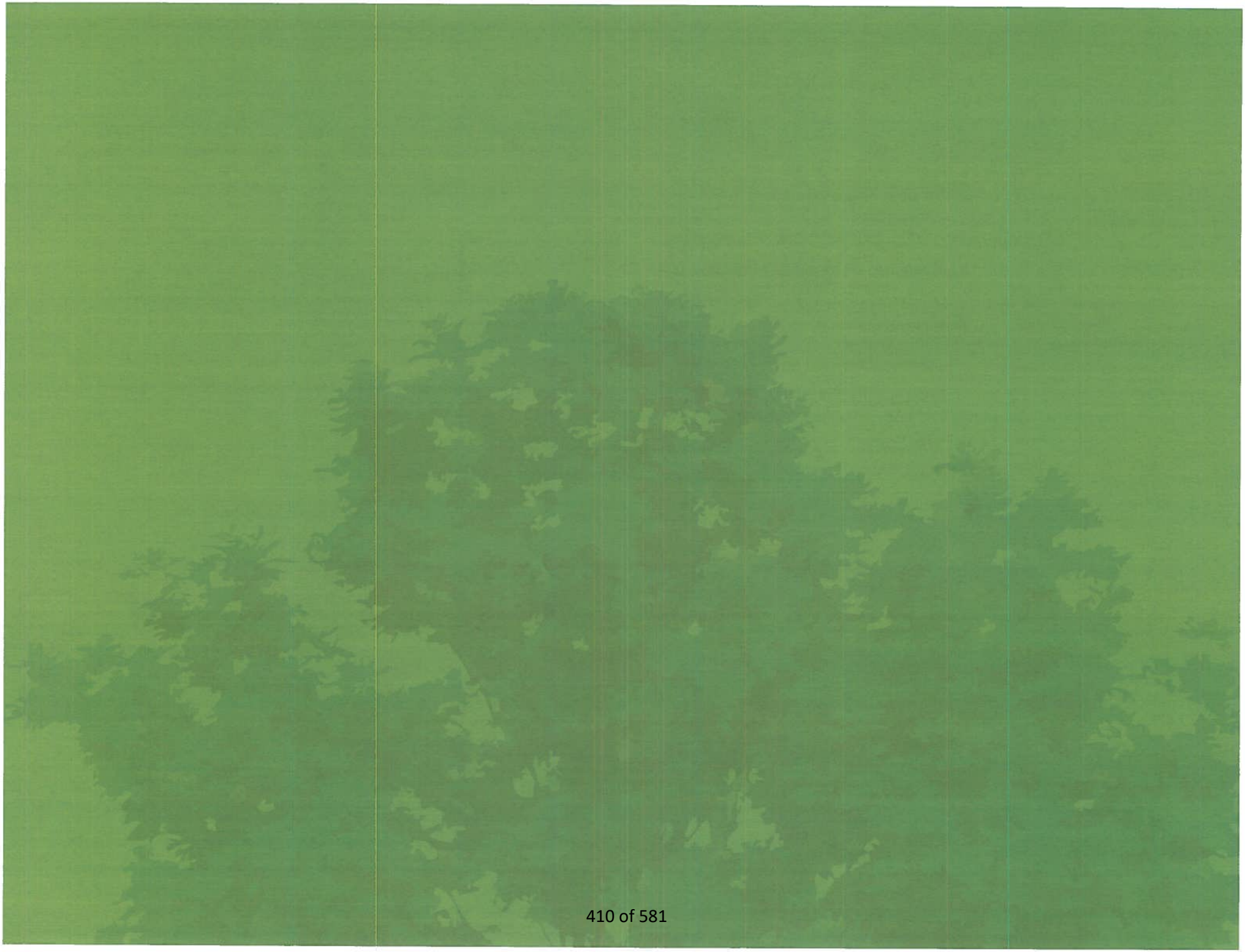


6.3.11 Tree Bylaw implementation

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:

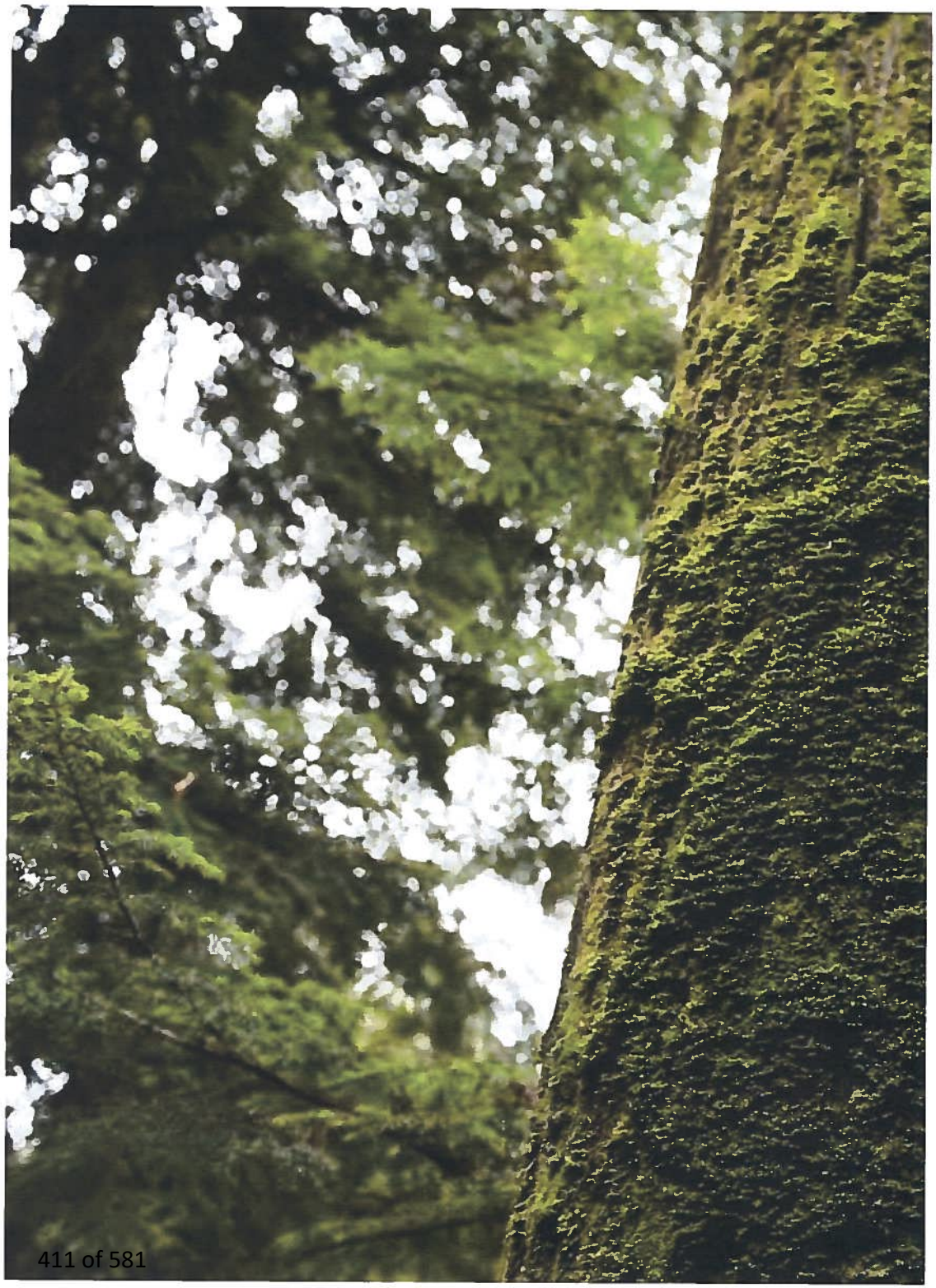
- **Clearly stated goals:** Describe the capacity of the bylaw to achieve certain goals with clear connection to any wider management strategies. Goals are essential to interpret the bylaw and evaluate its effectiveness.
- **Designated responsibility:** Assign authority of a single person responsible 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.

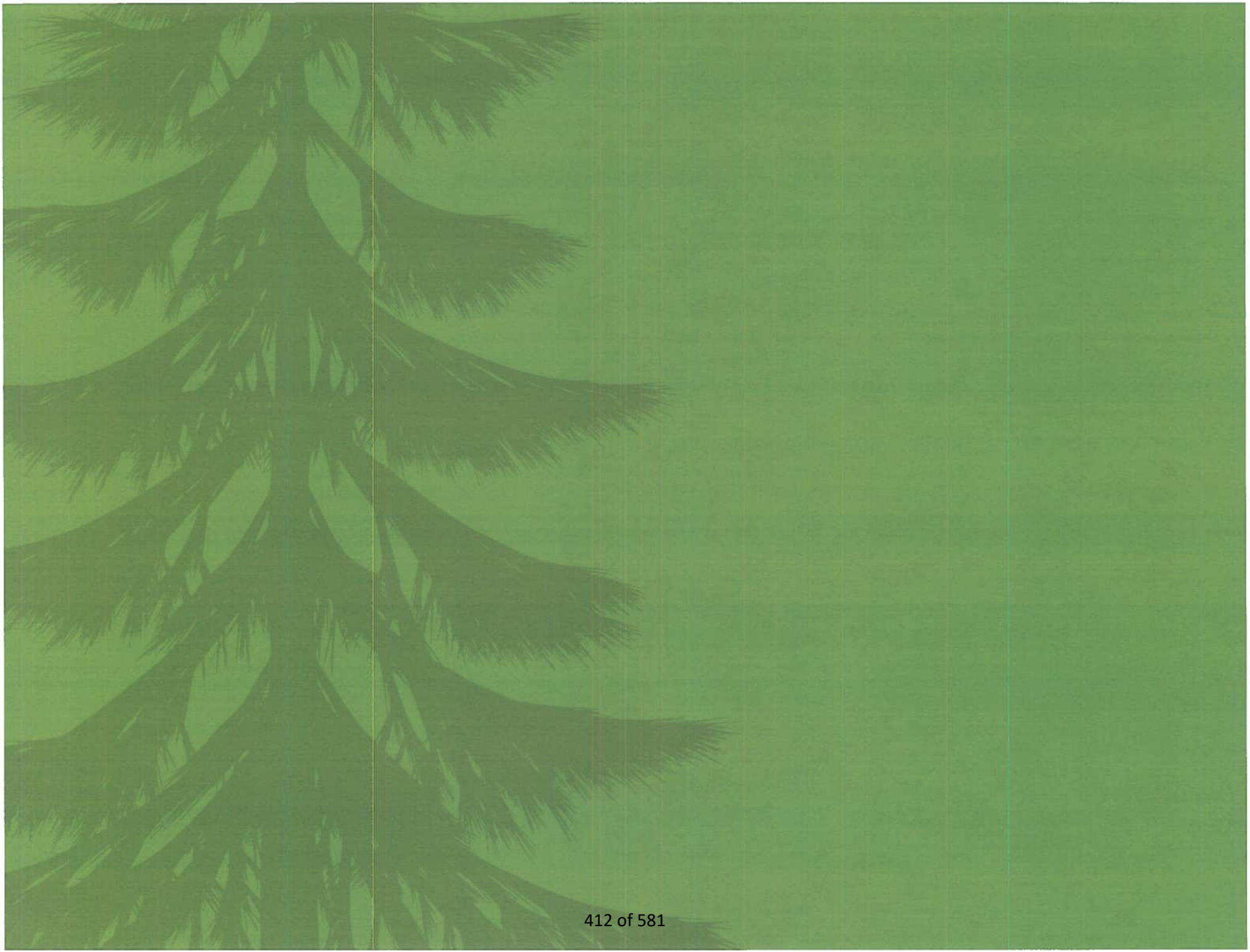


7.0 Conclusion

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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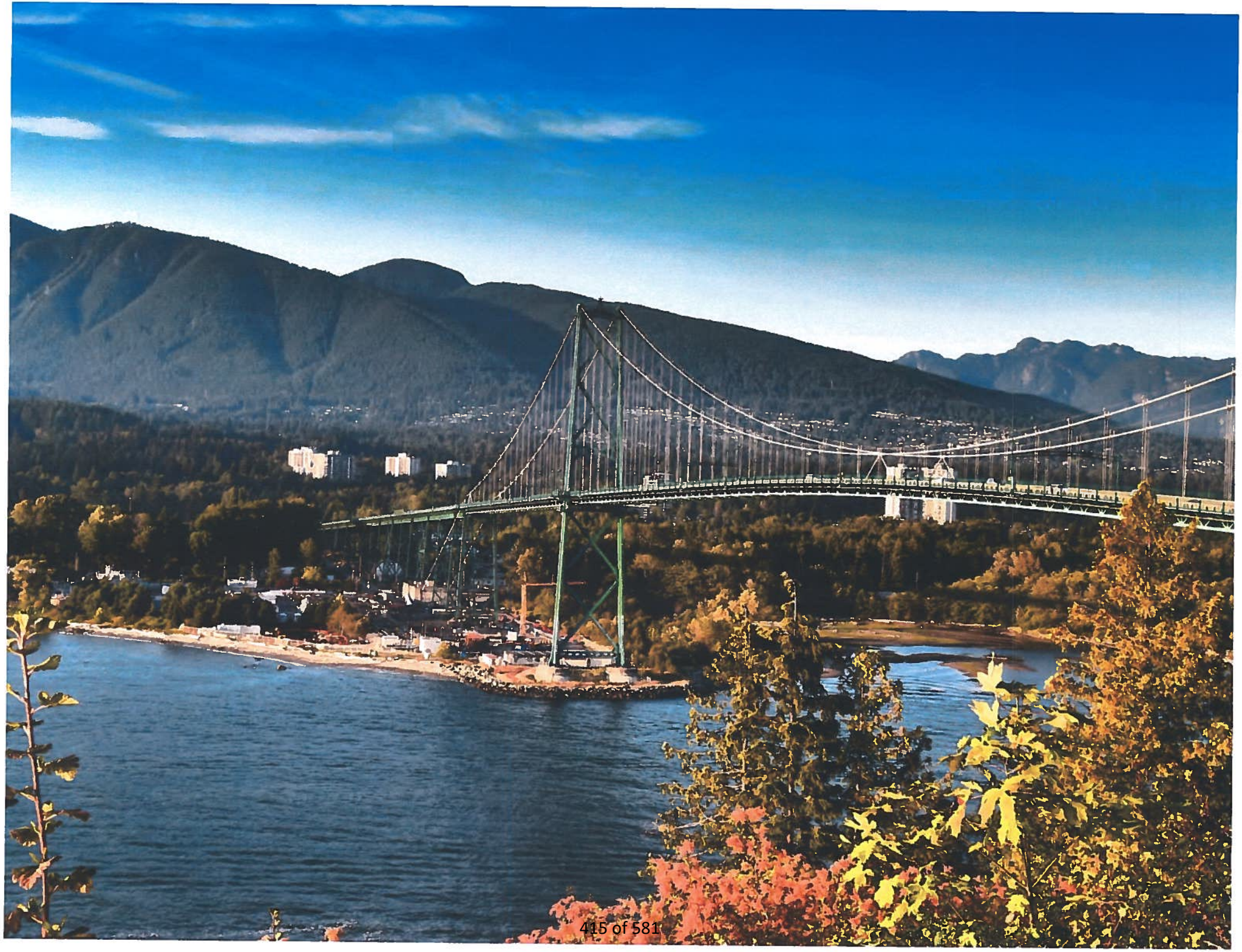
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To: Climate Action Committee

From: Conor Reynolds, Division Manager, Air Quality and Climate Change Policy
Jason Emmert, Program Manager, Climate Policy
Parks and Environment Department

Date: May 27, 2021 Meeting Date: June 11, 2021

Subject: **Cancellation of Provincial Climate Action Revenue Incentive Program (CARIP)**

RECOMMENDATION

That the MVRD Board authorize the Board Chair to write a letter to the Provincial Minister of Municipal Affairs, Minister of Environment and Climate Change Strategy, and Minister of Finance, regarding the cancellation of the Climate Action Revenue Incentive Program, providing details on key elements to be retained in a replacement program and suggested improvements, based on the analysis in the report dated May 27, 2021, titled "Cancellation of Provincial Climate Action Revenue Incentive Program (CARIP)".

EXECUTIVE SUMMARY

Metro Vancouver and its member jurisdictions are advancing innovative climate actions that are critical to enabling the Province to meet its *CleanBC* GHG reduction targets. The cancellation of the Provincial Climate Action Revenue Incentive Program (CARIP) was announced on May 11 without prior consultation with local governments. The impact for local governments is the loss of an established framework for tracking and reporting climate action, both corporately and in the community, which supports coordination and sharing of best practices, as well as the loss of a source of funding for local government climate action staffing and programs.

The cancellation of the program presents an opportunity for local governments to call for the launch of a replacement program that improves on its predecessor and provides flexible and consistent funding, streamlines the public reporting process, strengthens accountability for community emissions reductions, and provides more resources to smaller communities.

The Mayors Committee and MVRD Board have previously considered this matter and is preparing correspondence to the Province, calling for a replacement program that builds on and improves the existing CARIP program. The MVRD Board has referred the matter to the Climate Action Committee and directed staff to prepare a followup response that provides details on suggested improvements.

PURPOSE

To provide information on the cancellation of the Provincial Climate Action Revenue Incentive Program and summarize impacts for Metro Vancouver and its member jurisdictions. Per direction from the MVRD Board, this reports seeks Climate Action Committee feedback and direction on the specifics of a replacement program that provides funding for local government climate action programs, and brings consistency and transparency to the calculation and reporting of greenhouse

gas (GHG) emissions by local governments, which will be conveyed to the appropriate provincial ministries.

BACKGROUND

On May 11, 2021 the Province announced the end of the Climate Action Revenue Incentive Program. A subsequent letter from the Minister of Municipal Affairs to B.C.'s Mayors and Chairs confirmed that 2021 will mark the end of the CARIP program (reporting for 2020 actions), with final payments of the carbon tax refund before end of year (Attachment).

At its meeting on May 26, 2021, the Mayors Committee considered a staff report on the cancellation of the CARIP program, leading to the subsequent adoption of the following resolution by the MVRD Board at its meeting of May 28, 2021:

That the MVRD Board:

a) authorize the Board Chair to write a letter to the Provincial Minister of Municipal Affairs, Minister of Finance, and Minister of Environment and Climate Change Strategy regarding the cancellation of the provincial Climate Action Revenue Incentive Program ("CARIP"), including its financial implications, impacts of the cancellation of the program, and requesting an environmentally-sustainable replacement of the CARIP with an improved program with payments to start in 2022 without conditions; and

b) refer the matter of the cancellation of the CARIP program to the Climate Action Committee and direct staff to prepare an additional response that provides details on suggested improvements to the program.

This report responds to part (b) of the Board resolution, and provides staff's analysis of suggested elements for an improved replacement for the CARIP program.

CLIMATE ACTION REVENUE INCENTIVE PROGRAM

Local Government signatories to the BC Climate Action Charter committed to measure and report GHG emissions, aim for carbon neutrality in their own operations, and plan compact, energy efficient communities. CARIP was created by the Province as a reporting and funding framework for signatories to the Charter. Participants were required to annually report their climate actions, quantify the GHG emissions associated with corporate operations, and demonstrate progress towards carbon neutrality. Local governments that fulfilled these requirements were eligible to receive a refund of their carbon taxes paid on direct fuel purchases.

Acceleration and Coordination of Local Government Climate Action

Since the inception of the Climate Action Charter, 187 of 190 municipalities, regional districts and the Islands Trust have signed on and have been publically reporting their climate actions, including Metro Vancouver and all of its member municipalities. As of 2018, 147 local governments were measuring and reporting their emissions and 50 had achieved carbon neutrality in their operations. This represents a comprehensive and current database of local governments' actions in their communities, which has enabled sharing of best practices among climate program staff. In addition, the process of annual CARIP reporting to the province has highlighted the scope and impact of climate actions at the local government level to Municipal Councils and Regional District Boards across BC.

In its communication with local government staff following the cancellation of CARIP, the Province has reiterated that local governments will continue to be a key partner in the collective efforts to address the challenges of a changing climate, and will play a specific and important role in reaching British Columbia's climate goals. The end of CARIP risks undermining the level of action and coordination among local governments on climate actions that directly support *CleanBC*.

Metro Vancouver's CARIP Reporting and Linkages to *Climate 2050*

Metro Vancouver has been preparing its annual climate action report using the CARIP framework program since the 2012 reporting year. While CARIP reporting was made optional in 2019 due to capacity constraints faced by local governments as a result of COVID-19, Metro Vancouver submitted its report in accordance with provincial timelines, and achieved carbon neutrality in its operations (References 1 and 2). The achievement of carbon neutrality by Metro Vancouver and a number of local governments serves as a call to action to extend carbon neutrality to the region as a whole, supporting targets adopted by the MVRD Board.

CARIP funding has supported the development of *Climate 2050*, Metro Vancouver's 30-year climate action strategy, and the implementation of ambitious strategies and actions to accelerate greenhouse gas reductions in the region. *Climate 2050* includes actions to ensure Metro Vancouver continues to reduce its corporate GHG emissions, adapt its corporate assets and services to the impacts of climate change, and share best practices with its member jurisdictions.

Implications of Loss of CARIP Funding

The Province has indicated that the cancellation of CARIP means that the final carbon tax refund to local governments will be paid in 2021. To date, no replacement program with non-application based funding for climate action has been announced, and it appears that future programs would be grant-based for eligible local governments. The Province has signaled its aim to work with local governments through UBCM and the Green Communities Committee on further supporting the *CleanBC* goals, but there are no details at this time, and local governments have not been engaged.

Metro Vancouver received over $200,000 in CARIP funding each year in recent years. Since the inception of the program, Metro Vancouver received more than $1.2 million and has been able to leverage more than $250,000 in additional funding from other partners. Select examples of impactful projects and programs supported by CARIP include the following:

- Electric vehicle outreach programs (e.g., *Emotive*)
- Modelling a Carbon Neutral Region
- Quantifying GHG reductions from Burns Bog restoration and new park land acquisition
- Development of a Building Energy and Emissions Benchmarking and Performance Standard
- Partial funding for a staff positon to develop the *Climate 2050 Energy Roadmap*

A STRONGER CLIMATE ACTION PROGRAM FOR LOCAL GOVERNMENTS

The Provincial *CleanBC* plan puts a priority on reducing greenhouse gas emissions, supporting energy-efficient solutions and building a low-carbon economy. A replacement to CARIP must ensure local governments are well resourced to be strong partners in meeting the Provincial climate targets. It should build on the strengths and the lessons learned from the decade of implementing CARIP, and also represents an opportunity to address some of its challenges and weaknesses of CARIP.

CARIP was a reliable source of funding for local governments that allowed them to plan multi-year climate action projects that were not reliant on application-based grant funding. Since the CARIP funding was not tied to a specific project it could be used for the climate priorities that fit local governments' individual contexts, opportunities, and needs. At the same time, because the funding was tied to local government reporting of climate actions and emissions, it helped ensure a level of accountability to the Province and the public.

Local Governments have identified two main weaknesses of CARIP. First, smaller local governments typically paid low carbon taxes which resulted in small carbon tax rebates that were insufficient to fund meaningful climate action. In many cases the rebates were disproportionate to the staff time needed to meet the reporting requirements, such that many small communities were not able to report their corporate emissions or climate actions. Secondly, since funding was tied to corporate purchase and use of fossil fuels, local governments that were successful in reducing their corporate emissions would receive reduced funding. Local government successes in making progress towards corporate carbon neutrality could impact on the funding received to implement actions to reduce community emissions. These challenges could be addressed in a replacement program by creating a minimum funding amount for smaller communities and tying the funding to a metric other than corporate emissions such as population. Finally, the Province could streamline the reporting process by aligning it with other reporting protocols.

Since the announcement of the cancellation of the CARIP program, Metro Vancouver staff have engaged with other local government staff across the province, as well as member jurisdictions, UBCM staff and the Community Energy Association. Staff have also had discussions with provincial staff from the Ministry of Environment and Climate Change Strategy, and the Ministry of Municipal Affairs. From these discussions, while there appears to be receptiveness to a replacement program for CARIP, and for constructive suggestions from affected local governments, the mechanism and extent of engagement is unclear. Another issue is the timing to develop a replacement program, as for most local governments it is critical that there not be a lapse in funding, i.e., rebates received in 2021 must be followed up with funding in 2022 and beyond.

ALTERNATIVES

1. That the MVRD Board authorize the Board Chair to write a letter to the Provincial Minister of Municipal Affairs, Minister of Environment and Climate Change Strategy, and Minister of Finance, regarding the cancellation of the Climate Action Revenue Incentive Program, providing details on key elements to be retained in a replacement program and suggested improvements, based on the analysis in the report dated May 27, 2021, titled "Cancellation of Provincial Climate Action Revenue Incentive Program (CARIP)".

2. That the Climate Action Committee receive for information the report dated May 27, 2021, titled "Cancellation of Provincial Climate Action Revenue Incentive Program (CARIP)", and provide alternate direction to staff.

FINANCIAL IMPLICATIONS

Metro Vancouver received just under $217,000 in 2020, which was used to directly support both corporate and regional climate action projects and programs. In 2020, it is estimated that CARIP accounted for $3 to $4 million in climate action funding for Metro Vancouver's member jurisdictions which was used to fund staff, consultants, and capital projects that support climate action. CARIP funding was projected to increase annually with increases to the provincial carbon tax rate (despite projected improvements in corporate energy efficiency). The loss of consistent funding for Metro Vancouver's climate action projects and program could impact the ability to pursue actions in the *Climate 2050* strategy. While the Province has announced additional funding to local governments in its 2021-2022 budget, these application-based funding programs are not a direct replacement to the CARIP funding. The timing to develop a replacement program for CARIP is also critical, as local governments cannot experience a lapse in funding after 2021.

CONCLUSION

The unexpected Provincial announcement of the end of the Climate Action Revenue Incentive Program and associated funding will compromise local governments' ability to deliver climate action programs, and in turn will make it more difficult to reach *CleanBC* and local government GHG targets.

Alternative 1 is recommended and is based on direction from the MVRD Board, for staff to prepare a followup letter to correspondence from the Board to the province, to convey staff's suggestions for a replacement program for CARIP. Staff have had initial discussions with provincial government staff, and are also coordinating with member jurisdictions, other local governments in BC, UBCM and others.

Attachment

Letter from Minister of Municipal Affairs to BC Mayors and Chairs confirming cancellation of Provincial Climate Action Revenue Incentive Program, dated May 11, 2021 *(45563350)*

References

1. Metro Vancouver Climate Actions 2019: Climate Action Revenue Incentive Program (CARIP) Public Report (dated May 31, 2020)
2. Carbon Neutral Achievement Sets Stage for Bold Climate Action (Metro Vancouver media release dated June 29, 2020)

45693543

May 11, 2021

Ref: 266895

Dear Mayors and Chairs:

I am writing in follow up to a recent update from Okenge Yuma Morisho, Deputy Minister of Municipal Affairs, to Chief Administrative Officers regarding the Climate Action Revenue Incentive Program (CARIP). As you may be aware, 2021 will mark the wind down and final year of grant payments under this program. Budget 2021 also commits new funding to help local governments reduce greenhouse gas emissions through planning for compact, energy-efficient communities. The purpose of this letter is to thank British Columbia's local governments for your continued leadership and to describe how our government continues to work with local governments to achieve our collective climate goals.

Since the 2008 inception of the Climate Action Charter (CAC), almost every local government in B.C. has signed the CAC, committing to take action and develop strategies to achieve the following three goals:

- Work toward becoming carbon neutral in their local government corporate operations
- Measure and report on their community greenhouse gas (GHG) emissions profile
- Create complete, compact, energy-efficient rural and urban communities

As of 2018, the last year of full reporting prior to the pandemic, 187 local governments had signed on to the CAC and were publicly reporting on their progress toward meeting their climate action goals, 147 were measuring and reporting GHG emissions, and 50 local governments had achieved carbon neutrality in their operations. Communities across B.C. both large and small have consistently demonstrated leadership in taking action on climate change, in areas as broad as local food production, renewable energy generation and planning for public transit and active transportation. Thank you for your continued ambition and efforts to reduce greenhouse gas emissions in your corporate operations, and more broadly to inspire and work within your communities to tackle climate change.

Under CleanBC, the Province of British Columbia has put a priority on reducing pollution, boosting energy-efficient solutions and building a low-carbon economy. Local governments will continue to be a key partner in our collective efforts to address the challenges of a changing climate, playing a specific and important role in B.C.'s climate goals.

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Ministry of Municipal Affairs Office of the Minister

Mailing Address:
PO Box 9056 Stn Prov Govt
Victoria BC V8W 9E2
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Victoria BC V8V 1X4

http://www.gov.bc.ca/muni

Just as local governments' actions on climate solutions have evolved in the past decade, our government is responding to support you with tools and funding programs such as:

- Updating the BC Action Climate Toolkit and the Green Communities Committee Carbon Neutral Framework.
- Investing $110 million in combined provincial and federal funding to help local governments and Indigenous communities develop energy efficiency and clean energy projects through the Investing in Canada Infrastructure Program CleanBC Communities Fund.
- Working with the federal government to assess the climate impacts of all major infrastructure being funded under the Investing in Canada Infrastructure Program to reduce GHG emissions and increase resilience to climate change, which benefits communities and creates jobs.
- Boosting active transportation infrastructure with $18 million through the Ministry of Transportation and Infrastructure.
- Making sure commuters can get out of their cars with historic investments in public transit, such as the Broadway Subway Line, and free transit for kids 12 and under starting this September.

Building on record investments in CleanBC, the province will continue to strengthen our work with local governments and support the CAC.

As noted, Budget 2021 commits $11 million in new funding to help local governments plan for compact, energy-efficient communities, directly supporting the CAC's commitment to create complete, compact, energy-efficient rural and urban communities. I look forward to working with all local governments through Union of BC Municipalities and the Green Communities Committee on how to support greener and more livable communities.

Our government remains committed to working with local governments to reach our climate goals and make life better for people across British Columbia.

Sincerely,

Josie Osborne
Minister

pc: Chief Administrative Officers

To: Climate Action Committee

From: Amy Thai, Senior Policy Analyst
Julie Saxton, Air Quality Planner
Parks and Environment Department

Date: May 18, 2021 Meeting Date: June 11, 2021

Subject: **Next Phase of Engagement on an Open-Air Burning Emission Regulation**

RECOMMENDATION

That the MVRD Board:

a) receive for information a summary of the initial engagement on a potential emission regulation for open-air burning of vegetative debris in Metro Vancouver, as described in the report titled "Next Phase of Engagement on an Open-Air Burning Emission Regulation", dated May 18, 2021; and

b) authorize staff to proceed with additional engagement on a potential emission regulation for open-air burning of vegetative debris in Metro Vancouver, based on the draft discussion paper and updated engagement plan presented in the report titled "Next Phase of Engagement on an Open-Air Burning Emission Regulation", dated May 18, 2021.

EXECUTIVE SUMMARY

Reducing emissions of smoke from open-air burning of vegetative debris can protect public health, air quality, and our climate. Metro Vancouver completed the initial phase of engagement on a potential open-air burning emission regulation in August 2020. Feedback was generally supportive of the development of an emission regulation as a simpler process for authorizing emissions from open-air burning compared to the current site-specific approval process. Staff considered feedback and adjusted proposals presented during the initial engagement, such as simplifying record keeping and notification to neighbours and authorities, clarifying registration requirements and associated fees, and options to increase protection of the public near open-air burning activities. Details about the adjusted proposals and additional information requested during initial engagement are provided in a discussion paper, which will be used to support the next phase of engagement.

PURPOSE

This report summarizes engagement to date on a potential emission regulation for open-air burning of vegetative debris in Metro Vancouver. This report also outlines how regulatory proposals were adjusted based on feedback and seeks Board approval to carry out the next phase of engagement.

BACKGROUND

The MVRD Board endorsed the *Integrated Air Quality and Greenhouse Gas Management Plan* and the *Climate 2050 Strategic Framework*, which both identify the need to reduce emissions from open-air burning. On November 1, 2019, the MVRD Board directed staff to proceed with initial engagement on an open-air burning emission regulation and endorsed a two-phase engagement plan. Phase 1 was conducted between November 2019 and August 2020 on regulatory measures to

reduce emissions from open-air burning of vegetative debris, as described in a discussion paper presented to the MVRD Board (Reference 1). The Climate Action Committee 2021 Work Plan includes a second phase of engagement on a potential open-air burning emission regulation.

This report presents a summary of the feedback received during initial engagement (Attachment 1) and describes how initial proposals were revised in response to feedback (Attachment 2). This report seeks Board approval to engage on revised proposals described in a discussion paper (Attachment 3).

PURPOSE OF INTRODUCING AN OPEN-AIR BURNING EMISSION REGULATION

Open-air burning refers to the outdoor combustion of vegetative debris, such as agricultural crop residues, land-clearing waste, and yard trimmings, that is not vented through a chimney or stack. Open-air burning of vegetative debris is usually inefficient and produces more smoke than controlled combustion. Thousands of planned outdoor fires of various sizes occur across the region each year, and the smoke emissions can impact public health, air quality, and our climate.

Metro Vancouver exercises its air quality regulatory authority through permits and short-term approvals that apply to individual facilities, and emission regulations that apply to types of operations and activities with similar characteristics. Metro Vancouver has been managing emissions from open-air burning through site-specific approvals that can be issued for a cumulative period of 15 months per site. A regional regulation would provide a simpler, more efficient way of managing emissions from open-air burning activities that meet specified requirements. The current system of site-specific approvals would be retained for managing emissions from exceptional short-term activities.

The *BC Open Burning Smoke Control Regulation* places restrictions on open-air burning while making allowances for certain exemptions. Metro Vancouver can be more restrictive in implementing a regional emission regulation than what is required by provincial law, but cannot be less restrictive.

INITIAL REGULATORY PROPOSALS

Initial engagement was based on a discussion paper outlining proposals for an emission regulation for open-air burning of vegetative debris, which would reduce regulatory burden while protecting public health (Reference 1). The proposals included requirements mirroring those in the provincial *Open Burning Smoke Control Regulation* (OBSCR), such as requirements for minimizing and preparing material to be burned and adhering to minimum distances between open-air burning and residences, businesses, institutions, and care facilities. Due to the population density in Metro Vancouver and greater risk of exposure to smoke, staff proposed some requirements that were more stringent than OBSCR, such as registration of properties where vegetative debris is burned, additional notification of neighbours and Metro Vancouver before burning, additional record keeping, and consideration of designating sub-regional areas in which more stringent protective measures would apply.

SUMMARY OF INITIAL ENGAGEMENT ACTIVITIES

The objectives of initial engagement were to inform interested parties and the public of the proposals for regulating emissions from open-air burning and to receive feedback for consideration in the development of a potential regulation. Engagement followed Metro Vancouver's public engagement policy and took into account the wide range of audiences to be engaged, the potential impact of the proposals that were being explored, and the intention to adjust proposals in response to feedback.

Engagement activities targeted a wide range of audiences including the public, other governments including First Nations, member jurisdictions, staff at federal and provincial government agencies, and health authorities. Additional issue-specific audiences included municipal fire departments, the agriculture sector including individual farms and agricultural associations and committees. Input and feedback were sought through meetings, phone calls, webinars, and presentations. Open houses were planned for spring 2020, but events were modified due to COVID-19 public health measures. Input was also received through online feedback forms, email and letters. A complete list of engagement activities and participating audiences is provided in Attachment 1.

INITIAL ENGAGEMENT FEEDBACK

Feedback received in the first phase of consultation indicated general support for a simpler and more streamlined process. Comments and questions generally fell into four categories:

- **Proposed Requirements**, including concerns about restrictions related to the timing, frequency, and duration of burns as well as the materials allowed to be burned, and questions about the proposed process to register a site, requirements to notify neighbours and Metro Vancouver prior to burning, where a regulation would apply, and what the criteria would be for areas with more stringent requirements.
- **Existing Regulatory Processes**, including concerns about the cost and timeliness of the current process and their effect on missed chances to conduct burns, the conditions included in approvals, and a desire for more streamlined municipal and regional permitting processes.
- **Alternatives to Open Burning**, including questions and support for different alternatives to open burning, and concerns about availability of equipment, lack of awareness of alternatives, potential cost, and material transportation barriers.
- **Consultation and Outreach**, including a desire for increased awareness and communication on open-air burning requirements, and the need for more ways to access information.

A summary of the feedback received in each of these categories is presented in Attachment 1 and a detailed account of the feedback received and staff responses is in Attachment 2.

ADJUSTED REGULATORY PROPOSALS FOR NEXT PHASE OF ENGAGEMENT

Based on initial feedback, proposals were adjusted as described in Attachment 4, including:

- simplifying required notifications of neighbours and Metro Vancouver prior to burning to align more closely with the provincial OBSCR;
- describing the records that need to be kept and committing to creating a form or template to simplify record keeping;
- clarifying site registration requirements and the associated fees, which would be $100-$250 for initial registration and $50-$100 for annual renewals, with the lower range of fees intended for agricultural operations;
- focusing on greater protection of the areas around residences, businesses, schools, hospitals, daycares, and long term care facilities already set apart in OBSCR instead of designating additional areas with more stringent requirements; and
- providing options of adhering to more stringent limits on the duration and size of open-air burning activities or using cleaner-burning technology as means of reducing emissions within the more protected areas around residences, businesses, institutions, and care facilities.

Information has been included in the discussion paper (Attachment 3) to provide more detail or clarification on proposed requirements in response to feedback, including:

- information about clean and seasoned vegetative debris;
- the frequency and duration of burns;
- the minimum distances that must be kept between various types of open-air burning and nearby residences, businesses, institutions, and care facilities;
- cleaner-burning technology operating and performance conditions;
- conditions for disposal of diseased vegetative debris by open-air burning;
- conditions for open-air burning activities that reduce community wildfire risk; and
- the ability for Metro Vancouver to make substitutions for any requirements and to temporarily prohibit open-air burning.

ACTIVITIES FOR NEXT PHASE OF ENGAGEMENT

For the second phase of engagement, staff will engage with audiences that may be impacted by a potential Metro Vancouver open-air burning regulation. Since the two-phase engagement process was approved in 2019, changes made to engagement generally relate to the timing of engagement phases and shifting to online activities due to the COVID-19 public health measures.

Metro Vancouver intends to seek feedback on the adjusted proposals between July and October 2021, through online meetings, phone calls, webinars, presentations to community associations and committees, newsletter and social media ads, and direct mail to agricultural operations. The updated engagement plan (Attachment 5) provides details about the process for the next phase of engagement. The engagement timeline may be extended or additional engagement activities may be identified to better reach interested parties depending on future feedback.

ALTERNATIVES

1. That the MVRD Board:
   a) receive for information a summary of the initial engagement on a potential emission regulation for open-air burning of vegetative debris in Metro Vancouver, as described in the report titled “Next Phase of Engagement on an Open-Air Burning Emission Regulation”, dated May 18, 2021; and
   b) authorize staff to proceed with additional engagement on a potential emission regulation for open-air burning of vegetative debris in Metro Vancouver, based on the draft discussion paper and updated engagement plan presented in the report titled “Next Phase of Engagement on an Open-Air Burning Emission Regulation”, dated May 18, 2021.

2. That the MVRD Board receive for information the report titled “Next Phase of Engagement on an Open-Air Burning Emission Regulation”, dated May 18, 2021, and provide alternate direction to staff.

FINANCIAL IMPLICATIONS

Under Alternative 1, the additional engagement activities described in this report can be completed under the approved budget for 2021, including staff time and consulting expenditures.

CONCLUSION

The *Climate 2050 Strategic Framework* identifies the need to reduce agricultural emissions, such as those from open-air burning, to reduce the impacts of climate change. The current *Integrated Air Quality and Greenhouse Gas Management Plan* and the next *Clean Air Plan* that is currently under development include actions for Metro Vancouver to reduce emissions from open-air burning. Based on feedback received during initial engagement on a potential open-air burning emission regulation that took place between November 2019 and August 2020, staff adjusted proposals and developed a discussion paper to support the next phase of engagement. The discussion paper includes additional information in response to feedback requesting more detail or clarification on initially proposed requirements.

Staff recommend Alternative 1, for the Board to receive for information the summary of the initial engagement on a potential emission regulation for open-air burning of vegetative debris, and to authorize the next phase of engagement on adjusted proposals described in the attached discussion paper.

Attachments *(46023514)*

1. Consultation Summary Report – Metro Vancouver, Open-Air Burning Engagement, February 25, 2021 *(42784276)*
2. Consultation Issues-Response Table – Open-Air Burning, March 3, 2021 *(42780153)*
3. Proposals for a Regulation to Manage Emissions from Open-air Burning of Vegetative Debris – Discussion Paper *(41104103)*
4. Summary of Adjustments Made in Response to Feedback from Initial Engagement on a Potential Emission Regulation on Open-Air Burning of Vegetative Debris *(45569904)*
5. Updated Engagement Plan for an Alternative Approach for Regulating Emissions from Open-Air Burning of Vegetative Debris in Metro Vancouver *(42979455)*

Reference

1. Open-Air Burning: Consultation on an Alternative Approach for Regulating Emissions form Open-Air Burning of Vegetative Debris in Metro Vancouver, October 2019

45713778

MODUS

from insight to impact

CONSULTATION SUMMARY REPORT

METRO VANCOUVER, OPEN-AIR BURNING ENGAGEMENT

Prepared by: MODUS Planning, Design & Engagement Inc.
Version: 3.0
Date: 25 February 2021

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1 CONSULTATION OVERVIEW

1.1 INTRODUCTION

The Metro Vancouver Regional District (MVRD, operating as Metro Vancouver) is responsible for managing air quality in the region and regulating the discharge of air contaminants under authority delegated from the provincial government in the British Columbia *Environmental Management Act* (EMA). Metro Vancouver protects public health and the environment through a tiered approach of site-specific permits, sectoral emission regulations, and provisions in the *Greater Vancouver Regional District (GVRD) Air Quality Management Bylaw No. 1082, 2008* (Bylaw 1082) to manage the discharge of air contaminants. The system of permits and short-term approvals apply to individual facilities, and emission regulations apply to types of operations and activities with similar characteristics. Approvals are similar to permits, but are used in instances where discharges from a site are expected to be of short duration. Approvals for emissions from a particular site can only be issued for a cumulative period of up to 15 months (including any renewals).

Metro Vancouver is exploring options for alternative approaches to regulating emissions from open-air burning. The release of air contaminants from open-air burning in the Metro Vancouver region requires authorization by Metro Vancouver. The development of an emission regulation would offer an alternative mechanism for authorizing emissions that is aligned with the *BC Open Burning Smoke Control Regulation* (OBSCR), easier for the regulated community than the current approvals process, and less resource-intensive for Metro Vancouver. Introducing an emission regulation would reduce regulatory burden by providing ongoing authorization of open-air burning of vegetative debris in cases where specified requirements are met, more simply and efficiently than through site-specific approvals.

In December 2019, Metro Vancouver began conducting public and stakeholder engagement to gather feedback on potential components of a proposal for an emissions regulation. This report summarizes the engagement efforts and key engagement findings from this phase of engagement.

1.2 CONSULTATION OBJECTIVES

The objectives of Phase 1 Engagement were to inform interested parties and the public of the proposals for regulating emissions from open-air burning activities and to receive feedback. The proposals were described in a discussion paper, which had the following purposes:

- Provide information about the environmental and health impacts of smoke emissions from open-air burning in Metro Vancouver;
- Describe options to reduce emissions from open-air burning of vegetative debris through a potential emission regulation; and
- Support consultation and encourage feedback from affected and interested parties on options for regulating air emissions from open-air burning.

1.3 LIST OF STAKEHOLDERS

Staff identified the following stakeholders as being impacted or could have an interest in a potential emission regulation:

- General public
- Member jurisdictions
- Local Indigenous communities
    - Katzie First Nation
    - Kwantlen First Nation
    - Kwkwetlem First Nation
    - Matsqui First Nation
    - Semiahmoo First Nation
    - Musqueam Indian Band
    - Squamish Nation
    - Tsawwassen First Nation
    - Tsleil-Waututh Nation
- Agricultural producers
- Agricultural advisory committees
- Health agencies
- Industry and industry associations
- Municipal fire departments
- Professional organizations
- Provincial, federal and other government agencies
- Neighbouring jurisdictions

1.4 CONSULTATION ACTIVITIES

1.4.1 MEETINGS & PRESENTATIONS

Meetings and presentations were held to gather feedback on the proposed regulation from regional committees, and municipal advisory committees. Discussions were held with the groups shown in the table below. Staff made broad adjustments to engagement during this consultation in light of physical distancing requirements due to the emerging COVID-19 situation. These adaptations, which mainly moved efforts online, aimed to respond to public and stakeholder feedback and still provide the same level of engagement as outlined in the Metro Vancouver Board policy.

AUDIENCE	DATE	PARTICIPANTS
Lower Fraser Valley Air Quality Coordinating Committee (LFVAQCC)	December 3, 2019	21
Pitt Meadows Agricultural Advisory Committee	January 23, 2020	14
Maple Ridge Agricultural Advisory Committee	January 30, 2020	13
Surrey Agriculture & Food Policy Advisory Committee	February 4, 2020	17

AUDIENCE	DATE	PARTICIPANTS
Government Staff Interagency Meeting	February 12, 2020	20-30
Richmond Food Security and Agricultural Advisory Committee	February 20, 2020	19
Township of Langley Agricultural Advisory and Economic Enhancement Committee	February 26, 2020	11
Delta Agricultural Advisory Committee	March 4, 2020	12
Metro Vancouver Agricultural Advisory Committee	March 20, 2020	18

1.4.2 OPEN HOUSES

The following open houses were planned but were cancelled due to the COVID-19 situation.

LOCATION	DATE
Township of Langley: Murrayville Fire Hall	March 17, 2020
Coquitlam: Burke Mountain Fire Hall	March 19, 2020
Richmond: Hamilton Community Centre	March 26, 2020
Maple Ridge: CEED Centre	March 31, 2020

1.4.3 WEBINARS

AUDIENCE	DATE	PARTICIPANTS
Municipal partners, comprising staff from fire/planning/bylaw departments	June 22, 2020	3
Public	July 8, 2020	7
Public	July 16, 2020	6

1.4.4 PHONE CALLS & ZOOM MEETINGS

AUDIENCE	DATE	PARTICIPANTS
Bowen Island Municipality municipal and fire department staff meeting (Zoom Meeting)	July 24, 2020	5
City of Surrey Fire Chief (Zoom meeting)	August 4, 2020	3
Township of Langley municipal and fire department staff (Teleconference call)	August 5, 2020	4

Metro Vancouver staff also made 89 phone calls to farmers in the region between March 2 and March 5, 2020 to advise them about the consultation.

1.5 SUPPORT MATERIAL

To support consultation activities, Metro Vancouver created communication material to inform stakeholders and members of the public about the proposed regulation and to promote consultation activities.

1.5.1 GENERAL INFORMATION MATERIAL

To promote awareness of the proposed emission regulation and share opportunities to provide input, Metro Vancouver created:

- Website content: Website content posted to a project webpage on metrovancouver.org provided information on the proposed emission regulation, invited readers to participate in consultation activities and had links to the discussion paper and contextual background information.
- Discussion Paper: The discussion paper provided detailed information on potential regulatory approaches to control emissions from open-air burning, rationale, and alternatives to burning. Links to the discussion paper were provided on the project webpage.
- Email list: Stakeholders and interested members of the public were given an opportunity to sign up for email notifications regarding open-air burning regulatory engagement activities and other air quality and climate protection initiatives
- Feedback Form: An opportunity to provide feedback was provided in an online feedback form that sought information on current burning practices and opinions on the proposed regulation and burning alternatives. The link to this was on the project webpage.

1.5.2 PROMOTIONAL MATERIAL

To promote engagement activities, Metro Vancouver created the following material:

- E-vite: Email invitations to promote open house and webinar events were sent to stakeholders and interested members of the public. Open house events were eventually cancelled due to the COVID-19 situation, and shifted to webinars where possible.
- Social media: Posts on Facebook & Twitter advertised webinars and provided links to the online questionnaire.
- Newspaper advertisements: Advertisements were prepared and published in local newspapers to promote the open house events described in section 1.4.2.
- Postcards: Postcards were developed to promote awareness of the regulation and participation in consultation activities. These were not used because public spaces were closed due to the COVID-19 situation.

1.5.3 PRESENTATIONS & WORKSHOP MATERIAL

Metro Vancouver created material to support consultation activities:

- Presentations: Presentation decks were created to provide information about the emission regulation proposals and to encourage feedback from webinar and meeting participants. The presentation slides were also provided on the project webpage for information.
- Poster Boards: Poster boards were created to engage participants and encourage feedback at in-person open houses.
- One-pager: Summary document developed to highlight key aspects of the proposed emission regulation and similarities/differences with new provincial regulation.

2 CONSULTATION FEEDBACK

2.1 SUMMARY OF FEEDBACK

Feedback gathered through consultation activities included open-ended comments and concerns raised by participants during engagement events, correspondence received, and on questionnaires, as well as semi-quantitative data about levels of support for different aspects of the proposals from the responses to questionnaires.

Comments and questions fell into five broad categories:

Proposed Requirements
There were questions and concerns about the proposed requirements related to burn time restrictions, permitted materials and seasonal restrictions that limit burn windows. Participants questioned the processes of site registration, record keeping and notification, and requirements for sites in proximity to schools, businesses, public services and residential areas. There were also questions about the geographic scope of the proposed regulation and criteria for high sensitivity zones outlined in OBSCR.

Existing Regulations/Requirements
Comments addressed the timeliness of the current approval process and requirements of authorization. They also expressed a need for a more streamlined permitting process between local municipalities and Metro Vancouver. Participants wanted greater clarity on the role of local fire departments in regulating and enforcing a potential open burning bylaw. There was also concern about non-compliance with existing regulatory requirements and the cost of permits.

Alternatives to Open Burning
Participants provided questions and support for different alternatives to open burning, including chipping, grinding, forced air technology and green waste recycling. Participants also highlighted potential cost and transportation barriers and recommended the use of incentives to encourage interest in alternatives.

Consultation and Outreach
There was a general desire for increased awareness and communication on open-air burning requirements. Participants requested more ways of distributing and accessing information. There were also comments related to the consultation process and how public and stakeholder feedback will be collected and incorporated into the proposed regulation.

Other Feedback
Participants provided other comments related to the availability of information from air quality monitoring stations and the ventilation index. There were also questions on the timeline and implementation of a potential draft bylaw and how it would regulate different types of open-air

burning as well as other sources of emissions. Some comments expressed concern for the overregulation of farming and that new policy creates unfair restrictions for agricultural burns. Comments also indicated a desire to balance the needs of public health and safety with the needs of the agriculture community.

2.2 DETAILED FEEDBACK

PROPOSED REQUIREMENTS

Burn Time Restrictions

Participants in consultation activities expressed concern that it would be difficult to fully restrict or control the length of a burn and that multiple burns conducted on the same day may result in prolonged smoke or haze in an area, regardless of the burn time. It was recommended by a member jurisdiction that Metro Vancouver adopt the same burn time duration guidelines as the Open Burning Smoke Control Regulation (OBSCR).

Geographic Scope

There were a few questions related to the geographic areas where the proposed regulation would apply and where open-air burning approvals are required by Metro Vancouver. There was also concern about the potential for discrepancies between municipal open-air burning processes and new regional restrictions.

High Sensitivity Zones

Participants in consultation activities requested more information on the selection criteria for defining areas of high sensitivity and wanted confirmation that the additional limits in those zones would be the same as outlined in OBSCR. Some participants commented that the limits on the number of burn days in high sensitivity zones would unlikely be reached given the limited number of days that would have favourable burning conditions.

Material Restrictions

Feedback was received about potential challenges to regulating the volume and size of materials to burn, and stated that size restrictions may not be feasible for larger operations. Many participants in consultation activities also commented on the need to burn noxious weeds and diseased materials in a swift and safe way as an important means of pest and pathogen control for agricultural operators. Some participants questioned how Metro Vancouver will verify if materials have been properly cleaned and seasoned and raised concern about a potential lack of public awareness of particulate matter in smoke produced from burning debris. There were also suggestions to include an exemption to the proposed diseased plant material seasoning if authorized by an enforcement officer.

Notification

Comments were received about the cost and difficulty of properly notifying neighbours of their intention to burn, particularly in denser residential areas. Some respondents suggested that notifying Metro Vancouver and the local fire department should be sufficient and expressed a

need for a more streamlined and less labour-intensive method of communication. However, one respondent recommended requiring notification to high-risk populations nearby (e.g., hospitals, care facilities, schools).

Proximity to Schools and Businesses
There was a concern about sensitivity about smoke from farms in nearby residential areas. However, other respondents noted potential impacts to residents and First Nation communities. Some wanted clarification that Metro Vancouver would use the same conditions currently stated in the OBSCR that require burns remain at least 100m from residences and businesses and at least 500m from schools, hospitals and care facilities.

Record Keeping
Some participants questioned the process for record keeping and if Metro Vancouver is proposing the same guidelines as outlined in OBSCR. There was also interest in increasing awareness of record keeping requirements

Seasonal/Weather Restrictions
There was concern about the limited burn window for farmers to conduct the needed number of burns each season. Participants commented on the challenge of obtaining authorization that may not last long enough to conduct a burn within unpredictable windows. A need for greater outreach from Metro Vancouver on the anticipated timing of favourable burning conditions and information on seasonal restrictions was expressed. Some also expressed concern that a limited burn window will result in concentrated burning from farmers at the same time, which may negatively impact the regional air quality.

Site Registration
Participants in consultation activities questioned the process for site registration and whether it was an annual/seasonal requirement or required for each burn. There was also concern for potential lack of compliance for site registration and the ability to appropriately time burns if the site approval is valid for only a limited time.

EXISTING REGULATIONS AND REQUIREMENTS

Approval Process
Many participants expressed challenges with the timeliness and complexity of permit approvals and a lack of understanding for the current process. Some stated other barriers to the process including required information that may be difficult to provide and the limited amount of time for which approvals are valid. There is a need for a more streamlined process and understanding of the government entities from which applicants need approval.

Enforcement
Concern was expressed that regulations will be enforced disproportionately on smaller operations rather than large operations. There were also concerns about a lack of staff capacity from Metro Vancouver and municipal bylaw enforcement to actively patrol and monitor

burning processes and site inspection. There was concern about how the authorization process would differ from the permitting process and if fire departments would assume responsibility of site investigations and bylaw enforcement. Many participants in consultation activities also commented on the general public's inability and disinterest in reporting suspicious burns or recognizing prohibited material.

Non-Compliance
Participants in consultation activities were concerned that a lack of understanding of current requirements makes it difficult for farmers to adequately comply. Some also stated the importance of local municipalities receiving notification when there is a case of non-compliance within their jurisdiction.

Approval Fee
Some participants in consultation activities felt that there was a discrepancy between the cost of municipal permits and the cost of authorization from Metro Vancouver. Several participants felt that it was unfair for farmers to pay a permit fee when they do not have the chance to burn due to prolonged unfavourable conditions.

Streamlined Permit Process
A need for a "one window" system for the permitting process was mentioned in feedback. Participants in consultation activities commented on the cost and time burden of applying for two separate permits and were unsure whether they needed prior authorization from Metro Vancouver before receiving a municipal permit.

ALTERNATIVES TO OPEN BURNING

Alternative Disposal Methods
Many participants in consultation activities expressed support for the use of alternatives to open-air burning and commented on the importance of phasing out burning for less carbon intensive disposal methods. Participants suggested alternatives including recycling and use of agricultural waste for other purposes, such as soil conditioning and chipping or grinding of waste materials. There were questions related to the availability and capability of forced air technology and electric chippers, potential options for green waste collection and how the policy will define "reasonable" alternatives. There was also concern for a lack of general education and awareness of alternatives.

Cost of Alternatives
Cost was noted as a barrier for farmers to adopt alternatives to open-air burning. This includes the fees associated with chipping and forced air assistance, recycling green waste and transportation of waste to transfer stations. Participants in consultation activities noted the importance of reducing carbon emissions but expressed a need for alternatives that are affordable.

Incentives
Incentives, such as tax credits or discounts for green waste transfer, were suggested to encourage the use of alternatives that are less carbon intensive. Some participants in consultation activities indicated that switching to alternatives would be difficult and unappealing to farmers without some kind of incentive.

CONSULTATION AND OUTREACH

Communications
Participants in consultation activities shared the need for providing additional forms of communication and sharing new information publicly on open-air burning requirements, either via the website or by phone. There was concern about the lack of awareness of the provincial, regional and municipal regulations.

Consultation Process
Participants in consultation activities indicated a need for broad outreach and suggested targeted consultation on proposals with specific groups such as the Environment and Climate Action Committee of Bowen Island and Delta Farmers Institute. There were also questions related to the feedback received so far in the process and future opportunities for involvement.

Lack of Awareness or Education
There was concern about a lack of education and awareness of existing provincial, regional and municipal regulations on residential burns and permit requirements. Some expressed desire for other ways that information can be distributed offline.

OTHER FEEEDBACK

Air Quality Monitoring
Participants in consultation activities were unsure how to receive updates and notifications from the air quality monitoring stations to determine if burning is allowed. There was also concern whether the data would be accurate or representative for farmers who do not live near the stations.

Different Types of Burning
There was concern that regulations will not be equally applied to all types of open burning and were unsure if ceremonial burns, backyard or campfire burns and other types of burns would be included. Some participants questioned whether smaller burns would require the same permitting process as larger burns.

Fire Department Permits
Comments were received on the need for a more streamlined permitting process between Metro Vancouver and local fire departments and questions about how the number of fire department permits compares to the number of Metro Vancouver approvals. There was also confusion about who is responsible for fire prevention.

Draft Bylaw

There were questions related to the timeline of the draft bylaw and how it will be implemented if it is adopted. Participants also desired the opportunity for stakeholders to review and comment prior to its consideration for approval.

Other Sources of Emissions

Some comments questioned how the bylaw will address other sources of carbon emissions, including construction, airport activity, vehicle traffic and cannabis production. There were also questions on how farmers may measure emissions from their own individual operations.

Overregulation of Farming

Participants in consultation activities expressed concern that additional regulation will put an extra and unfair burden on the agriculture industry and create procedural obstacles to navigate. Some comments also recognized that new regulation should be balanced between addressing needs of the agriculture community and the negative health and environmental effects from smoke caused by burning.

Ventilation Index

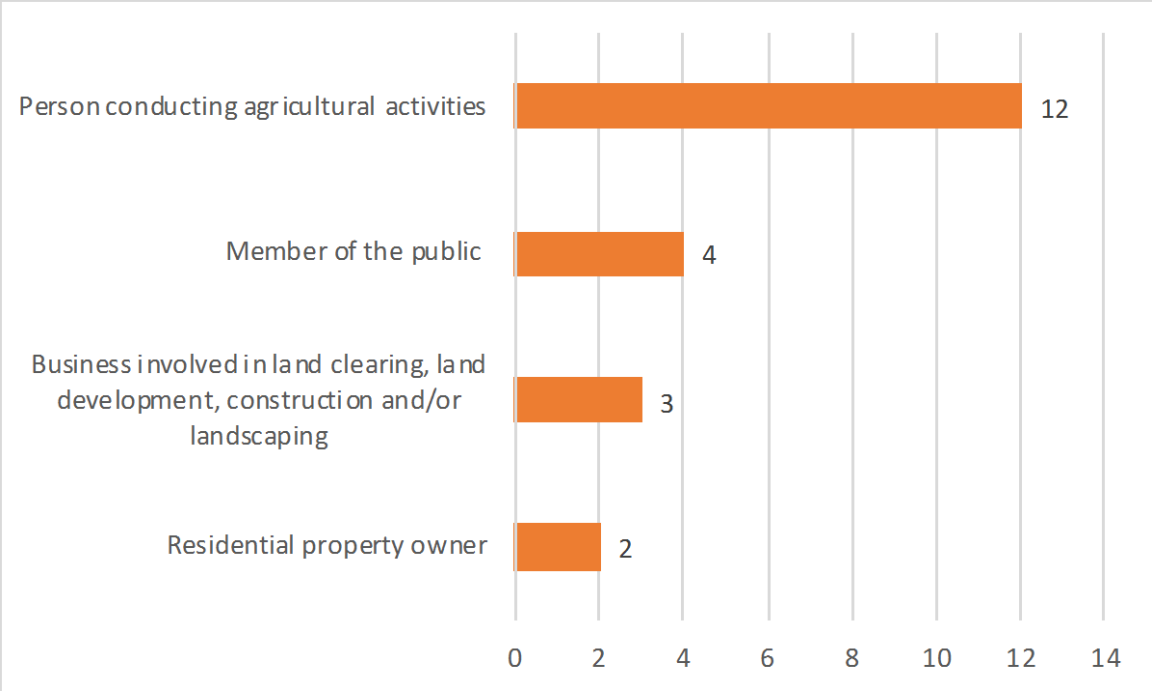
Some participants in consultation activities requested more notice when conditions are predicted to be favourable so compliant registrants may plan burns ahead of time. There was some concern that the ventilation index does not allow for many burns per year and expressed the need for additional education and awareness on the benefits of forced air assistance technologies.

2.3 FEEDBACK FROM QUESTIONNAIRE

The following section describes the results from the public questionnaire.

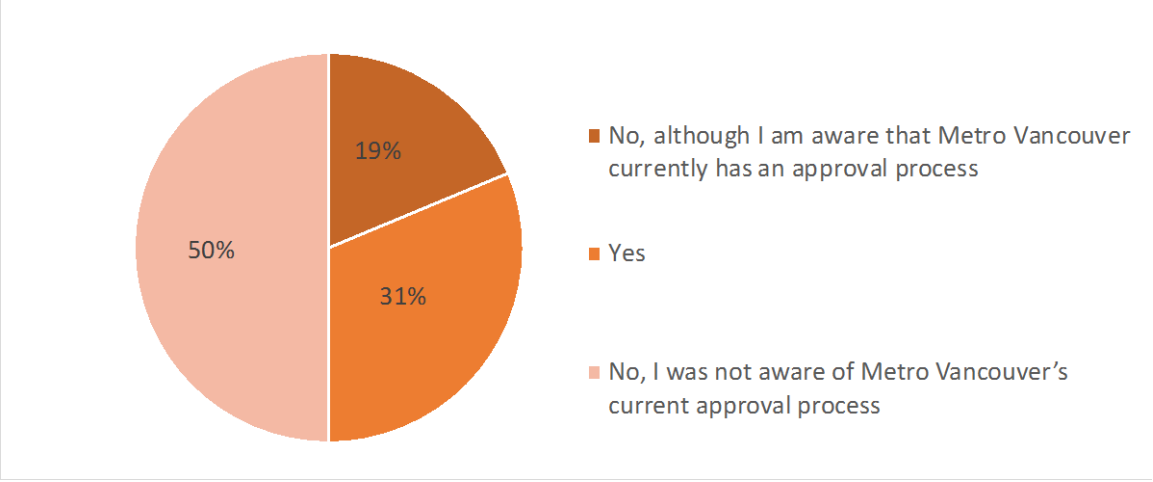
Q1. Which of the following best describes you? (select all that apply)

Responses: 16



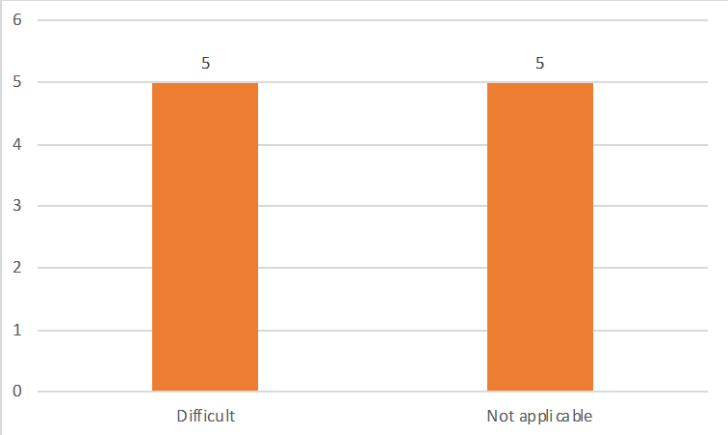
Q2. Have you ever applied for an open-air burning approval from Metro Vancouver?

Responses: 16



Q3. If you answered yes for question 2, how did you find the application process?

Responses: 10



Q4. What made it difficult for you to comply with the current open-air burning approval process? (Select all that apply)

Responses: 7



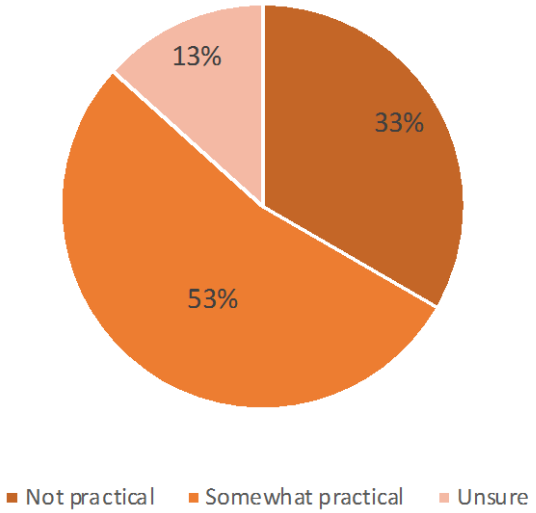
Other (2):

- Haven't applied for permit in last two years because too difficult, so don't know new restrictions
- Easier to work with local Delta Fire Department directly

In the following five questions, participants were asked to rate how practical it is for you to comply with the following potential Metro Vancouver regulatory options:

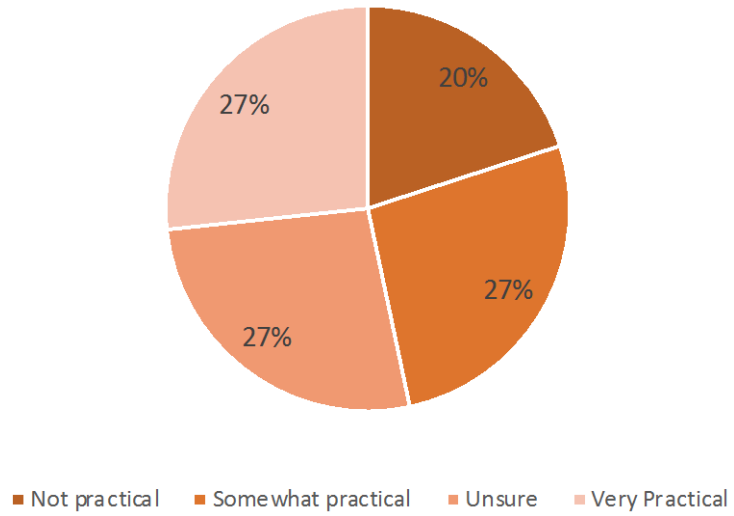
Q5. Register your site for open-air burning

Responses: 15



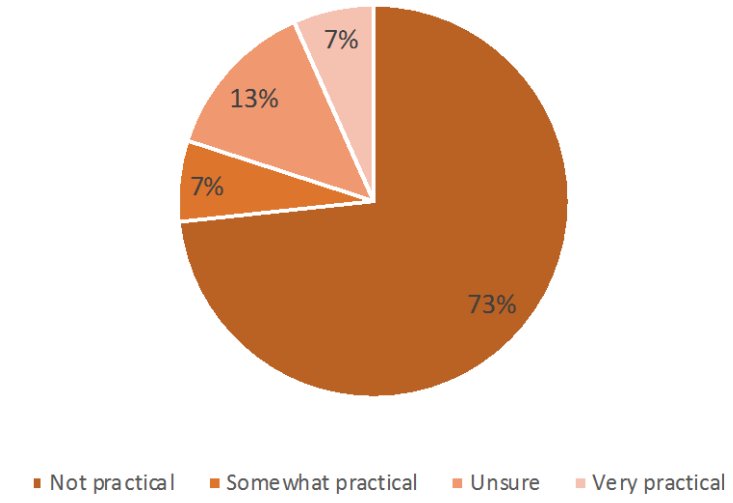
Q6. Ensure all material that is burned originates from the registered site

Responses: 15



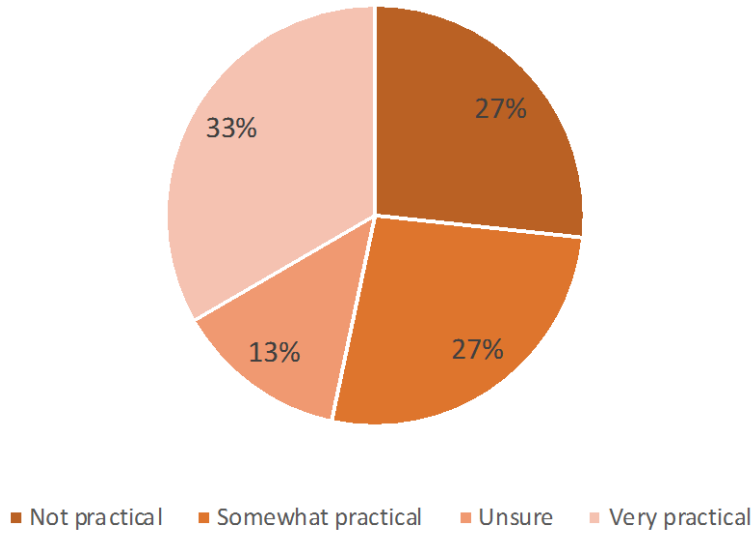
Q7. Notify neighbours and in certain cases, Metro Vancouver, prior to all burns

Responses: 15



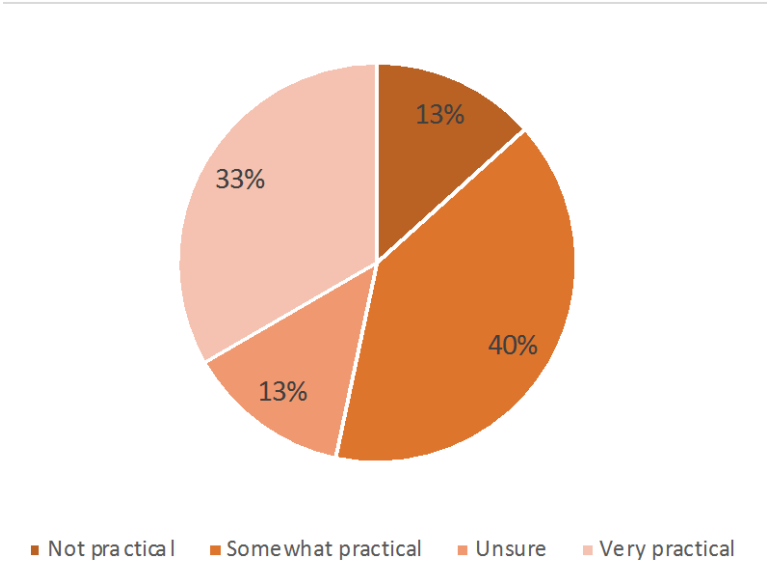
Q8. Not use accelerants, such as diesel, gasoline or kerosene

Responses: 15



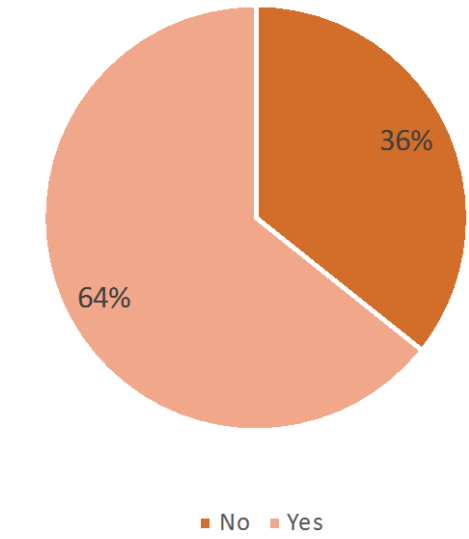
Q9. Not burn during fire bans or periods of degraded air quality

Responses: 14



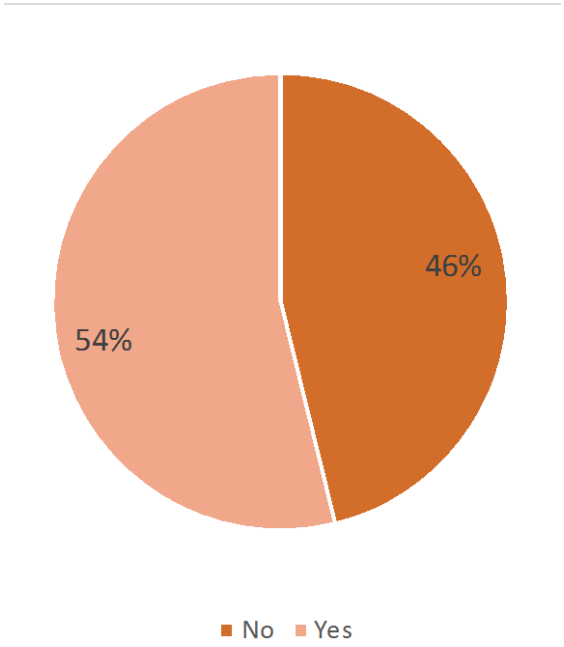
Q10. Do you currently pursue alternatives to open burning, such as reusing, recycling or composting materials?

Responses: 14



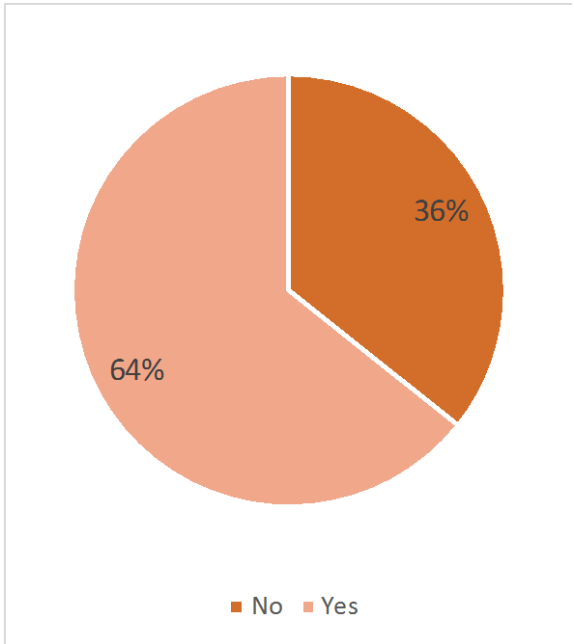
Q11. Do you currently check for reported favourable ventilation conditions?

Responses: 13



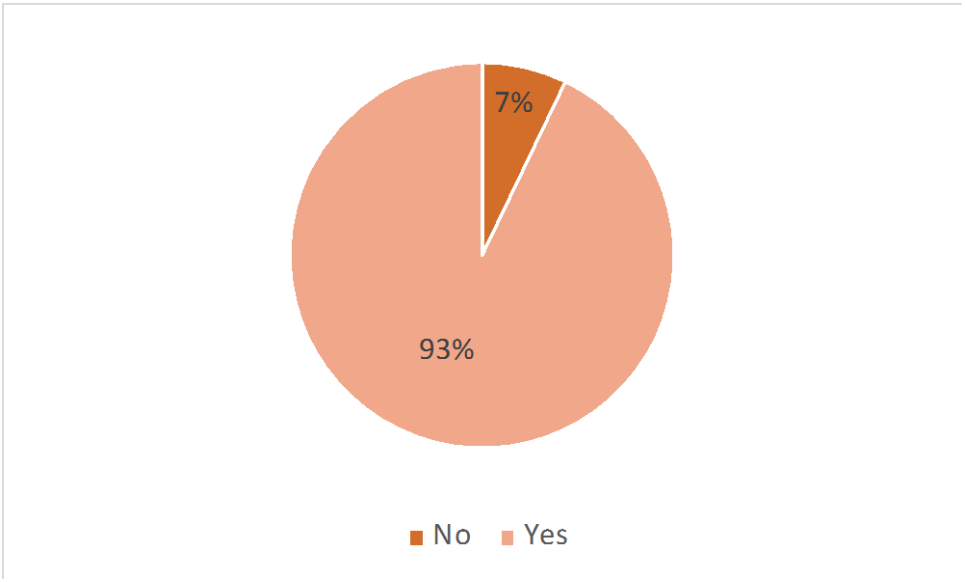
Q12. Do you currently ensure material is clean and seasoned (dry)?

Responses: 14



Q13. Do you currently respect minimum distances of the burn site from residences and businesses, and schools, hospitals and care facilities?

Responses: 14



Q14. What would make it easier for you to comply with these requirements?

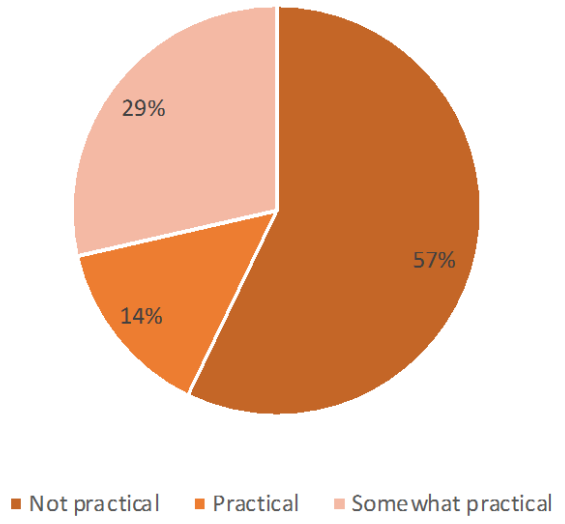
Responses: 5

Respondents shared that if certain areas were exempt from the permit requirement then it would be easier to comply. Reducing the price of green waste disposal was suggested. Compliance may also be supported through a streamlined permitting process as well as increasing the length of time a permit is valid so that it does not expire before permit holders are able to use it.

For the following three questions, respondents were asked to rate how practical it is to comply with the following potential requirements:

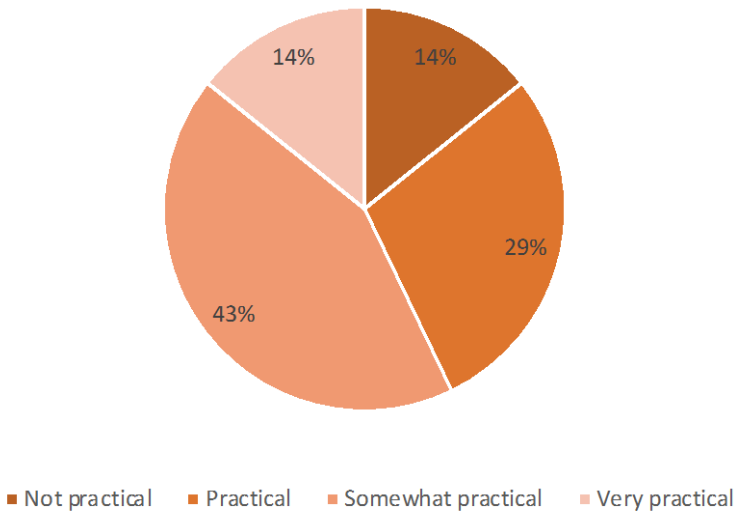
Q15. Apply stricter requirements (for example, requiring the use of equipment to reduce smoke emissions such as forced air assistance or air curtain technology), or more restrictive limits on the frequency and duration of open-air burning activities, for parts of Metro Vancouver, based on factors such as population density and topography

Responses: 14



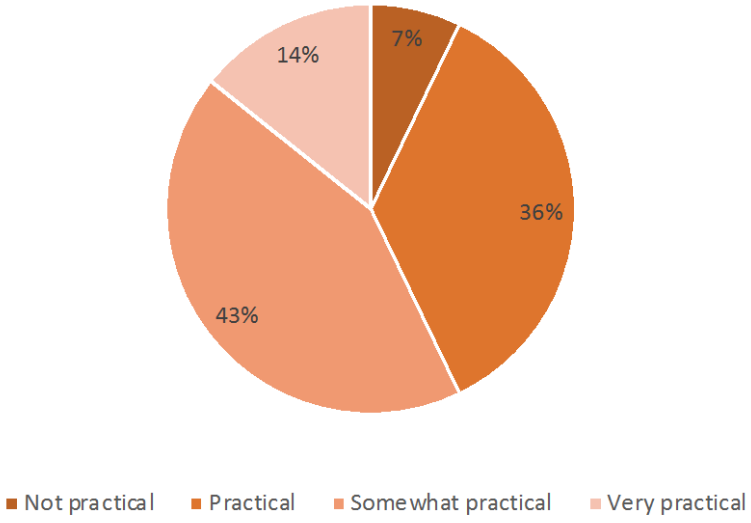
Q16. Ensure a person is attending the fire at all times

Responses: 14



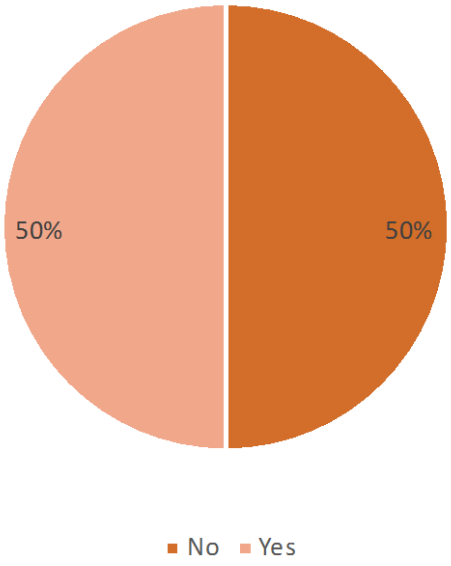
Q17. Not cause a navigation hazard due to smoke from the burn

Responses: 14



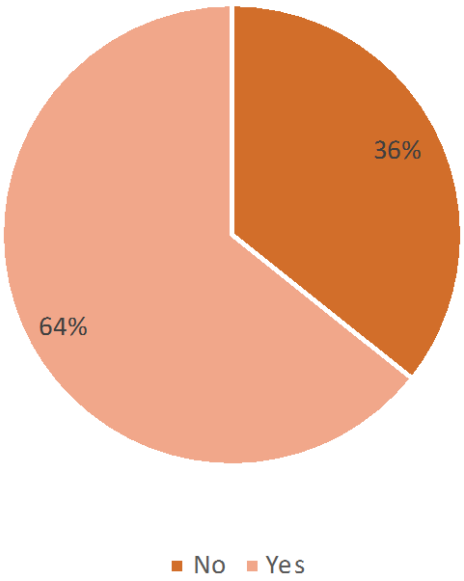
Q18. Do you currently burn during limited times within a day?

Responses: 14



Q19. Do you currently burn a maximum of 12 days per year, and no more than 6 days per month?

Responses: 14



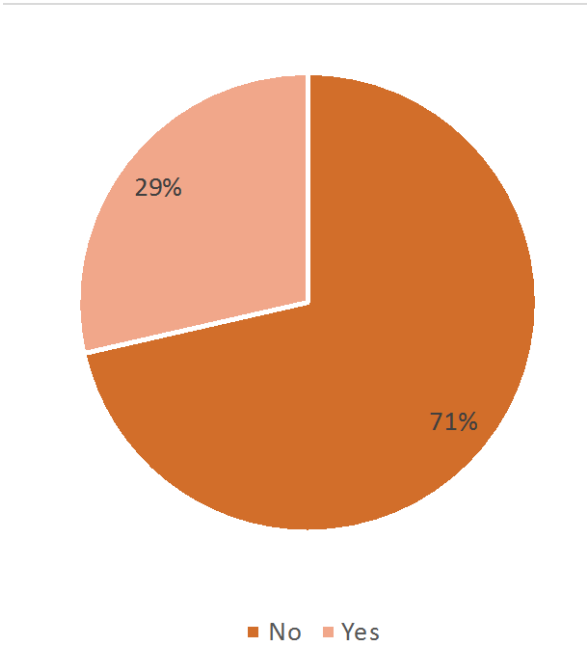
Q20. What would make it easier for you to comply with these requirements?

Responses: 5

Participants suggested ensuring Metro Vancouver regulation applies to all municipalities, so each municipality does not have a separate permitting process. Some expressed the desire for municipal authority over the permitting process. Participants also stated a need for flexibility, particularly in instances that may be out of individual control (e.g., wind changing directions during a burn).

Q21. Would you be able to maintain descriptive records of each open-air burning event to comply with this proposed requirement?

Responses: 14



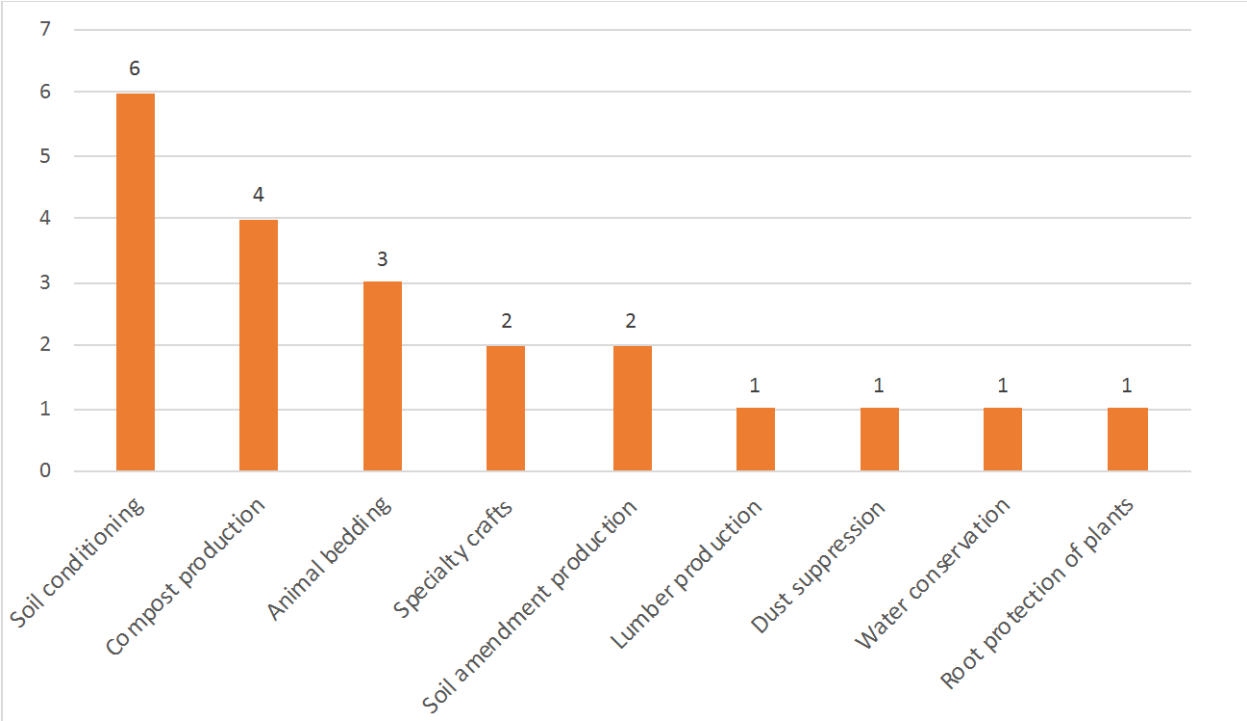
Q22. What would make it easier for you to comply with this proposed requirement?

Responses: 6

Reduced paperwork and processing times would make it easier to comply with the proposed requirement. Other comments included support for a simpler application, without requiring estimated volume of debris or venting conditions. There was also support for a digital template for permit applications to be submitted online.

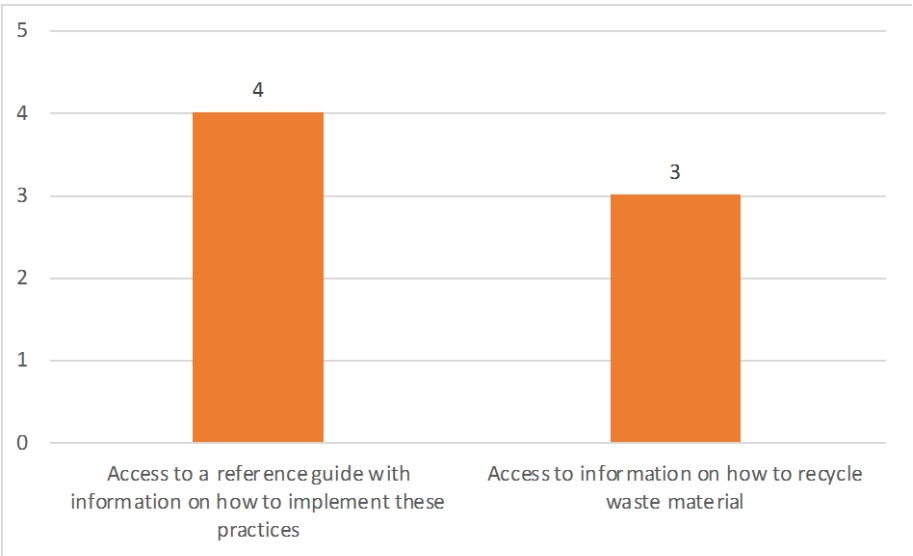
Q23. Depending on the size and type of vegetative debris, it can be used for various purposes. Which following are practical for you to use? (Check all that apply)

Responses: 10



Q24. What would make it easier for you to implement these alternative practices to open-air burning?

Responses: 8

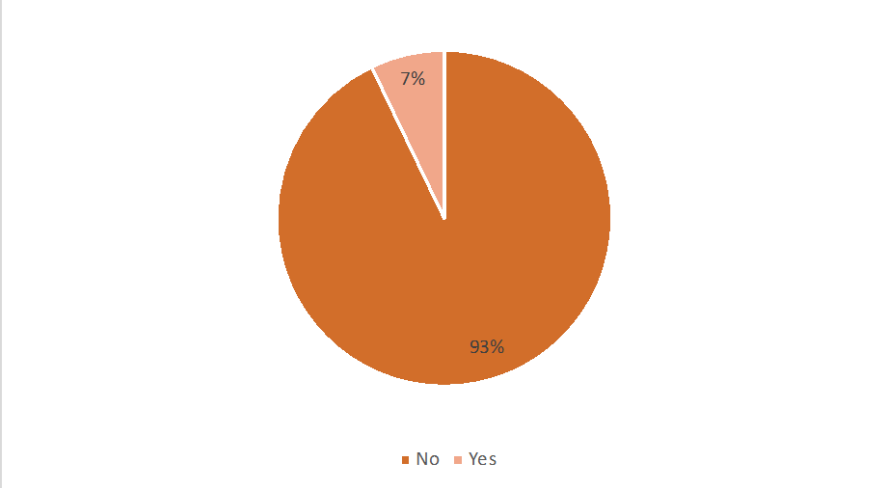


Other:

- More accessible and more convenient recycling for materials
- Make recycling service free
- More funding for alternatives

Q25. Would you implement air curtain technology?

Responses: 14



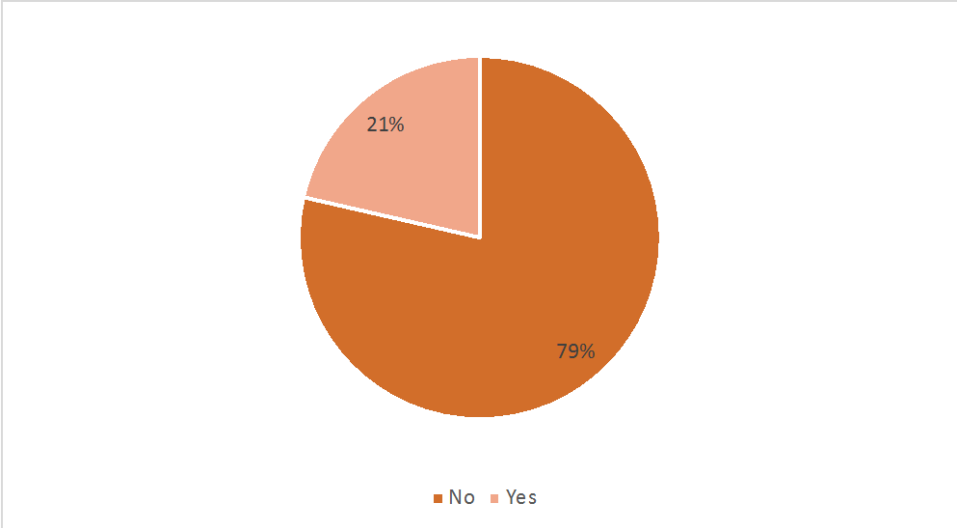
Q26. What would make it easier for you to implement air curtain technology?

Responses: 4

Financial assistance and less expensive technology options were included as ways to make implementation easier.

Q27. Would you implement forced air technology?

Responses: 14



Q28. What would make it easier for you to implement forced air technology?

Responses: 4

Participants expressed concern with potential hazards from electrical extension cords of fan technology near buildings and suggested financial assistance as a means of supporting the implementation of forced air technology.

Q29. Would you like to provide any additional comments?

Responses: 4

Participants commented that the approval process takes too much time and may not correspond with the opportunity to burn under favourable conditions. Some also noted that burning vegetation is not appropriate given today's climate and recycling of green waste and vegetative debris should be prioritized and incentivized. Other comments reflected a sentiment that the process is overregulated.

Consultation Issues-Response Table

Initial Consultation

An Alternative Approach for Regulating Emissions from Open-Air Burning of Vegetative Debris in Metro Vancouver

Consultation Issues-Response Tracker
Open Air Burning
March 3rd, 2021

ID #	Theme	Issue Topic	Source	Questions/Issues/Concerns	Response
1	**Proposed Requirements**	**Burn Time Restrictions**	Maple Ridge Agricultural Advisory Committee (1) Surrey Agriculture & Food Policy Advisory Committee (1) Matsqui First Nation (1) City of Delta (1)	Restrictions on time may be difficult operationally. An extinguished fire is difficult to restart.	Metro Vancouver has proposed the same burning duration time as in the provincial Open Burning Smoke Control Regulation (OBSCR), except for more stringent limits for burns that occur between 100-500 m from neighbouring residences and businesses and between 500-1000 m from sensitive receptors due to population density and increased risk of exposure to smoke. Metro Vancouver's requirements cannot be less stringent than OBSCR.
				Canada Food Inspection Agency's (CFIA) requirements to immediately burn diseased vegetative debris should be built into the proposed regulation.	Metro Vancouver is proposing to allow burning of diseased vegetative debris with similar requirements to the provincial Open Burning Smoke Control Regulation (OBSCR)
				Concern about poor air quality when many burns are concentrated over a short window of time during favourable burning conditions.	Comment noted. Measures such as requiring material to be clean and seasoned are intended to reduce emissions from open-air burning that would be happening during favourable burning conditions. Metro Vancouver is also proposing similar protective measures to OBSCR, which would allow the District Director to prohibit burning to protect the public or the environment if it becomes necessary. Metro Vancouver must align with OBSCR, which does not allow burning during unfavourable conditions.

ID #	Theme	Issue Topic	Source	Questions/Issues/Concerns	Response
				The proposed Metro Vancouver Regulation should retain the burning duration time as specified in the Open Burning Smoke Control Regulation. If air quality deteriorates because of open air burning, the regional district's authority to quickly impose burning bans is a sufficiently protective regulatory tool.	Comment noted. Metro Vancouver has proposed the same burning duration time as in the provincial Open Burning Smoke Control Regulation (OBSCR), except for more stringent limits for burns that occur between 100-500 m from neighbouring residences and businesses and between 500-1000 m from sensitive receptors. However, due to the higher population density and increased risk for exposure than other parts of the province, Metro Vancouver is proposing to apply burn duration time limits to properties of any size in the region. Metro Vancouver is also proposing similar protective measures to OBSCR, which would allow the District Director to prohibit burning to protect the public or the environment if it becomes necessary.
2		**Geographic Scope**	Richmond Food Security and Agricultural	Need more information about where the proposed regulation would apply.	The proposed regulation and any site-specific open air burning approval issued by Metro Vancouver apply only in the Metro Vancouver region.

ID #	Theme	Issue Topic	Source	Questions/Issues/Concerns	Response
			Advisory Committee (1) Township of Langley Agricultural Advisory and Economic Enhancement Committee (1) Written Questionnaire Response (1) Feedback from Farmers (1) Bowen Island Municipality (1)	Concern about discrepancy between local open air burning processes/regulations and regional requirements.	Local open air burning regulations may fulfill a different purpose than Metro Vancouver's potential regulation, which is intended to protect air quality and, by extension, public health. Local and regional requirements will not contradict each other, and the most stringent requirements will prevail. A proposed Metro Vancouver regulation aims to be more efficient and less resource-intensive than the current approval process. Open-air burning activities that meet the requirements of the proposed regulation will not need to apply for a Metro Vancouver approval. Applicants would still need to obtain a municipal fire permit, if applicable.
3		**High Sensitivity Zones**	City of Delta (1) Ministry of Agriculture (3)	Need more information on whether certain municipalities or areas within a municipality qualify to be in a higher or lower smoke sensitivity zone, and how these zones would be determined.	Under the provincial Open Burning Smoke Control Regulation (OBSCR), all of the Metro Vancouver region is categorized as a High Smoke Sensitivity Zone. Under both OBSCR and Metro Vancouver's proposed regulation, the minimum distances for open-air burning are at least 100 m from neighbouring residences and businesses and at least 500 m from hospitals, schools, daycares and long-term care facilities (sensitive receptors). Metro Vancouver is proposing more stringent conditions than OBSCR for burns that occur between 100-500 m from neighbouring

ID #	Theme	Issue Topic	Source	Questions/Issues/Concerns	Response
					residences and businesses and between 500-1000 m from sensitive receptors due to population density.
				Need more information on whether Metro Vancouver intends to use the same start and end time guidelines for high sensitivity zones as stated in OBSCR.	The same start and end times on each day of burning have been proposed as are stated in the provincial Open Burning Smoke Control Regulation (OBSCR) for high smoke sensitivity zones. Metro Vancouver cannot be less stringent than the requirements in OBSCR.
4		**Material Restrictions**	Pitt Meadows Agriculture Advisory Committee (3) Maple Ridge Agricultural Advisory Committee (1) Lower Fraser Valley Air Quality Coordinating Committee (1) Matsqui First Nation (2) Written Questionnaire Response (1) City of Surrey (4) City of Delta	Concern that restrictions on volume and size of materials to burn do not work.	Comment noted. Metro Vancouver's proposed requirements cannot be less stringent than requirements in the provincial Open Burning Smoke Control Regulation (OBSCR). Metro Vancouver is proposing some more stringent conditions than OBSCR on volume and size of materials to qualify to do open-air burning between 100-500 m from neighbouring residences and businesses and between 500-1000 m from sensitive receptors, due to the higher population density and increased risk for exposure than other parts of the province. Open-air burning activities that don't meet the requirements of a proposed regulation may continue to seek authorization through an approval.
				Some municipalities hire local services with large grinders to plough ground material, including diseased material, back into land. This builds soil and is a benefit but may contravene regulations limiting tannin leachate into	Comment noted. Metro Vancouver is exploring ways to promote alternative methods of managing vegetative debris that align with relevant regulations. Metro Vancouver does not propose to require the burying of woody materials.

ID #	Theme	Issue Topic	Source	Questions/Issues/Concerns	Response
			(5) Ministry of Agriculture (1) Feedback from Farmers (1)	groundwater and creeks. Other regulations may also be contravened by burying ground wood materials.	
				The proposed regulation is better suited to small properties as large operations need to burn large quantities of material (30x the size of the allowed amount).	Activities that do not meet the requirements of a regulation require site-specific approvals, which is the current process for all open-air burns in the Metro Vancouver region.
				Need more information on Metro Vancouver's definition of "clean and seasoned material".	Metro Vancouver defines "clean" material as minimizing any soil content that may be mixed in with the vegetative debris. Metro Vancouver is proposing the same definition of "seasoned material" as the provincial Open Burning Smoke Control Regulation: material has been dried to the extent that the dry basis moisture content is 30% or less, has been put in piles for a period of at least 4 months, or has originated from standing dead timber.
				There would be no way to determine if the vegetative material is seasoned before it is burned.	Metro Vancouver is proposing the same definition of "seasoned material" as the provincial Open Burning Smoke Control Regulation: material has been dried to the extent that the dry basis moisture content is 30% or less, has been put in piles for a period of at least 4 months, or has originated from standing dead timber.
				Many farmers burn wet debris, but it is important that piles are dried prior to burning.	Support noted. Metro Vancouver is proposing that vegetative debris is seasoned before burning, with exceptions for diseased vegetative debris.

ID #	Theme	Issue Topic	Source	Questions/Issues/Concerns	Response
				Lack of awareness of type of specific particulate matter contaminants found in emissions from burning debris.	Open-air burning of vegetative debris produces smoke, which is a source of fine particulate matter (PM2.5). Fine particles are associated with health issues that include bronchitis, asthma, emphysema, pneumonia and heart disease. Infants, children, pregnant women, the elderly, and people who already have respiratory illnesses, heart problems or other chronic diseases are most at risk, and healthy adults can also be affected. Research has shown there is no known threshold below which airborne fine particles have no health effects. This means it is important to minimize the amount of smoke produced and reduce exposure to it.
				According to ALR regulations, only agriculture material may be burned (e.g., blueberry bush debris).	Comment noted. Metro Vancouver is aligning with the provincial Open Burning Smoke Control Regulation on the types of material that can be burned.
				Concerns about the prompt disposal of diseased material and how this regulation will affect the burning of this material.	Metro Vancouver is proposing that seasoning is not required for diseased material, as per the provincial Open Burning Smoke Control Regulation. It is proposed that an accelerant must be used if the diseased material is not seasoned.
				Need more information on whether there will be a verification requirement for noxious weed burning similar to diseased material and whether noxious weeds need to be seasoned before burning.	A discussion paper containing more detailed proposed requirements will be published for a second phase of consultation. Best Management Practices and factsheets with information about how to dispose of invasive species, including noxious weeds, can

ID #	Theme	Issue Topic	Source	Questions/Issues/Concerns	Response
				Suggestion that noxious weeds can be burned while still rooted in the soil to reduce propagule spread.	be found at metrovancouver.org, search for “invasive species”.
				Concern about past compliance with respect to material restrictions.	Concern noted. Metro Vancouver officers are responsible for promoting compliance with and enforcing Metro Vancouver Bylaws. Further information about the compliance promotion and enforcement program can be found on metrovancouver.org by searching for "compliance promotion".
				No land clearing debris can be burned under some municipal bylaws, even if on ALR land.	Comment noted. Metro Vancouver's proposed regulation is intended to manage emissions from open-air burning of vegetative debris, which can include land clearing debris, wherever this activity is allowed in the region. There may be additional municipal and ALR burning requirements and restrictions.
5		**Notification**	Maple Ridge Agricultural Advisory Committee (1) City of Delta (6) Written Questionnaire Response (1) Ministry of Agriculture (3) City of Surrey	Notifying neighbours is too onerous.	The provincial Open Burning Smoke Control Regulation requires all reasonable efforts are made to notify neighbours. A Metro Vancouver regulation cannot be less stringent than the provincial regulation.
				Need clarification about the purpose and extent of notifications.	Notifications assist Metro Vancouver in responding to complaints and assessing if there were authorized open-air burns in the area. The provincial Open Burning Smoke Control Regulation (OBSCR) requires all reasonable efforts are made to notify nearby residences, businesses, schools, hospitals, and care facilities no later than 24 hours before the start of an open burn. A Metro Vancouver

ID #	Theme	Issue Topic	Source	Questions/Issues/Concerns	Response
			(1) Public (1)		regulation cannot be less stringent than the provincial regulation.
				Concern about cost of notifications.	Comment noted. The provincial Open Burning Smoke Control Regulation (OBSCR) requires all reasonable efforts are made to notify nearby residences, businesses, schools, hospitals, and care facilities no later than 24 hours before the start of an open burn. A Metro Vancouver regulation cannot be less stringent than the provincial regulation in relation to the extent of required notifications and associated costs.
				Concern that notification has never been a priority in the past as farmers have not had a need to inform neighbours of their intention to burn.	The provincial Open Burning Smoke Control Regulation, amended in September 2019, includes requirements for anyone conducting agricultural burning to notify neighbours when the vegetative debris to be burned is 10 cm or larger in diameter. Due to the higher population density and increased risk for exposure than other parts of the province, Metro Vancouver is proposing that notification been done for burning of any size of vegetative debris.
				Need more information about why there is an additional need for written notification to Metro Vancouver and others if a permit has already been applied for through Metro Vancouver.	Open-air burning activities that meet the requirements of a proposed regulation will not need to apply for a Metro Vancouver approval. A proposed regulation aims to be more efficient and less resource-intensive than the current approvals process. The provincial Open Burning Smoke Control Regulation (OBSCR) requires all reasonable efforts are made to notify nearby residences, businesses, schools, hospitals, and care facilities no later than 24 hours before the

ID #	Theme	Issue Topic	Source	Questions/Issues/Concerns	Response
					start of open burning. Metro Vancouver's proposed requirements cannot be less stringent than OBSCR.
				Desire to know why in some cases (i.e., when using an air curtain incinerator), the regional district should be notified at least two weeks in advance.	Air curtain burners are generally used to reduce the higher potential for impacts of burns that are large or close to neighbours, so proper use of the air curtain burner is important. Advance notification was proposed to enable Metro Vancouver to schedule staff to conduct an inspection. The timing has been adjusted in proposals being put forward for a second phase of consultation.

ID #	Theme	Issue Topic	Source	Questions/Issues/Concerns	Response
				The air curtain incinerator notification requirement and possible subsequent inspection by Metro Vancouver is especially useful for registrants who have no experience in using this technology. However, Metro Vancouver should use discretion when deciding whether to conduct inspections related to air curtain incinerator use, particularly for registrants who have previously demonstrated proper use of the technology, so as not to dissuade air curtain use due to a real or perceived increase of regulatory scrutiny.	Comment noted. Metro Vancouver Officers have the authority to use their discretion to ensure that available resources achieve the best outcomes overall. Metro Vancouver Officers may use discretion when deciding whether to conduct inspections as a result of air curtain burner notification, particularly of registrants who have previously demonstrated proper use of the technology.
				Concern about challenge of maintaining communication between local governments and Metro Vancouver on complaints from residents.	Comment noted. Municipalities that wish to receive notification of unauthorized open burns should submit that request by email to regulationenforcement@metrovancouver.org. Municipalities can share information about complaints and inquire about the status of open burn authorization through this email address as well.
				Metro Vancouver staff should consult with its provincial counterparts to enquire about what methods of neighbourhood notification are cost and time-efficient, while also considered legally	The consultation process for the development of a potential Metro Vancouver open-air burning regulation has included discussion with staff from the provincial government. The provincial regulation states "all reasonable efforts", but provincial staff did not provide any specific guidance since it

ID #	Theme	Issue Topic	Source	Questions/Issues/Concerns	Response
				acceptable by the Ministry of Environment and Climate Change Strategy.	depends on the circumstances of a given situation.
				Metro Vancouver should require registrants to directly contact facilities with high risk populations (e.g. hospitals, care facilities, and schools) within the notification radius, despite potential challenges to mass notification.	Metro Vancouver is proposing to align with the provincial Open Burning Smoke Control Regulation (OBSCR) which requires all reasonable efforts are made to notify nearby residences, businesses, schools, hospitals, and care facilities no later than 24 hours before the start of open burning.
6		**Proximity to schools, businesses, etc.**	Pitt Meadows Agriculture Advisory Committee (1) Matsqui First Nation (1) Ministry of Agriculture (1)	Concern that there is a higher sensitivity to smoke around farms when residential areas are nearby which adds a barrier to farming.	Concern about barriers to farming noted. Under the provincial Open Burning Smoke Control Regulation (OBSCR), the entire Metro Vancouver region is categorized as a High Smoke Sensitivity Zone, which means there are particular restrictions near residential areas and other sensitive land uses. Metro Vancouver's proposed requirements cannot be less stringent than OBSCR. Municipalities are responsible for zoning of residential developments.
				IR#2 and IR#4 are in agricultural areas where there is constant burning of debris that smokes up the entire Matsqui Village and impacts residents in the IR#4 location periodically.	Air quality complaints can be registered with Metro Vancouver at 604-436-6777. Metro Vancouver staff recommend contacting the local health authorities if there are any health concerns attributed to the described burning activities.

ID #	Theme	Issue Topic	Source	Questions/Issues/Concerns	Response
				Need more information on whether Metro Vancouver is planning to use the same guidelines as described in the OBSCR. OBSCR describes the additional conditions required to burn 100m from residences and businesses; and 500m from schools, hospitals and care facilities.	Under both the provincial Open Burning Smoke Control Regulation (OBSCR) and Metro Vancouver's proposed regulation, the minimum distances for open-air burning are at least 100 m from neighbouring residences and businesses and at least 500 m from hospitals, schools, daycares and long-term care facilities (sensitive receptors). Metro Vancouver is proposing requirements that are more stringent than OBSCR for burns that occur between 100-500 m from neighbouring residences and businesses and between 500-1000 m from sensitive receptors due to population density.
7		**Record Keeping**	Lower Fraser Valley Air Quality Coordinating Committee (1) Ministry of Agriculture (2)	Desire to know whether there a process or form for record keeping.	Metro Vancouver's proposed regulation will list the items that must be recorded. A form or template would be developed should the Metro Vancouver Board adopt the bylaw.
				Desire to know whether Metro Vancouver is planning to increase awareness around general record keeping needs.	Metro Vancouver would conduct education and outreach to build awareness of new regulatory requirements.
8		**Seasonal/Weather Restrictions**	Maple Ridge Agricultural Advisory Committee (1) Surrey Agriculture & Food Policy Advisory Committee (2)	Concern for limited amount of days allowed for burning and difficulty to finish the needed amount of burns for each season (i.e., good smoke dispersion conditions are rare, and in practice, there is sometimes only a 3 day open window per year to burn, which is not practical for a large farm).	Metro Vancouver has proposed that open-air burning is allowed up to 12 days per year and up to 6 days per month, providing other requirements such as smoke dispersion conditions are met. It is proposed that using an air curtain burner may make it possible to burn under a wider range of smoke dispersion conditions. Activities that do not meet the requirements of a regulation would require site-specific approvals, which is the current

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			Interagency Meeting (2) Delta Agriculture Advisory Committee (3) July 16th Webinar (1) Written Questionnaire Response (4) Township of Langley Fire Department (1) City of Surrey (1)		process for all burns in the Metro Vancouver region.
				Concern about doubling up of pollutants during the summer wildfire season and interest in expanding seasonal burn windows to October-March.	Comment noted. Metro Vancouver's proposed requirements on when open-air burning can occur depend on smoke dispersion conditions, which are based on the ventilation index. Metro Vancouver may restrict open-air burning during the summer during episodes of degraded air quality (from wildfire smoke and other sources) or during provincial burn bans. Municipalities may have additional seasonal restrictions.
				Desire to know whether there a seasonal pattern for burns.	Metro Vancouver's proposed requirements are based on smoke dispersion conditions. This typically limits the number of days in the winter when burning can occur and in the last few years, December has had the fewest days that burning can occur. Metro Vancouver is also proposing that burning could be restricted by the District Director. As a result, during episodes of degraded air quality, such as due to wildfire smoke in the summer, open-air burning could be restricted. Provincial burn bans may also occur in drier months, and some municipalities have additional restrictions on open-air burning at certain times of year.
				Confusing messaging regarding when farmers can burn (i.e., all year or seasonal).	Residents who are planning to carry out open-air burning can check Metro Vancouver's open-air burning advisory message to determine if open-air burning is allowed on that day. Municipal requirements should also be consulted as they may differ from Metro

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					Vancouver's requirements. Metro Vancouver would conduct education and outreach to build awareness of new regulatory requirements.
				Concern that farmers will not get the chance to burn material, because the approval process will take too long or there will not be any favourable conditions for burning. Farmers would lose money on the approval application fee if this happened.	The proposed regulation aims to be more efficient, less resource-intensive, and less costly than the current approvals process: open-air burning activities that meet the requirements of a regulation would not need to apply for a Metro Vancouver approval. Metro Vancouver is proposing an initial site registration which will be valid for one year, and subsequent annual registration if burns are occurring during those years.
				The windows to burn vegetative debris are too unpredictable	Comment noted. Metro Vancouver's proposed requirements on when open-air burning can occur depend on smoke dispersion conditions, and are based on the ventilation index.
9		**Site Registration**	Delta Agriculture Advisory Committee (2) Feedback from Farmers (2) City of Delta (1) June 16th Webinar (1)	Questions and confusion about frequency of registration and whether registration is required for every burn or for an entire burn period.	Metro Vancouver is proposing an initial site registration, and subsequent annual registration if burns are occurring during those years. Municipalities may have additional requirements.
				Desire to know whether it is possible to have site specific inspections and simultaneous permitting and posting. Paperwork could be submitted in advance and checked off for compliance at the site visit.	Implementation processes will be developed once a proposed bylaw has been adopted. This allows them to reflect the requirements of the bylaw.

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				Concern for lack of compliance with site registration.	Metro Vancouver officers are responsible for promoting compliance with and enforcing Metro Vancouver bylaws. Further information about compliance promotion and enforcement program can be found on metrovancouver.org by searching for "compliance promotion".
				Desire to know whether residents who register for open-air burning would need to complete a questionnaire similar to the questions asked in the current approval form.	The registration process will be developed after a bylaw has been adopted. The information that is proposed to be required will be available in a discussion paper for the second phase of consultation.
				Desire to know if further questioning would be conducted after registration, or only when an investigation or inspection is required.	It is possible that registrants may be asked additional questions so that Officers can assess compliance with the proposed Bylaw.
10	**Existing Regulations and Requirements**	**Approval Process**	Maple Ridge Agricultural Advisory Committee (1) Delta Agriculture Advisory Committee (2) Metro Vancouver Agriculture Advisory	Desire to know proportion of approvals that are agricultural.	In the last 2 years, just over half of open-air burning approvals issued were agricultural.
				Need more information on the current approval process for open-air burning.	Authorization of emissions from open-air burning from Metro Vancouver is typically done through approvals. An approval can only be given for a combined total of 15 months. Information about the approval process can be found on metrovancouver.org by searching for "open burning". There may also be municipal permit requirements.
				Need clarification on whether the information needed to obtain a permit from Metro Vancouver is distributed with	The process to share information about obtaining authorization from Metro Vancouver depends on the municipality.

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			Committee (1) City of Delta (2) July 16th Webinar (1) Bowen Island Municipality (1) City of Surrey (3) Written Questionnaire Response (2)	each municipality's burn permits.	
				Need more information on how the proposed registration process differs from the current process.	The proposed regulation aims to be more efficient and less resource-intensive than the current approvals process: open-air burning activities that meet the requirements of the proposed regulation will not need to apply for a Metro Vancouver approval. Metro Vancouver is proposing an initial site registration, and subsequent annual registration if burns are occurring during those years.
				There should be zones in more rural areas where permits are not required.	The Greater Vancouver Regional District Air Quality Management Bylaw No. 1082 prohibits the discharge of air contaminants unless authorized under a regulation, permit, approval or order or other conditions stated in the bylaw. It is anticipated that an emission regulation would reduce regulatory burden by simplifying the process for obtaining authorization of emissions for appropriate types of open-air burning.
				The estimated volume of debris and burn registration number should not be needed for approval process.	The estimated volume of debris is required by the BC Open Burning Smoke Control Regulation for some types of activities. Metro Vancouver's requirements cannot be less stringent than the provincial regulation.

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				Support for the transition from the current Air Quality Management Bylaw approval process to the proposed registration process, to help reduce the regulatory burden for both the regulator and registrants while still achieving acceptable air quality for the region.	Comment noted
11		**Enforcement**	Surrey Agriculture & Food Policy Advisory Committee (3) Metro Vancouver Agriculture Advisory Committee (1) City of Delta (1) Feedback from Farmers (6) Public (1) City of Delta (1) City of Surrey (2)	Complexities with current regulations make it difficult to know how they will be enforced.	It is anticipated that an emission regulation would reduce regulatory burden by simplifying the process for obtaining authorization of emissions for appropriate types of open-air burning. Information about Metro Vancouver's compliance promotion and enforcement program can be found on metrovancouver.org by searching for "compliance promotion".
				Concern about lack of equitable enforcement for all who burn.	Metro Vancouver aims to promote compliance with its laws in an effective, efficient, timely and fair manner. However, resources are limited and therefore regulatory efforts are focussed to achieve the greatest environmental threat reduction.
				It is difficult for the public to identify and report non-compliant burns, and there is a lack of interest in reporting non-compliant burns.	Comment noted. The public can check whether a burn is currently authorized on the "Permitting" page of Metro Vancouver's website by searching by municipality. Non-compliant burns can be reported to Metro Vancouver by calling the air quality complaint line at 604-436-6777. Metro Vancouver will

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					call complainants if they require additional information.
				Need clarification on whether enforcement will remain a complaints-driven or user-initiated process.	Metro Vancouver Officers proactively inspect open burns observed while in the field. In addition, Metro Vancouver follows up on complaints by residents about open burns occurring in the region.
				Concern for time that would be required from local Fire Departments for enforcement and to visit sites prior to burning.	Metro Vancouver officers are responsible for promoting compliance with and enforcing Metro Vancouver Bylaws. Metro Vancouver staff communicate reports of open burns to municipal staff so they can assess compliance with their own bylaws.
				Limited period of time each year when permits are issued.	Municipalities may have additional requirements for when permits are issued.
				An equitable cost recovery agreement should be discussed if Metro Vancouver staff request a local Fire Department to conduct investigations on their behalf.	Metro Vancouver officers are responsible for promoting compliance with and enforcing Metro Vancouver Bylaws. Metro Vancouver staff communicate reports of open burns to municipal staff so they can assess compliance with their own bylaws.
12		**Non-Compliance**	Written Questionnaire Response (3) Township of Langley Fire Department (1) City of Surrey (1) Public (1)	Larger burns have been left unattended in the past after they had been burning for 8 hours or have been conducted during a municipal burning ban.	Comment noted. The focus of a Metro Vancouver regulation would be to reduce emissions from open-air burning. Metro Vancouver staff communicate reports of open burns to municipal staff so they can assess compliance with their own bylaws. Open-air burns that are non-compliant with Metro Vancouver bylaws can be reported to Metro Vancouver by calling the air quality complaint line at 604-436-6777.

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				It is important for municipalities to receive notification of non-compliance.	Comment noted. Municipalities that wish to receive notification of unauthorized open burns should submit that request by email to regulationenforcement@metrovancouver.org.
				Desire to know how compliance will be ensured.	Metro Vancouver officers are responsible for promoting compliance with and enforcing Metro Vancouver Bylaws. Further information about Metro Vancouver's compliance promotion and enforcement program is available on metrovancouver.org (search for "compliance promotion").
				Lack of knowledge or understanding of the current requirements make it difficult for famers to comply.	Comment noted. The development of a regulation would include education and outreach, including information on Metro Vancouver's website.
13		**Approval Fee**	Written Questionnaire Response (1) Feedback from Farmers (2) City of Surrey (2)	The current system is not equitable as farmers have to pay a costly application fee when they are not contributing significantly to air pollution and may not get the chance to burn because there are no favourable conditions.	It is anticipated that an emission regulation would reduce regulatory burden by simplifying the process for obtaining authorization of emissions for appropriate types of open-air burning. In the next phase of consultation, Metro Vancouver will be seeking feedback on proposed fees for initial registration and annual renewal under a potential regulation.
				Discrepancy between cost of municipal permit and cost of Metro Vancouver authorization.	Metro Vancouver's aim is to recover regulatory costs in a way that is effective, fair and efficient.

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14		**Streamlined Permit Process**	Richmond Food Security and Agricultural Advisory Committee (1) Delta Agriculture Advisory Committee (1) July 16th Webinar (1) Bowen Island Municipality (2) City of Surrey (2) City of Delta (1) Written Questionnaire Response (2)	There is a need for a more streamlined approach between municipal permitting processes and authorization from Metro Vancouver. Many farmers have been burning only with municipal permits and never obtain a Metro Vancouver approval.	Comment noted. The Greater Vancouver Regional District Air Quality Management Bylaw No. 1082 prohibits the discharge of air contaminants unless authorized under a regulation, permit, approval or order or other conditions stated in the bylaw. Currently, emissions from open-air burning in Metro Vancouver are typically authorized through a short-term approval. It is anticipated that an emission regulation would reduce regulatory burden by simplifying the process for obtaining authorization of emissions for appropriate types of open-air burning. People wishing to conduct open-air burning may still need to obtain a municipal fire permit.
				Need more information on the following: “An emission regulation would aim to reduce regulatory burden by authorizing open-air burning activities that meet all specified requirements, so these activities would not need to obtain a site-specific approval”	Emissions from open-air burning in Metro Vancouver are currently typically authorized through an approval. It is anticipated that an emission regulation would reduce regulatory burden by simplifying the process for obtaining authorization of emissions for appropriate types of open-air burning. Open-air burning that meets all of the requirements of a Metro Vancouver regulation would not need to apply for a Metro Vancouver approval. People wishing to conduct open-air burning may still need to obtain a municipal fire permit.
				Need clarification on whether municipal permits should be dependent on receiving Metro Vancouver authorization.	It is up to individual municipalities to determine if their permits require additional authorizations.

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				Local municipalities should be responsible for burn permits. It was much easier when people who burn could work with the local Fire Department directly, as they know the area first-hand. This new process is buried in bureaucracy.	Metro Vancouver has delegated authority under the BC Environmental Management Act to regulate emissions and manage air quality within the region. Currently, under Metro Vancouver's Bylaw 1082, emissions from open-air burning are typically authorized through a short-term approval. It is anticipated that an emission regulation would reduce regulatory burden by simplifying the process for obtaining authorization of emissions for appropriate types of open-air burning. Burn permits may also be required from local municipalities
15	**Alternatives to Open Burning**	**Alternative Disposal Methods**	Pitt Meadows Agriculture Advisory Committee (2) Ministry of Agriculture (1) Surrey Agriculture and Food Policy Advisory Committee (1) Interagency Meeting (1) Delta Agriculture Advisory	There are value-added applications for agricultural waste. We can learn from farmers that are managing waste without burning and there may be places or people that would want to use agriculture waste for other purposes (e.g., tree waste).	Comment noted. Metro Vancouver has sought input from the agriculture sector in a separate study of alternative methods of managing vegetative debris. One of the eventual outcomes of that work will be the development of a best management practices guide, which it is hoped will involve input from farmers, farming associations, and others, and could include information about the uses of agricultural waste for other purposes.
				Need rationale for why biowaste can't clippings be collected from farms.	Collection can typically be arranged with private waste hauling companies for most materials.
				Lack of education and awareness of alternatives to open burning.	The development of a regulation would include education and outreach to promote and encourage the use of alternatives to open burning. Metro Vancouver is also working on the development of a best management practices guide, to reduce barriers to

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			Committee (1) Metro Vancouver Agriculture Advisory Committee (2) Maple Ridge Agricultural Advisory Committee (1) July 16th Webinar (4) Feedback from Farmers (4) Written Questionnaire Response (3) City of Delta (1)		alternatives to open burning. It is hoped that initiative will involve getting input from farmers, farming associations, and others.
				We need to phase out open burning and consider banning open burning long-term, not just in our current circumstances. Many farmers started using alternatives like chipping and grinding 20 years ago and stopped burning.	Comment noted. The proposed regulation would promote alternatives to the use of open-air burning as a method for the disposal of vegetative debris and define conditions for conducting open-air burning to reduce emissions of harmful air contaminants.
				Some farmers chip their waste, but that may not be viable method for all farming operations (e.g. it is very difficult to chip blackberry vines).	Comment noted. A proposed regulation would define conditions for conducting open-air burning that would seek to reduce emissions of harmful air contaminants as well as promote alternatives to open-air burning where possible while recognizing that such alternatives may not be viable for all circumstances.
				Many farmers burn because it is a free way to get rid of green waste and green roadside pickup is not an option. Desire to know of alternatives that make it easier for farmers to get rid of waste and if there is an option to reduce the cost of green material waste per tonne for agricultural landowners	Metro Vancouver's solid waste system operates on a cost recovery basis. Tipping fees are based on the cost to run the system. Metro Vancouver is also working on the development of a best management practices guide, to reduce barriers to use an alternative method to open-air burning for the disposal of vegetative debris. It is hoped that that initiative will involve getting input from farmers, farming associations, and others.

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				Need more information on whether there are electric chippers powerful enough to handle agricultural waste	The electric chippers currently available for handling agricultural waste typically require the use of electricity rather than battery power. Metro Vancouver is currently exploring alternatives for the disposal of agricultural vegetative debris in a separate study.
				One of recommendations for agriculture debris is to use chipping machines, but the amount of noise pollution as well as air pollution is still considerable from a gasoline powered chipping machine.	Smoke contains a complex mixture of harmful air contaminants and open-air burning of vegetative debris is generally inefficient and produces smoke at a rate significantly higher than controlled combustion. Metro Vancouver is currently exploring alternatives for the disposal of vegetative debris in a separate study, which includes an assessment of emissions from the different disposal methods.
				Desire to know the number of approvals that have been issued where forced air technology was proposed. There are not many available companies that can provide this in the lower mainland.	In 2020, nine open burn approvals were issued; seven of them required a fan or blower.
				Need clarification on whether Metro Vancouver intending to use the same definition of "reasonable" as OBSCR (in relation to "reasonable alternatives" in proposed policy).	For a second phase of consultation a more detailed discussion paper will be published. Metro Vancouver' proposals would require that practical alternatives for disposal instead of open-air burning be pursued. Definitions will be created as part of bylaw development process.
16		**Cost of Alternatives**	Pitt Meadows AAC (1)	Tipping fees associated with disposing of yard waste are	Metro Vancouver's solid waste system operates on a cost recovery basis. Tipping fees

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			Bowen Island Municipality (1) Written Questionnaire Response (3) Metro Vancouver Agriculture Advisory Committee (1) Maple Ridge Agricultural Advisory Committee (1) July 16th Webinar (1)	high, eliminating tipping fees would reduce burning.	are based on the cost to run the system. Metro Vancouver is currently exploring ways to reduce barriers to alternative methods of disposing of agricultural vegetative debris
				Alternatives to open burning are costly and affect the viability of farming. People don't want to pollute but they need affordable alternatives.	Metro Vancouver is currently exploring how to reduce barriers to using alternatives to open-air burning to manage agricultural debris in a separate study. It is hoped that initiative will involve getting input from farmers, farming associations, and others.
				Transporting green waste to disposal sites is costly and time-consuming, and not environmentally sound if traveling longer distances.	Metro Vancouver encourages on-site disposal alternatives to open-air burning such as chipping, mulching/mowing, and composting. Metro Vancouver is exploring how to reduce barriers to using alternatives to manage agricultural debris in a separate study, which includes an assessment of emissions from the different disposal methods. That initiative also includes the development of a best management practices guide to reduce barriers to alternatives to open burning.
				Desire to know whether Metro Vancouver worked with the Environmental Farm Plan. They have cost sharing for wood residue management (i.e., chipper and forced air assistance).	Comment noted. Metro Vancouver is exploring how to reduce barriers to using alternatives to open-air burning to manage agricultural debris in a separate study. That initiative looked at the Environmental Farm Plan.
17		**Incentives**	Maple Ridge Agricultural Advisory Committee (1)	Without incentives, alternatives are not as appealing to farmers.	Metro Vancouver is currently exploring alternatives for the disposal of agricultural vegetative debris in a separate study. That work includes the development of a best management practices guide, to reduce

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			Written Questionnaire Response (2)		barriers to alternatives to open burning. It is hoped that initiative will involve getting input from farmers, farming associations, and others.
				Need more information on whether there are credits available for those who use tools or practices that reduce air emissions.	BC Hydro offers rebates to individuals and businesses for energy efficiency: visit bchydro.com to view current rebates. Metro Vancouver does not offer a credit program for practices that reduce emissions from open-air burning. However, Metro Vancouver is currently exploring alternatives for the disposal of agricultural vegetative debris in a separate study. That work includes looking at ways to reduce barriers to alternatives to open burning.
18	**Consultation and Outreach**	**Communications**	Metro Vancouver Agriculture Advisory Committee (2) Bowen Island Municipality (1) Township of Langley Fire Department (1) Written Questionnaire Response (2) Feedback from Farmers	Concern about lack of awareness of the provincial, regional and municipal regulations. Also, questions about whether Metro Vancouver will increase outreach and awareness of current open-air burning requirements including open-air burning authorization, compliance with Ventilation Index and timing of acceptable burn conditions, and issues outlined in the new regulation.	The implementation of a new regulation would involve education and outreach. Information on Metro Vancouver's website will be updated.
				Desire to know whether Metro Vancouver has a representative on call for people to speak with.	For questions about policy proposals, contact AQBylaw@metrovancouver.org or 604-432-6200. For air quality complaints, call 604-436-6777.

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			(1) City of Surrey (1)	Need for access to a reference guide with information on implementing required practices.	Comment noted. Metro Vancouver is exploring how to reduce barriers to using alternatives to open-air burning, including the development of a best management practices guide. Metro Vancouver would also conduct education and outreach to build awareness of new regulatory requirements.
19		**Consultation Process**	Maple Ridge Agricultural Advisory Committee (2) Interagency Meeting (2) Richmond Food Security and Agricultural Advisory Committee (1) Delta Agriculture Advisory Committee (3) Metro Vancouver Agriculture Advisory Committee (2) Bowen Island	Need more information on how Metro Vancouver is consulting with farmers and producer groups to explore barriers to alternatives. It would be useful to send letters to farmers.	Comment noted. Metro Vancouver identified outreach methods and a wide range of stakeholders, including agricultural producers and agricultural advisory committees, in an engagement plan. Due to the COVID-19 situation that arose during consultation, activities were adapted to meet public health protection requirements. Engagement methods will be adjusted to include a mail drop for the second phase of consultation.
				Need more information on how feedback is being collected.	Metro Vancouver identified outreach activities in an engagement plan and an update that was required due to the COVID-19 situation. A summary of the feedback is compiled and published on Metro Vancouver's website as part of the reporting process.
				Desire to know whether recommendations went out to the Delta Farmers Institute.	Metro Vancouver reached out to a wide range of stakeholders, such as agricultural producers, associations (including the Delta Farmers Institute) and advisory committees.
				Desire to know when the next phase of consultation and development is and if the next phase will be more detailed	The feedback received during the first phase of consultation guide the development of a new discussion paper, which will include more detailed proposals for further consultation. When the updates have been made,

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			Municipality (3) Feedback from Farmers (2)	than the first round of consultation.	information about updated consultation materials and upcoming opportunities for input in 2021 will be posted on Metro Vancouver's website.
				It will be difficult to obtain fair and adequate input in the current situation (i.e., COVID-19).	Due to the COVID-19 situation that arose during consultation, the engagement plan was reviewed, and activities were adapted to meet public health protection requirements.
				Desire to know if the Fall Fair display been used to provide information about proposed regulation to farmers.	This event was cancelled in 2020 due to the COVID-19 pandemic.
20		**Lack of Awareness or Education**	Public (2) Ministry of Agriculture (1)	Need more information on the other ways (rather than information posted on websites) that can be employed to inform and educate.	Metro Vancouver will explore methods of informing and educating residents about correct burning practices and would conduct education and outreach to build awareness of new regulatory requirements. In addition to a website, potential tools include mail outs, notices in agricultural associations' newsletters and mailing lists, and rack cards at libraries and agricultural events
21	**Other**	**Air Quality Monitoring**	Delta Agriculture Advisory Committee (2)	Need more information on how people determine if it is permitted to burn from the air quality monitoring station.	Metro Vancouver's open burning advisory phone line at 604-436-6777 provides callers with a message indicating whether or not smoke dispersion conditions are favourable for conducting open-air burning activities.
				Monitors may not give representative data for farmers who do not live near them. Concern that the air quality monitoring station does not accurately represent the area	The network of air quality monitoring stations is designed to be representative of air quality conditions experienced by most people most of the time.

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				(e.g. more concentrated pollutants at airport).	
22		**Different Types of Burning**	Written Questionnaire Response (2) Public (2) Feedback from Farmers (2) City of Surrey (1) Township of Langley Fire Department (3)	Concern that rules and regulations will not be equally applied across a region and to a wide mix of stakeholders. There are agriculture land and suburban backyards with burn pits and charcoal grills. There are forests and campers with campfire. Desire to know if all groups are being regulated equally.	The focus of the proposed regulation is open-air burning of vegetative debris. During consultation, Metro Vancouver is seeking feedback from the public, stakeholders and others orders of government to create a fair, efficient and cost-effective open-air burning regulation for vegetative debris management. Campfires are proposed to be exempt from most requirements.
				Need more information on how small burns (e.g., backyard burns, campfires, ceremonial burns) will be regulated. Need more information on whether the same application fee ($300.00) imposed on farm owners will apply.	The focus of the proposed regulation is open-air burning of vegetative debris. As ceremonial burns are recognized as a cultural practice, Metro Vancouver is proposing to exempt these burns from the regulation. Campfires are proposed to be exempt from most requirements. The current Metro Vancouver open burning approval application fee is $200. In the next phase of consultation Metro Vancouver will be seeking feedback on proposed fees for initial registration and annual renewal under a potential regulation. The aim is to recover regulatory costs in a way that makes sense financially and is fair to the regulated community.
				Desire to know if small burns need a municipal burn permit.	Residents need to consult with their municipality on which activities require a municipal permit.

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		Fire Department Permits	Maple Ridge Agricultural Advisory Committee (2) Richmond Food Security and Agricultural Advisory Committee (3) Township of Langley Agricultural Advisory and Economic Enhancement Committee (1) City of Surrey (2) Written Questionnaire Response (1) City of Delta (1)	Need more information on the difference between Metro Vancouver approvals and municipal fire department permits.	Emissions from open-air burning in Metro Vancouver are currently typically authorized through a short-term approval. Open-air burning that meets all of the requirements of a potential Metro Vancouver regulation would not need to apply for a Metro Vancouver approval. People wishing to conduct open-air burning may still need to obtain a municipal fire permit.
				Desire to know the number of approvals issued by the municipal fire departments compared to Metro Vancouver.	In 2019, Metro Vancouver issued 26 open burn approvals. In 2020, open burning was banned for several months due to the COVID-19 pandemic, as a result only 9 open burn approvals were issued. Metro Vancouver does not have recent statistics for the municipal fire departments, but based on previous information it is anticipated that member jurisdictions issue more burn permits than Metro Vancouver issues approvals.
				Confusion around fire prevention responsibilities.	Comment noted. The focus of a Metro Vancouver regulation would be to reduce emissions from open-air burning.
23		**Draft Bylaw**	Delta Agriculture Advisory (4) Committee City of Surrey	Need clarification on how this relates to the Right to Farm Act.	Under the BC Environmental Management Act, Metro Vancouver has delegated authority from the province to manage air quality and regulate the discharge of air contaminants in the region. A proposed regulation will help

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			(1) Township of Langley Fire Department (1) Interagency Meeting (1) Richmond Food Security and Agricultural Advisory Committee (1)		reduce smoke emissions from open-air burning of vegetative debris.
				Need information on when a draft bylaw be available for review and consultation.	A second phase of consultation with more detailed proposals is planned which would outline proposed bylaw requirements. The second phase of consultation would be scheduled for a period of approximately three to four months. A proposed regulation will be drafted once the feedback and input from the second phase of consultation has been completed. The proposed regulation would be first available for review when it is published in the agenda of the relevant standing committee of the Metro Vancouver Board, currently the Climate Action Committee.
				Need more information on how the regulation will be implemented.	The implementation process will be developed after a bylaw has been adopted. Education and outreach would be conducted to support the bylaw.
24		**Other Sources of Emissions**	Interagency Meeting (2) Delta Agriculture Advisory Committee (1) Maple Ridge Agricultural Advisory Committee	Need more information on how the regulation will address emissions from vehicle traffic.	This potential regulation is intended to address emissions from open-air burning of vegetative debris. Other Metro Vancouver initiatives address other sources of emissions.
				Question about how other sources of $PM_{2.5}$ will be addressed.	Metro Vancouver has developed regulations for other significant sources of $PM_{2.5}$, such as non-road diesel engines and residential wood burning. Metro Vancouver is also developing the Clean Air Plan to manage air quality over the next 10 years, which will include actions to further reduce $PM_{2.5}$ in the region.

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			(1) Farmer (1) Bowen Island Municipality (1)	Need more information on how Metro Vancouver accounts for cannabis emissions.	Metro Vancouver is exploring options to manage emissions from cannabis production operations in a separate initiative. Information on engagement opportunities can be found at metrovancouver.org, search "cannabis".
				Need more information on how farmers can measure individual emissions generated by using a gasoline powered engine as well as dust generated from mowing.	Metro Vancouver is currently exploring alternatives for the disposal of agricultural vegetative debris in a separate ongoing study. As part of that study, the emissions associated with alternative disposal methods have been assessed.
				Concern about disposal of construction waste.	Comment noted. A proposed regulation is intended to manage emissions from open-air burning of vegetative debris and would not apply to construction waste.
25		**Overregulation of Farming**	Pitt Meadows Agriculture Advisory Committee (2) Maple Ridge Agricultural Advisory Committee (2) Interagency Meeting (1) Surrey Agriculture & Food Policy Advisory	Concern that a new regulation will add more obstacles for farmers and the agriculture industry.	Metro Vancouver is proposing to develop a regional emission regulation that would reduce the administrative and financial burden of the current site-specific approvals process. Under an emission regulation, activities that meet all specific requirements would be authorized without having to obtain site-specific approvals. Metro Vancouver is also exploring how to reduce barriers to using alternatives to open-air burning to manage agricultural debris.
				Needs of people with health issues must be balanced with the needs of agriculture community.	Comment noted. The guiding principles of the development of a regulatory strategy identify both the need to reduce regulatory burden and the need to minimize the risk to public health, the local environment, and the global climate from emissions of smoke. Metro

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			Committee (1)		Vancouver's approach to managing emissions from open-air burning will continue to ensure that the health effects of smoke are minimized.
26		**Ventilation Index**	Pitt Meadows Agriculture Advisory Committee (1) City of Delta (5) City of Surrey (1) Surrey Agriculture & Food Policy Advisory Committee (1) Bowen Island Municipality (1) Written Questionnaire Response (2)	Ventilation index creates many constraints for farmers.	Comment noted. The consultation process helps Metro Vancouver identify and understand the barriers faced by residents who engage in open-air burning activities. However, Metro Vancouver's requirements cannot be less stringent than those of the BC Open Burning Smoke Control Regulation, including smoke dispersion conditions, characterized using the ventilation index.
				Desire to know the number of days the ventilation index allowed for burning last year.	In 2019, Metro Vancouver's smoke dispersion conditions advisory message, which is based on the ventilation index and other considerations, allowed new burns to start on 35 days. There were additional days when material was allowed to be added to an existing multi-day burn. Some municipalities have additional restrictions on when burning is allowed, which reduces the number of days available.
				Need more information on where the information for the ventilation index comes from.	The ventilation index is calculated by Environment and Climate Change Canada and represents a measure of the ability of smoke to disperse in current atmospheric conditions.
				Concerns with further limiting number of days where open-air burning without forced air technology will be permitted.	In order to minimize health effects in our densely populated region while allowing for the management of vegetative debris by open-air burning, Metro Vancouver has proposed to relax certain requirements, such as the required smoke dispersion conditions,

ID #	Theme	Issue Topic	Source	Questions/Issues/Concerns	Response
					in cases where an air curtain burner that meets certain operating and performance conditions is used to control emissions. This could potentially increase the number of days on which open-air burning could occur. Metro Vancouver is also exploring how to reduce barriers to using alternatives to open-air burning, including the development of a best management practices guide
				The discussion paper mentions emission control technologies, with the examples shown as the air curtain incinerator or forced air assistance. The provincial regulation specifies that relaxation of the ventilation index requirement is only for when air curtain incinerators are in use. Need clarification on whether this means that Metro Vancouver cannot allow the use of blower fans on open burning piles during fair ventilation index days, unless the vegetative material is placed in a trench and the blower fans are positioned at the top of the trench to simulate an air curtain.	Metro Vancouver can be more restrictive in requirements in a regional emission regulation than the requirements of the BC Open Burning Smoke Control Regulation (OBSCR) but cannot be less restrictive. The discussion paper provides information on the utilization of forced air assistance devices, such a blower fans, as an example of a technology that can improve combustion efficiency. The use of a forced air device during an above ground open-air burning activity would not qualify for a variance from smoke dispersion condition requirements but use of an adequately sized forced air blower could create more efficient burning conditions and reduce emissions.
				Need for more available information on how ventilation	Comment noted. Education and outreach in support of a new bylaw will include guidance on finding smoke dispersion conditions and

ID #	Theme	Issue Topic	Source	Questions/Issues/Concerns	Response
				index applies to specific municipalities.	promote understanding of when conditions are favourable for open-air burning.
				Desire for Metro Vancouver to give a notice when ventilation index conditions are most likely going to be favorable (i.e., indicating common times where ventilation index is typically favourable).	The ventilation index is calculated by Environment and Climate Change Canada. This is used by Metro Vancouver to provide smoke dispersion conditions information to residents about whether or not open-air burning can occur in the region through the open burning advisory phone line. The forecast from Environment Canada currently only extends to the day following the day the forecast is issued.
				Concern that changes in wind direction can affect where the smoke goes.	Comment noted. Minimum distance requirements are intended to ensure that the impacts of smoke at ground-level will be minimized. In addition, as per the provincial Open Burning Smoke Control Regulation (OBSCR), anyone carrying out open-air burning must ensure that no more vegetative debris is ignited or added to ignited piles, or put in an air curtain burner, if the local air flow or atmospheric mixing is causing a negative impact at a nearby population centre or work camp, or is a navigation hazard at nearby airports or highways.
				Confusion about the ventilation index.	Metro Vancouver will provide more background information about the ventilation index as part of an outreach initiative to support measures to manage emissions from open-air burning of vegetative debris.

ID #	Theme	Issue Topic	Source	Questions/Issues/Concerns	Response
				It is recommended that Metro Vancouver uses the ventilation index requirements required for high smoke sensitivity zones in the Provincial Open Burning Smoke Control Regulation, which would allow a registrant to quickly take advantage of good ventilation index days.	Comment noted. Under the provincial Open Burning Smoke Control Regulation, the entire Metro Vancouver region is categorized as a High Smoke Sensitivity Zone. Periods when burning can be conducted are indicated on the Metro Vancouver open burning advisory phone line, at 604-436-6777, which is based on the ventilation index.
				Need for additional education and awareness to the agricultural community on the benefits of employing forced air assistance technologies even if ventilation index exemptions cannot be utilized.	Comment noted. Metro Vancouver would conduct education and outreach to build awareness of new regulatory requirements as well as share information about best practices.

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Proposals for a Regulation to Manage Emissions from Open-Air Burning of Vegetative Debris

Discussion Paper

June 2021

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Proposals for a Regulation to Manage Emissions from Open-Air Burning of Vegetative Debris

INTRODUCTION

The Metro Vancouver Regional District (MVRD, operating as Metro Vancouver) consists of 21 municipalities, one Electoral Area and one Treaty First Nation. Metro Vancouver is responsible for managing air quality in the region and regulating the discharge of air contaminants under authority delegated by the provincial government in the British Columbia *Environmental Management Act* (EMA). Currently, Metro Vancouver manages air emissions from open-air burning of vegetative debris by issuing a site-specific approval under the *Greater Vancouver Regional District (GVRD) Air Quality Management Bylaw No. 1082, 2008* (Bylaw 1082). Approvals for emissions from a particular site can only be issued for a cumulative period of up to 15 months (including any renewals) as stipulated in the EMA and Bylaw 1082.

Metro Vancouver conducted initial engagement on a potential regulation to manage emissions from open-air burning between November 2019 and August 2020. Metro Vancouver is undertaking a second phase of consultation on a potential emission regulation as an alternative approach to managing air contaminant emissions from open-air burning. This discussion paper presents proposals that are being considered for inclusion in a potential emission regulation. Under the proposal for a regulation, a person wanting to conduct an open-air burn that would not meet the requirements of the emission regulation would still be able to apply for a site-specific approval.

The *Climate 2050 Strategic Framework* identifies the need to reduce agricultural emissions, such as those from open-air burning, to reduce the impacts of climate change. The current *Integrated Air Quality and Greenhouse Gas Management Plan* and the next *Clean Air Plan* that is currently under development include actions for Metro Vancouver to reduce emissions from open-air burning. Reducing harmful air contaminant emissions will help improve air quality for the region, to protect human health and the environment. The development of emission regulations for agriculture, industry, and business will help to accelerate emission reductions in these sectors and are part of the overarching approaches to achieve regional air quality and climate targets.

PURPOSE

The purpose of this discussion paper is to:

- Provide information about the environmental and health impacts of smoke emissions from open-air burning in Metro Vancouver;
- Describe proposals for a potential regulation to reduce emissions from open-air burning of vegetative debris; and
- Support consultation and encourage feedback from affected and interested parties on proposals for a potential regulation to manage air emissions from open-air burning.

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For the purpose of this regulatory initiative, open-air burning is defined as the combustion of vegetative debris (such as branches, stalks, and other pieces of vegetative matter with or without leaves) that is conducted outside a structure and does not vent to a chimney or stack.

An emission regulation would offer a simpler alternative to the approval or permit process, which is the current method for authorizing emissions from open-air burning of vegetative debris. If an emission regulation is adopted by the MVRD Board, a person will have the option to conduct an open-air burn in compliance with the requirements of the regulation, rather than their only option for burning being to seek a site-specific approval for the open-air burn. A person must also separately ensure their own compliance with municipal regulations and any other legal restrictions. Under the proposal, if a person cannot meet the requirements in Metro Vancouver's emission regulation and still wishes to conduct an open-air burn, they would be required to seek authorization through an approval or permit issued under Bylaw 1082.

This discussion paper may be of interest to:

- members of the public affected by emissions from open-air burning;
- persons who conduct agricultural or open-air burning activities;
- businesses involved in land clearing, land development, construction and landscaping;
- businesses providing services of collection, recycling, and processing of vegetative debris;
- forestry operations;
- consultants, manufacturers and distributors of equipment that provide services for open-air burning activities, such as air emission control;
- manufacturers and distributors of equipment used to reduce the size of vegetative debris;
- local Indigenous communities;
- provincial ministries;
- Metro Vancouver's member jurisdictions;
- agricultural advisory committees;
- municipal fire departments;
- public health experts; and
- other interested parties affected by potential regulatory proposals related to open-air burning activities or by air quality in the Metro Vancouver region.

This discussion paper was drafted in the first half of 2021, and is being introduced for public, stakeholder, and government comment during the COVID-19 pandemic response. Metro Vancouver assesses work plans on a case by case basis to determine if the COVID-19 pandemic response requires an adjustment to any work plans, including engagement components. For air quality and climate change programs and initiatives, this means continuing with work plans that protect human health and the environment, but adjusting how we approach engagement to focus on online and mail consultation opportunities.

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A consultation program will allow Metro Vancouver to inform interested parties and the public of the proposals for regulating emissions from open-air burning activities described in this discussion paper and to receive feedback. Representatives of interested parties and the public will be invited to provide feedback between July and October 2021.

DEFINING THE PROBLEM

Smoke Emissions and their Effects

Smoke is emitted when wood or other organic matter burns inefficiently. Open-air burning of vegetative debris is usually inefficient and produces smoke at a rate significantly higher than controlled combustion.

Smoke is a complex mixture of harmful air contaminants including fine particles ($PM_{2.5}$) and many gases such as carbon monoxide (CO), nitrogen oxides (NO_x), and volatile organic compounds (VOCs). Smoke contains smaller quantities of other harmful compounds such as benzene, acrolein, formaldehyde, and polycyclic aromatic hydrocarbons (PAHs). Fine particles are associated with health issues that include bronchitis, asthma, emphysema, pneumonia and heart disease. Infants, children, pregnant women, the elderly, and people who already have respiratory illnesses, heart problems or other chronic diseases are most at risk, and healthy adults can also be affected. Research has shown there is no known threshold below which the fine particles in smoke have no health effects. This means it is important to minimize the amount of smoke produced and reduce exposure to it.

BC Centre for Disease Control (BCCDC) notes that there is strong evidence that exposure to air pollution increases susceptibility to and severity of respiratory viral infections, including COVID-19, by decreasing immune function. Evidence also suggests that air pollution from combustion sources is most strongly associated with the increased risk of viral infection, particularly vehicle emissions and biomass burning. While the focus to prevent the spread of infection and reduce the number of COVID-19 cases remains on safety measures and physical distancing, keeping our air as clean as possible will also help to protect the population during the pandemic. The BCCDC has previously recommended implementing measures that help to reduce excess air pollution in populated airsheds across the province.

In addition to its effects on health, smoke emissions also impact the environment. At the local level, emissions of $PM_{2.5}$, NO_x and VOCs in smoke can contribute to visual air quality degradation, which can range from the formation of a regional haze that obscures distant views to dense smoke that can cause immediate safety concerns. At the global level, emissions from open-air burning may contribute to climate change due to the release of short-lived climate forcers such as black carbon (soot) particles and ground-level ozone, which is formed from VOCs and NO_x.

Regional Sources of Smoke

Sources of smoke in the region include open-air burning of vegetative debris, indoor residential wood burning, industrial combustion sources, wood-fired ovens, biomass boilers, campfires, special event

fires and wildfires. Thousands of open-air burning events occur in various sizes across the region each year.

Open-Air Burning of Vegetative Debris

Open-air burning is used to dispose of vegetative debris generated by land clearing activities, agricultural land management, residential property maintenance and forestry practices. Due to Metro Vancouver's population density, smoke emissions from open-air burning tend to impact a greater number of people than in more rural areas of the province. Furthermore, open-air burns that are authorized under approvals are generally only authorized to occur during limited windows of time, which can create the potential for high, short-term exposure to smoke. In addition to health impacts, smoke has a distinctive odour and can irritate the eyes and respiratory pathways, which can negatively affect residents' use and enjoyment of their environment. Metro Vancouver has received complaints and requests for help from the public related to smoke emissions from open-air burning.

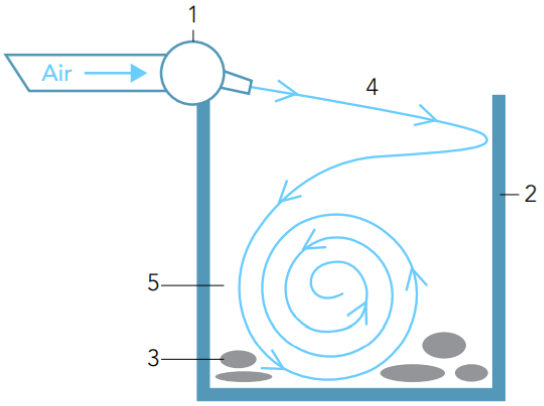
Individual, longer approvals or multiple, shorter approvals for open-air burning emissions at a particular site can be issued for a cumulative period of up to 15 months, after which Bylaw 1082 requires authorization under a permit or an emission regulation. At this time, Metro Vancouver is proposing to authorize emissions from open-air burning through a potential emission regulation, as an alternative to the approvals process that is already used.

Best Management Practices

Best management practices can be employed to either avoid burning vegetative debris, or to reduce the amount of smoke generated by open-air burning. The proposed regulation would promote the use of best practices. For example, vegetative debris can be recycled or reused instead of burned. Depending on the size and type of vegetative debris, the material can be used for various purposes such as soil amendment or ground cover.

If debris is burned, smoke can be reduced with proper preparation of vegetative debris prior to burning, such as drying the material and removing excess soil. Burning only when atmospheric dispersion conditions are good can also lower concentrations of smoke at ground level compared to when dispersion is poor. Emission control technologies, such as air curtain technology and forced air assistance, can also reduce smoke by improving the efficiency of burning.

Air curtain technology burns vegetative debris in a partially-enclosed space with an open top over which a high-speed flow (or 'curtain') of air is directed (Figure 1). The partially-enclosed space can be an above-ground, self-contained unit or an excavated trench. The curtain of air has the effect of providing additional oxygen to the fire, raising the burning temperature and also trapping the smoke. The result is almost a smokeless burning activity, with a nearly complete combustion of all emissions. Similarly, forced air assistance uses blower fans to improve air circulation, increase burning temperatures, and reduce emissions.



1. Air curtain burner manifold and nozzles directing high velocity air flow
2. Refractory lined wall for self-contained or earthen wall for trench burning system
3. Waste material to be burned
4. Air flow forms a high velocity 'curtain' over fire
5. Continued air flow over-oxygenates fire keeping temperatures high and higher temperatures provide cleaner and more complete burn

Figure 1 - AIR CURTAIN TECHNOLOGY

GUIDING PRINCIPLES

The regulatory strategy to address regional smoke emissions from open-air burning aims to:

- minimize the risk to public health, the local environment, and the global climate from emissions of smoke;
- reduce regulatory burden by simplifying the process for obtaining authorization of emissions arising from appropriate types of open-air burning;
- promote alternatives to open-air burning for the disposal of vegetative debris;
- require the use of best burning practices so that smoke emissions are reduced in circumstances where open-air burning activities are authorized; and
- recover regulatory program costs in an effective, fair, and efficient manner.

WORKING WITHIN THE LEGISLATION

Provincial Regulation

The BC *Open Burning Smoke Control Regulation* (OBSCR), a regulation under the *Environmental Management Act*, restricts open-air burning and defines conditions under which open-air burning may be allowed to be conducted in the province. Updates to this regulation came into effect on September 15, 2019. The requirements of OBSCR stipulate what, where, how, and when material can be burned. OBSCR also designates smoke sensitivity zones that each have specific requirements. The entire Metro Vancouver region has been designated a high smoke sensitivity zone in OBSCR. High smoke sensitivity zones have the most stringent requirements.

Metro Vancouver's Regulatory Jurisdiction and Approval Process for Open-Air Burning

Under Section 31 of the *Environmental Management Act* (EMA), Metro Vancouver has the delegated authority for air pollution control and air quality management within the Metro Vancouver region, including on industrial and agricultural land. EMA states that the Metro Vancouver Board "may, by bylaw, prohibit, regulate and otherwise control and prevent the discharge of air contaminants."

Under Bylaw 1082, Metro Vancouver exercises its air quality regulatory authority with a system of permits and approvals that apply to individual facilities and emission regulations that apply to types of operations and activities with similar characteristics. Metro Vancouver's current regulatory requirements with respect to open-air burning of vegetative debris, set out under Bylaw 1082, are in addition to provincial OBSCR requirements.

Bylaw 1082 prohibits the disposal of waste by burning or incineration unless the discharge is conducted strictly in accordance with a permit, approval, order, or an emission regulation issued or adopted by Metro Vancouver, or unless the burning activity is exempted from the prohibition. In relation to the open-air burning of vegetative debris, Bylaw 1082 currently provides a number of exemptions for fires or burns conducted in compliance with the *Weed Control Act*, the *Wildfire Act* and *Fire Services Act* to control the spread of noxious weeds, to carry out fire hazard abatement activities, or for fire services training purposes, respectively. Discharges of smoke from non-exempt open-air burning activities are required to be authorized before open-air burning activities take place.

Currently, Metro Vancouver does not have an open-air burning emission regulation so authorizes such activities using site-specific approvals. Ensuring comprehensive compliance with Bylaw 1082 requirements with respect to open-air burning activities is a significant demand on Metro Vancouver resources. It is labour-intensive to issue, administer and enforce site-specific approvals and support programs that provide education and outreach on open-air burning requirements. Additionally, feedback received from some approval applicants indicates they find the process of obtaining an approval to be complicated, time-consuming and costly. An emission regulation would aim to reduce the burden by authorizing open-air burning activities that meet all specified requirements. Metro Vancouver can be more restrictive in implementing a regional emission regulation than what is required by provincial law, but cannot be less restrictive. In cases where the requirements of a regulation cannot be met, or if relaxation of certain requirements is sought (such as the relaxation of the requirement to burn only when the ventilation index allows open-air burning activities), emissions from open-air burning would need to be authorized under an approval or permit.

Municipal Bylaws

All Metro Vancouver municipalities have bylaws that include restrictions and conditions on open-air burning activities. These are primarily focused on establishing fire control and safety within their jurisdictions, rather than on health or air quality effects. Variations among the municipal bylaws throughout the region have resulted in a lack of consistency in open-air burning practices and reporting. Anybody who wishes to conduct open-air burning must also comply with local, municipal, and fire department requirements.

Path Forward

All the above listed regulatory tools from various levels of government support Metro Vancouver's regional management of smoke emissions from open-air burning. However, gaps exist, because these measures include variations in restrictions and exemptions. This discussion paper proposes a region-

wide regulatory mechanism to reduce smoke emissions from open-air burning in Metro Vancouver in order to minimize impacts on air quality, health, and the environment and provide a simpler alternative to the current approvals approach. Open-air burning activities would continue to need to comply with local or provincial requirements, prohibitions or fire bans.

PROPOSED REGULATORY REQUIREMENTS

Metro Vancouver is seeking feedback from stakeholders representing different perspectives on proposals for a potential regulation to manage smoke emissions from open-air burning of vegetative debris. The regulation must be as restrictive as OBSCR, but feedback on additional requirements proposed below will be taken into consideration during bylaw development.

Metro Vancouver's proposals align with OBSCR in many respects. However, due to the region's population density and air quality management priorities, additional protections are proposed. Table 1 outlines the areas of the proposed regulation that will mirror requirements in OBSCR and the areas for which Metro Vancouver is proposing more stringent requirements. Details of Metro Vancouver's proposed regulatory requirements are provided below Table 1.

Table 1: Comparison of BC Open Burning Smoke Control Regulation (OBSCR) to Metro Vancouver's proposed open-air burning emission regulation

Topic	***BC Open Burning Smoke Control Regulation* (OBSCR) Requirements**	**Proposed Metro Vancouver Requirements**
Registration and associated costs	None	Initial fee: $100-$250 Renewal fee: $50-$100 Lower range of fees would be for agricultural operations
Notifying relevant parties about open-air burning activities	No later than 24 hours before the start of open-air burning, all reasonable efforts must be made to notify neighbours (residences, businesses, schools, hospitals, and care facilities) when: • minimum distances between open-air burning and receptors are reduced • diseased vegetative debris is being open-burned • open-air burning to reduce community wildfire risk is being conducted	Neighbours must be notified of pending open-air burning activities as per OBSCR requirements. Metro Vancouver must be notified by email or phone of pending open-air burning activities when OBSCR requires notification of neighbours, plus when using one or more air curtain incinerators.

Topic	*BC Open Burning Smoke Control Regulation* (OBSCR) Requirements	Proposed Metro Vancouver Requirements
Smoke dispersion	Ventilation forecast for the area in which open-air burning is located must be obtained on the day, but before, the open burning starts	Instead of the ventilation index, Metro Vancouver's open-air burning advisory message must be checked on the day, but before, open burning starts.
Preparing material to be burned	Strategies and techniques to minimize smoke are listed and "seasoned debris" is defined.	Same as OBSCR
Transportation of materials	Material to be burned can be moved only within 5 km of its origin.	Only material generated on the registered property and within 5 km of its origin can be burned.
Use of accelerants	An accelerant must be used if diseased material is not seasoned.	Same as OBSCR
Frequency of burns	Maximum of 12 days or portions of days per year, and 6 days or portions of day per month for land parcels smaller than 64 hectares	Maximum frequency of burning stated in OBSCR applies to all of Metro Vancouver.
Duration of burns	• Starts not earlier than one hour after sunrise • Various end times as defined in OBSCR	Same as OBSCR
Minimum distances of open-air burns from receptors	• 500 m from residences and businesses • 1,000 m from schools, hospitals, and community care facilities • Reduced setbacks of 100 m from residences and businesses and 500 m from schools, hospitals, and community care facilities allowed if defined conditions are met.	More stringent conditions must be met for open-air burns conducted at minimum distances from the same receptors defined in OBSCR. Minimum distances apply if burning single pile of limited size in one day (debris < 10 cm diameter), or air curtain technology is used.
Smoke sensitivity zone locations	All of Metro Vancouver is considered a high smoke sensitivity zone. High smoke sensitivity zones set additional defined conditions for burning within certain distances from residences, businesses, schools, hospitals, and community care facilities.	Same zone as in OBSCR, with more stringent defined conditions for burning within certain distances from residences, businesses, schools, hospitals, and community care facilities.
Air curtain technology	May be used under defined operating and performance conditions.	Same as OBSCR

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Topic	*BC Open Burning Smoke Control Regulation* (OBSCR) Requirements	Proposed Metro Vancouver Requirements
Disposal of diseased vegetative debris	Must be verified and burned based on defined requirements.	Same as OBSCR
Wildfire risk reduction	Defined allowances of activities to reduce wildfire risk, such as controlled burns.	Same as OBSCR, plus open-air burning must be attended at all times.
When records are required	Records required when open-air burning conducts one or more category 3 open fires or uses one or more air curtain incinerators.	Records required for any open-air burning activity covered by the regulation except for short duration burns of pieces less than 3 cm in diameter.
Items recorded	• Burn registration number, if one has been issued under the *Wildfire Regulation*. • If no burn registration number has been issued, name, address and contact information and geographic location of the area in which the open burning is taking place. • Any decisions respecting substituted requirements made under section 29 that apply to the open burning. • Any ventilation forecasts or custom ventilation forecasts obtained in respect of the open burning. • Date on which the open burning starts. • Number of piles or air curtain incinerators ignited. • Approximate size of each pile of the approximate volume of material burned. • Whether the open burning relates to a domestic or industrial purpose and, if it relates to an	Same items as OBSCR, plus: • general type of material burned; • a description of actions taken to minimize burning amounts by reducing, reusing, or recycling; • rationale for requiring open-air burning of material that was not reduced, reused, or recycled; and • moisture content reading if moisture content was used as the method to confirm debris was seasoned.

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Topic	*BC Open Burning Smoke Control Regulation* (OBSCR) Requirements	Proposed Metro Vancouver Requirements
	industrial purpose, the name of the industry.	
Record retention and submission	Records must be retained for one year beginning on the start date of the open burning and submitted to an officer on request.	Same as OBSCR
Exemptions	Campfires are exempt from OBSCR.	Same as OBSCR Burning of salt-laden driftwood waste in campfires or other open-air burns would be prohibited.
Substituted requirements	A director may substitute a requirement in the regulation to further protect the public or the environment.	Same as OBSCR
Prohibitions and air protection measures	A director can temporarily prohibit open-air burning in an area.	Same as OBSCR
Dry land sorts	Defined requirements for open-air burning at a dry land sort area.	Open-air burning at a dry land sort would need to be authorized under a Metro Vancouver approval or permit.
Additional requirements	n/a	Open burning activities that cannot meet the requirements of the regulation would need to seek authorization under a Metro Vancouver approval or permit.

Before Burning

Under a potential regulation, proposed requirements would have to be met before starting any burn. The following subsections outline proposed requirements related to registering a property where open-air burning activities could occur, notifying relevant parties, and protecting the environment.

Registration

Registration is proposed as a simpler and less costly approach to providing information to Metro Vancouver about open-air burning activities than applying for multiple approvals. Any person planning open-air burning of vegetative debris would need to register with Metro Vancouver. The registration information required is their name and the address of the property where the open-air burning will take place.

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In cases where open-air burns do not meet regulation requirements or when relaxation of certain requirements is sought, the emissions would continue to need to be authorized under an approval or permit.

Notifying relevant parties
Notifying neighbours allows people to take precautions to minimize any effects from smoke produced during the open-air burning. OBSCR requires neighbours to be notified at least 24 hours in advance when:

- open-air burning of vegetative debris is conducted near residences, businesses, schools, hospitals, and care facilities (see "Minimum distances of open-air burns from receptors" subsection for conditions);
- diseased vegetative debris is open-air burned; and
- open-air burning to reduce community wildfire risk, such as controlled burns, is conducted.

Metro Vancouver is proposing that anyone carrying out these open-air burning activities would also be required to notify Metro Vancouver by email or phone at least 24 hours before conducting a burn. In addition, Metro Vancouver would also need to be notified when air curtain technology is used in the burning.

Environmental protection considerations
Burning when atmospheric conditions allow smoke to disperse can reduce smoke concentrations at ground level. To ensure that open-air burning occurs only when smoke can disperse efficiently, it is proposed that any person planning open-air burning of vegetative debris would have to check Metro Vancouver's open-air burning advisory message at 604-436-6777 after 8:30 am on the day of the planned open-air burning, before burning starts or continues. For open-air burning to be allowed, the open-air burning advisory message would have to identify that a new burn can be started or vegetative debris can be added to an existing multiple-day burn in progress.

Open-air burning activities are proposed to be prohibited when an air quality advisory or bulletin is in effect to prevent smoke from open-air burning from further worsening air quality.

Conducting Burns
The proposed requirements for conducting an open-air burn under the potential regulation are described in the following subsections. The proposals relate to material preparation, timing, and location of burning. Since Metro Vancouver is more densely populated than other parts of British Columbia, some more stringent restrictions are proposed than those in the OBSCR, to reduce the negative health effects of exposure to smoke.

Preparing material to be burned
The strategies and techniques outlined in OBSCR to minimize the amount of material to be open-air burned and smoke emitted would need to be followed, including the requirements for material to be

clean and seasoned and practical alternatives to burning to have been pursued. However, OBSCR allows vegetative debris to be moved within 5 km from its origin to be open-air burned whereas, under the proposed regulation, Metro Vancouver is proposing that vegetative debris may only be open-air burned on the registered property on which it was generated and within 5 km of the location in which it was generated on that property.

Requirements are proposed to apply to all sizes of vegetative debris, except within areas of increased protection around residences, businesses, schools, hospitals, and care facilities where a maximum size limit will apply to pieces of vegetative debris. In addition, open-air burning of salt-laden wood is proposed to be prohibited under the regulation.

Frequency and duration of burns

As stated in OBSCR, open-air burning can be carried out on properties smaller than 64 hectares for a maximum of 12 days or portions of days per year and 6 days or portions of days per month. This maximum frequency is proposed to apply to all sizes of properties in Metro Vancouver. The times of day when open-air burning is proposed to be allowed aligns with the requirements in OBSCR and is based on when the best smoke dispersion tends to occur in a day.

Minimum distances of open-air burns from the public

Minimum distances between open-air burning activity and nearby residences, businesses, or other occupied facilities are intended to reduce the potential for negative effects from smoke. OBSCR defines setbacks from neighbouring properties for open-air burning activities. Open-air burning cannot be conducted within the minimum distances established in these setbacks, which are:

- at least 100 m from neighbouring residences and businesses; and
- at least 500 m from hospitals, schools, daycares and long-term care facilities (sensitive receptors).

Exceptions to minimum distance requirements, such as when dealing with wildfire risk or diseased vegetative debris, are described in later sections, and are proposed to be the same as in OBSCR.

Under a potential Metro Vancouver regulation, more stringent conditions are proposed for these distances than are in OBSCR, to provide additional protection for people who are more likely to be sensitive to the negative health effects of air contaminants in smoke. Proposed conditions for open-air burning to occur in the more protected areas (between 100 m and 500 m from neighbouring residences and businesses and between 500 m and 1000 m from sensitive receptors) are:

- vegetative debris is in a single pile before it is burned, unless air curtain technology is used;
- the largest horizontal dimension of the pile is not greater than 3 metres and the height is not more than 2 metres, unless air curtain technology is used;
- a written record of the dates the debris was put into a pile is available on request;
- no stumps are present and individual pieces all have a diameter of less than 10 cm, unless air curtain technology is used;
- the vegetative debris is seasoned;

- the occupants of all residences, businesses, schools, hospitals and community care facilities within 500 m of the open-air burning are notified of the location of the open-air burning no later than 24 hours in advance;
- Metro Vancouver's open-air burning advisory message is checked on the day, before open-air burning starts or continues;
- the open-air burning advisory message identifies that a new burn can be started;
- open-air burning does not last longer than one day, unless air curtain technology is used;
- open-air burning starts not earlier than one hour after sunrise;
- open-air burning ends by 4:00 p.m. or two hours before sunset, whichever is later; and
- if air curtain technology is used, the amount of vegetative debris allowed to be burned would not be limited (see "Air Curtain Technology" section for conditions on air curtain technology use).

Open-air burning that occurs at distances greater than 500 m from neighbouring residences and businesses and 1,000 m from sensitive receptors are not subject to these more stringent conditions.

The proposal in the initial discussion paper for defining areas in which more stringent requirements would apply was not pursued because the areas protected by the minimum distance requirements described above encompass the areas of concern in the region.

Air Curtain Technology

Air curtain technology increases the efficiency of a burn and reduces smoke significantly by burning vegetative debris in a partially-enclosed space with an open top over which a high-speed flow or 'curtain' of air is directed. If air curtain technology is used to burn vegetative debris and meets the operating and performance conditions described in OBSCR as well as all other requirements of the proposed regulation, some requirements with respect to smoke dispersion conditions are proposed to be relaxed, which would make more days suitable for burning. When burning occurs at the minimum distances from residences, buildings, and sensitive receptors and the duration of the burn is limited to two consecutive days or less, use of air curtain technology could allow for burning of an unlimited amount of vegetative debris.

Disposal of Diseased Vegetative Debris

Recognizing that diseased vegetative debris must be disposed of quickly to reduce the spread of pathogens or insects, diseased vegetative debris is proposed to be allowed to be open-air burned under the conditions required by OBSCR. OBSCR has provisions for reduced minimum distances of at least 50 m to residences and businesses and 100m to sensitive receptors, provided the defined requirements are met. The District Director would have the discretion to authorize an alternative method of destroying diseased vegetative debris.

Written verification from a qualified professional that a pathogen or insect listed in Schedule 1 of OBSCR has infested the vegetative debris, or that a pathogen or insect not listed in Schedule 1 of

OBSCR has infested the vegetative debris, would have to be provided to the District Director. A registered agrologist, professional biologist, professional forester, or registered forest technologist, all as defined by the *Professional Governance Act*, would be acceptable as professionals qualified to provide the verification. In both cases, the District Director would confirm in writing that open-air burning of the vegetative debris is necessary to stop the spread of the pathogen or insect. In addition, for situations in which a pathogen or insect not listed in Schedule 1 has infested the vegetative debris, the District Director would confirm that in writing.

Plans for Community Wildfire Risk Reduction

Open-air burning activities such as controlled burns could be carried out for up to one day, provided they are done to reduce community wildfire risk and adhere to the conditions outlined in OBSCR as well as any other provincial requirements, prohibitions or fire bans. OBSCR includes provisions for reduced minimum distances of at least 50 m to residences and businesses and 100m to sensitive receptors, provided other defined requirements are met. Metro Vancouver also proposes that open-air burning carried out under these conditions must be attended at all times.

Record Keeping

Record keeping would be required for anyone conducting open-air burning, excluding short duration burns of pieces less than 3 cm in diameter. To facilitate record keeping, Metro Vancouver would develop a form or template listing the required information. The information required to be recorded would be the same as in OBSCR, with the following additional information:

- general type of material burned, such as branches or tree stumps;
- a description of actions taken to minimize burning amounts by reducing, reusing, or recycling;
- rationale for requiring open-air burning of material that was not reduced, reused, or recycled; and
- moisture content readings if moisture content was used as the method to confirm debris was seasoned.

Any person conducting open-air burning activity would have to follow the record retention and submission requirements stated in OBSCR.

Exemptions

The scope of the potential bylaw is the management of vegetative debris. Therefore, campfires, defined as an open fire that burns wood in one pile not exceeding 60 cm high and 75 cm wide for a maximum period of 5 hours, would be exempt from the requirements of the potential regulation, with the exception of the prohibition on burning salt-laden wood such as marine driftwood. Ceremonial burns are recognized as a cultural practice, and these burns would also be exempt from the potential regulation.

DRAFT

Additional Requirements

A person conducting open-air burning of vegetative debris that does not meet the requirements of a potential new Metro Vancouver regulation would have to continue to seek authorization through an approval or permit under Bylaw 1082. For example, anyone conducting open-air burning at a dry land sort (an area of land in which commercially harvested wood is collected and sorted before the wood is transferred elsewhere) in the Metro Vancouver region would require authorization under an approval or permit under Bylaw 1082.

Substitutions and Prohibitions

The proposed regulation would allow the District Director to temporarily substitute requirements in the regulation, such as to prohibit burning in conditions that are normally allowed under the regulation, to further protect the public or the environment. The provisions for implementing a substitution or prohibition would be the same as those in OBSCR.

PROPOSED ADMINISTRATION OF REGULATION AND FEES

An emission regulation could offer an alternative method to the current approval process for managing emissions from open-air burning of vegetative debris. The potential regulation is intended to be simpler for the regulated community and less resource-intensive for Metro Vancouver. In administering regulations, Metro Vancouver is expected to recover costs in a manner that is both fiscally responsible and fair to the regulated community. The proposed fees for registering under the potential regulation are summarized in the table below.

Type of vegetative debris	Current open burn approval fee	Proposed initial registration fee	Proposed annual renewal fee
Agricultural	$200*	$100	$50
Non-agricultural	$200*	$250	$100

*Under review

Metro Vancouver is currently also reviewing the approval application fee of $200 for open-air burning as described in the November 2020 discussion paper on "Proposed Amendments to Air Quality Permit and Regulatory Fees in Metro Vancouver". In that discussion paper, fees for agricultural open-air burn approvals and non-agricultural open-air burn approvals are proposed to be changed to $100 and $1,000 respectively.

PROVIDING FEEDBACK AND COMMENTS

Metro Vancouver is seeking feedback on proposals to manage air emissions from open-air burning of vegetative debris through a potential regulation as described in this discussion paper. Metro Vancouver will consider all comments in the development of a proposal for an emission regulation. The MVRD Board will receive a summary of the feedback received.

Metro Vancouver staff and contractors will treat comments received with confidentiality; however, please note that comments you provide and information that identifies you as the source of those comments may be publicly available if a freedom of information (FOI) request is made under the *Freedom of Information and Protection of Privacy Act*. If you have any questions or comments regarding the consultation process, please call 604-432-6200.

Metro Vancouver invites you to provide feedback by **October 31, 2021** by email to AQBylaw@metrovancouver.org or through consultation opportunities featured on Metro Vancouver's website (search for "open-air burning consultation"). Metro Vancouver will consider options to address concerns and suggestions raised. A summary of feedback received will be provided to the MVRD Board to inform decisions on an emission regulation bylaw for managing emissions from open-air burning of vegetative debris.

Thank you for taking the time to provide feedback on potential regulatory proposals for managing emissions from open-air burning of vegetative debris.

DRAFT

GLOSSARY

The following definitions are for clarification and discussion paper purposes only and are not intended to be used as legal definitions. The draft regulation will include legal definitions.

Air curtain technology: burns vegetative debris in a partially enclosed space with an open top over which a high-speed flow (or 'curtain') of air is directed. The partially enclosed space can be an above-ground, self-contained unit or an excavated trench. The curtain of air provides additional oxygen to the fire, raising the burning temperature and trapping the smoke. The result is an almost smokeless burning activity, with nearly complete combustion of all debris (see Figure 1 on page 7).

Campfire: an open fire that burns wood in one pile not exceeding 60 cm high and 75 cm wide for a maximum period of 5 hours.

Day: a calendar day.

Diseased vegetative debris: vegetative debris that has been infested by a pathogen or insect listed in Schedule 1 of the BC *Open Burning Smoke Control Regulation* (OBSCR).

District Director: a staff person appointed by the Metro Vancouver Board who makes decisions on authorizations of discharges of air contaminants.

End (as in when a burn ends): when each pile of vegetative debris has ceased flaming and is emitting smoke from no more than 10% of its burnt surface area.

Forced air assistance: devices, such as blower fans, that improve airflow and increase oxygen. This increases burning temperatures, resulting in more complete combustion and thereby reducing smoke emissions.

Opacity: a measure of the amount of light obscured by smoke. 100% opacity means all the light is obscured, and 0% means none of the light is obscured.

Open-air burning: combustion of vegetative debris, such as branches and other pieces of vegetative matter with or without leaves and plant stalks, that is conducted outside a structure and does not vent to a chimney or stack.

Seasoned vegetative debris: vegetative debris that has a dry basis moisture content of 30% or less, has been piled for at least four months, or has originated from standing dead timber.

Vegetative debris: branches and other pieces of vegetative matter with or without leaves and plant stalks. This does not include salt-laden wood.

DRAFT

Ventilation index: an index produced by Environment and Climate Change Canada which identifies how quickly and effectively smoke will clear out of an area.

DRAFT

Summary of Adjustments Made in Response to Feedback from Initial Engagement on a Potential Emission Regulation on Open-Air Burning of Vegetative Debris

Initial Proposal	Feedback	Adjusted Proposal
Notification of neighbours and authorities: Neighbours would be notified of any open-air burning activity, and Metro Vancouver would be notified when open-air burning involves a certain amount of vegetative debris.	Notification requirements are onerous.	Neighbours and Metro Vancouver would need to be notified in circumstances described in the *BC Open Burning Smoke Control Regulation*, to streamline notification requirements.
Record-keeping of specific information pertaining to open-air burning activity would be required, such as number and size of piles burned, estimated volume of debris, approximate drying time, venting conditions at ignition, date and time that burns were conducted, and burn registration number, if the person has a burn registration number issued under the Wildfire Regulation.	Questions about if a form or template would be provided.	A form or template will be developed. To minimize burning and help promote compliance, Metro Vancouver will require some additional items to be recorded compared to the BC Open Burning Smoke Control Regulation requirements.
Registration and associated fees would be required.	The current approval process is time-consuming and current approval fees ($200) are high.	Clarified that registration will be a simpler process than the current approval process and provided proposed registration fees of $100 ($50 renewal fee) for agricultural burns and $250 ($100 renewal fee) for non-agricultural burns.
Areas with more stringent requirements could be established based on factors such as population density and topography.	Concerns that residential areas' higher smoke sensitivity creates another barrier to farming.	More stringent conditions than in the *BC Open Burning Smoke Control Regulation* were proposed to further reduce emissions within protected areas around residences, businesses, institutions, and care facilities. This results in protecting all areas of concern in the region, so it is not necessary to define additional areas with more stringent requirements.
Use of emission control equipment, such as forced air assistance or air curtain technology would be required within designated areas with more stringent requirements.	Concerns about the cost and accessibility of air curtain incinerators.	More stringent limits on the duration and the size of the burn pile are proposed, as an alternative to the use of costly emission control equipment for reducing emissions within the more protected areas around residences, businesses, institutions, and care facilities.

Updated Engagement Plan for an Alternative Approach for Regulating Emissions from Open-Air Burning of Vegetative Debris in Metro Vancouver

In November 2019, a two-phase consultation and engagement process on a potential emission regulation to manage emissions from open-air burning of vegetative debris was approved by the MVRD Board. For the first phase of engagement, Metro Vancouver invited the public, Indigenous communities, agricultural producers, businesses, member jurisdictions, municipal fire departments, provincial government agencies, and other interested parties to provide feedback on a discussion paper outlining the potential emission regulation between November 2019 and August 2020. Initial engagement activities for early 2020 were impacted by COVID-19. As outlined in the report to the Climate Action Committee titled "Adapting Air Quality and Climate Change Engagement During COVID-19", dated April 30, 2020, staff moved all outreach online, reached out specifically to key stakeholders, and received insightful feedback on the proposals.

All feedback received to date has been considered to refine proposals where feasible for a second phase of engagement, and adjustments have been made to the engagement strategy. For example, participants shared the need for Metro Vancouver to use additional forms of communication about proposed open-air burning requirements. Additional engagement aims to mail postcards to agricultural communities, and include more committees and associations for targeted consultation, as well as to increase social media notifications.

OBJECTIVES

- Inform stakeholders about the amended provincial *Open Burning Smoke Control Regulation* (OBSCR) provisions and on the overlap and differences between the amended OBSCR and proposed Metro Vancouver emission regulation;
- Understand challenges of complying with the current Metro Vancouver approvals process;
- Gather feedback on Metro Vancouver's proposed requirements for an emission regulation; and
- Understand the barriers and supports needed to transition away from open-air burning.

STAKEHOLDERS, AUTHORITIES, AND THE PUBLIC

Staff expect to engage with the public and the following stakeholders and authorities on a potential emission regulation for open-air burning of vegetative debris in Metro Vancouver:

- The public;
- Member jurisdictions;
- Local Indigenous communities;
- Agricultural producers;
- Agricultural advisory committees and associations;
- Municipal fire departments and associations;
- Businesses involved in land development, construction, and landscaping;
- Industry and industry associations;
- Professional organizations;
- Provincial, federal and other government agencies;
- BC Hydro, Fortis BC;
- Neighbouring jurisdictions; and
- Health agencies.

ENGAGEMENT PLAN

As with all Metro Vancouver outreach, engagement on a potential emission regulation for open-air burning of vegetative debris will be responsive. Based on feedback received, the engagement timeline may be extended or additional engagement activities may be identified to better reach target audiences. Staff will be holding meetings with interested parties where requested. The preliminary timeline for the engagement process is described below.

Initial Engagement on Discussion Paper: Proposals for Regulating Emissions from Open-Air Burning of Vegetative Debris in Metro Vancouver

COMPLETE (November 2019 – August 2020)

Additional Engagement on Discussion Paper: Adjusted Proposals for a Potential Emission Regulation for Open-Air Burning of Vegetative Debris in Metro Vancouver

July – October 2021

A subsequent phase of engagement activities has been shaped by what was heard during initial engagement. Please note most activities from initial engagement will be repeated to ensure that all interested parties receive the adjusted proposals for a potential emission regulation for open-air burning of vegetative debris in Metro Vancouver and a summary of how initial feedback was considered.

- Webinars structured as an informational presentation and feedback session with:
    - agricultural producers in the region, industry associations, interested service associations, and the public (up to three)
- Virtual staff-to-staff meetings with:
    - staff from member jurisdictions, neighbouring jurisdictions, and municipal fire departments
    - staff from Indigenous communities
    - other orders of government
    - health agencies in the region
- Presentations and feedback sessions at municipal agricultural advisory meetings in the region and agricultural association events (approximately 8)
- Online feedback form
- Ads placed in relevant agricultural newsletters
- Mailed postcard to agricultural operations in the region
- Metro Vancouver's website and social media channels
- Direct communication (email and phone)

To: Climate Action Committee

From: Amy Thai, Senior Policy Analyst
Parks and Environment Department

Date: May 10, 2021 Meeting Date: June 11, 2021

Subject: **Air Quality and Climate Action Initiatives in *Caring for the Air* 2021**

RECOMMENDATION

That the MVRD Board receive for information the report dated May 10, 2021, titled "Air Quality and Climate Action Initiatives in *Caring for the Air* 2021".

EXECUTIVE SUMMARY

Caring for the Air is Metro Vancouver's annual plain language publication on regional climate action and air quality projects. The 2021 edition marks 10 years of *Caring for the Air* and features both a look back and a look forward. Over the past decade, Metro Vancouver improved and protected regional air quality and climate, with proactive management plans, progressive regulations, comprehensive monitoring, and outreach and engagement. Over the next several years, upcoming plans and programs will respond to emerging challenges such as wildfires and climate change.

In 2021, staff refreshed the online format of *Caring for the Air* to be more interactive and accessible, and created a 10th anniversary promotional video. The COVID-19 pandemic has necessitated a number of modifications to promotion and distribution of *Caring for the Air*.

PURPOSE

To present the 2021 edition of the annual *Caring for the Air* publication and provide information about outreach conducted for the 2020 edition to raise awareness about climate change and air quality initiatives in the Lower Fraser Valley airshed.

BACKGROUND

The Board Strategic Plan strongly emphasizes taking leadership on climate action through *Climate 2050*, and improving air quality by mitigating threats to public health and the environment. *Caring for the Air* has been published annually since 2012, and is Metro Vancouver's key branding document that promotes awareness of climate action and air quality initiatives. Written in plain language, it describes actions being taken by Metro Vancouver and partner agencies as well as activities that individuals can carry out to reduce greenhouse gas emissions, protect against the effects of climate change, and improve air quality. Each edition of *Caring for the Air* also summarizes the previous year's air quality measurements and compares the data to applicable guidelines.

The Climate Action Committee 2021 Work Plan identifies the development of the 10th annual *Caring for the Air* as a priority for the second quarter of the year.

INSIDE *CARING FOR THE AIR* 2021

2021 is the 10th anniversary of *Caring for the Air*. For this milestone, the theme is a look back at accomplishments over the past 10 years and a look ahead at upcoming plans and programs.

The main feature article summarizes progress made since the first edition of *Caring for the Air* in 2012, including adopting the *Climate 2050 Strategic Framework*, achieving corporate carbon neutrality, installing four new air monitoring stations, and adopting new emission regulations on non-road diesel engines and residential indoor wood burning. It also acknowledges emerging challenges due to changes in our region and climate, such as wildfire smoke impacts, and emphasizes Metro Vancouver's commitment to taking bold actions to tackle them. These actions are outlined in additional feature articles on the *Clean Air Plan* and carbon neutral modelling carried out to support the *Climate 2050 Roadmaps*.

The 2021 edition of *Caring for the Air* was prepared entirely during the COVID-19 pandemic, allowing for a large set of air quality data to be collected since public health protection measures were implemented in the Metro Vancouver region in March 2020, such as physical distancing. This edition includes an analysis of how the pandemic response affected regional air quality.

Other topics in *Caring for the Air* 2021 include:

- Results of the Strata Energy Advisor program, which provided professional energy advisor services to multi-unit homes;
- Resources on heat pumps;
- How to interpret the Air Quality Health Index;
- A summary of air quality data for 2020 and trends in key air contaminant levels since 2008;
- Improvements to Metro Vancouver's air monitoring network;
- Upcoming requirements for the residential indoor wood burning regulation adopted in 2020, and how Metro Vancouver promotes compliance; and
- New tools Metro Vancouver is using to estimate regional emissions.

Staff typically promote *Caring for the Air* through traditional media, social media, at relevant events and through other agencies and organizations. A report presented at the May 15, 2020 Climate Action Committee outlined how engagement will be modified while public health protection measures remain in place due to the evolving COVID-19 situation. Until public facilities, such as libraries and municipal halls, reopen and community events resume, staff will promote *Caring for the Air* 2021 with an increased emphasis on online promotions.

NEW FOR 2021

A combination of adapting promotional strategies during the COVID-19 pandemic and marking the 10-year anniversary of Caring for the Air led to a 'refresh' of the digital format. *Caring for the Air* was previously published online as a static report, identical to the print version. For the 2021 edition, the online version is now in a more interactive format to facilitate browsing, navigating, and sharing articles, and tracking readership.

Staff also developed a promotional video to highlight *Caring for the Air*. The video features interviews with Metro Vancouver representatives and testimonials from air quality and health professionals on how *Caring for the Air* supports and encourages residents to protect our air quality and climate.

DISTRIBUTION AND PROMOTION OF *CARING FOR THE AIR* 2020

For last year's edition (*Caring for the Air* 2020), a social media promotion, including promoted posts via Metro Vancouver's Facebook channel and organic posts via Twitter, was used to reach out to potential audiences between October and December 2020. Posts highlighted the range of topics covered by articles in the publication and provided links to the online version of *Caring for the Air* 2020. Analytics indicate that *Caring for the Air* social media posts reached over 11,500 people, resulting in over 200 engagements through likes, shares, and comments.

A link to the online version was also sent to a *Caring for the Air* email list, with over 400 subscribers, and to the Northwest Air Quality Communicators mailing list, which includes representatives from air quality organizations in western Canada and the United States.

Copies of *Caring for the Air* 2020 were circulated to municipal offices and libraries in the region, and additional copies were provided on request. A rack card was developed and highlighted the purpose and content of *Caring for the Air* 2020, but was not distributed due to public facility closures during the COVID-19 pandemic. Copies of Caring for the Air 2020 were also made available at the Metro Vancouver Information Centre and library.

At the time of writing, there have been over 330 views of the electronic version of *Caring for the Air* 2020.

ALTERNATIVES

This is an information report. No alternatives are presented.

FINANCIAL IMPLICATIONS

Caring for the Air 2021 describes projects and programs that were undertaken within approved budgets and work plans or funded through the Regional District Sustainability Innovation Fund. The report also provides information about work relevant to Metro Vancouver's air quality and climate action interests that were conducted by and entirely the responsibility of external organizations, supported by their own resources.

CONCLUSION

Caring for the Air makes information about Metro Vancouver's climate change and air quality initiatives accessible to a wide range of readers. It helps to increase public understanding of air quality and climate change issues and encourage public engagement and personal action. This 10th anniversary edition provides a retrospective of key accomplishments over the past decade and looks ahead at upcoming initiatives such as the *Clean Air Plan* and *Climate 2050*.

Caring for the Air complements other outreach activities and publications, such as the State of the Air report produced by the BC Lung Association, which describes air quality programs throughout

British Columbia, and Metro Vancouver's annual technical air quality monitoring report, the Lower Fraser Valley Air Quality Monitoring Report.

Attachment
Caring for the Air 2021 - print version *(45511110)*

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ATTACHMENT

Caring for the Air 2021



In this issue

- *Climate 2050 Roadmaps* to a carbon neutral region
- *Clean Air Plan* actions
- COVID-19 and air quality

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The Lower Fraser Valley airshed

Air pollutants can travel between Metro Vancouver and surrounding areas. Managing air quality successfully requires effective collaboration with our neighbours and other levels of government, and participation from businesses, public institutions, non-government organizations and residents. Articles in this publication reflect this cooperation.

Message from the Chair



In this landmark edition of *Caring for the Air*, Metro Vancouver celebrates many of the key milestones we've achieved over the last decade while underscoring the important work underway and the challenging road ahead.

In recent years, we have endured unprecedented wildfire seasons with smoke from distant forest fires settling into our region for days or weeks at a time. These periods of deteriorated air quality make us all acutely aware of the damaging health effects of wood smoke pollution and the role of climate change in exacerbating wildfire activity.

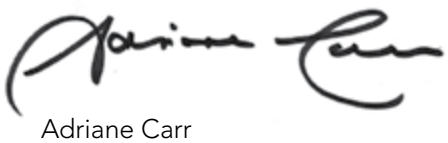
Indeed, climate action has emerged as our top priority — in this issue, you will read about how Metro Vancouver achieved carbon neutrality as an organization and how we are stepping up plans, based on scientific evidence, towards carbon neutrality in the entire region.

Back in October 2011, Metro Vancouver adopted the *Integrated Air Quality and Greenhouse Gas Management Plan*, as a 10-year vision for air quality and GHG management in the region. Fast forward ten years, and Metro Vancouver is developing the next iteration — the *Clean Air Plan*.

Air quality and climate change are inextricably linked, and the *Clean Air Plan* includes actions to significantly reduce air contaminant emissions over the next decade. These actions support *Climate 2050*, Metro Vancouver's regional climate action strategy, and include bold steps to reduce GHG emissions and accelerate climate change mitigation as well as adaptation measures.

This edition of *Caring of the Air* also examines some of the climate change and air quality implications of the COVID-19 global pandemic. As we look toward a robust economic and social recovery, many of the environmental improvements we saw over the past year give us hope that an environmentally-sound and socially-just recovery is feasible.

Clean air is one of the things that makes our region such a desirable place to live, work and play, and we thank all the regional, municipal, First Nation, and provincial staff and partners who work tirelessly to help keep our air clean.



Adriane Carr
Chair, Metro Vancouver Climate Action Committee

A Decade of *Caring for the Air*

This year marks the 10th anniversary of *Caring for the Air*. A lot has happened in the 10 years since the first edition in 2012, and there's a lot more planned for the next 10 years and beyond.

Metro Vancouver's air quality has steadily improved thanks to new programs and policies, and our response to new threats to air quality and climate change.

Let's take a look back at some of the changes in the past decade, and a look forward at what the next 10 years can bring.

Continues on next page

From page 1

A Decade of *Caring for the Air*

Air Monitoring

Since 2012, Metro Vancouver has:

- added four air monitoring stations to increase the network to 31 stations;
- built a new mobile air monitoring unit (MAMU) and deployed it to nine locations;
- upgraded particulate matter monitors to measure a portion of particulate matter not previously measured; and
- completed an in-depth review of the network, which included recommendations for improvement (see page 14).

Metro Vancouver's air monitoring network will continue to evolve to meet the region's air monitoring needs, whether it's for new pollutants, locations, or technology.

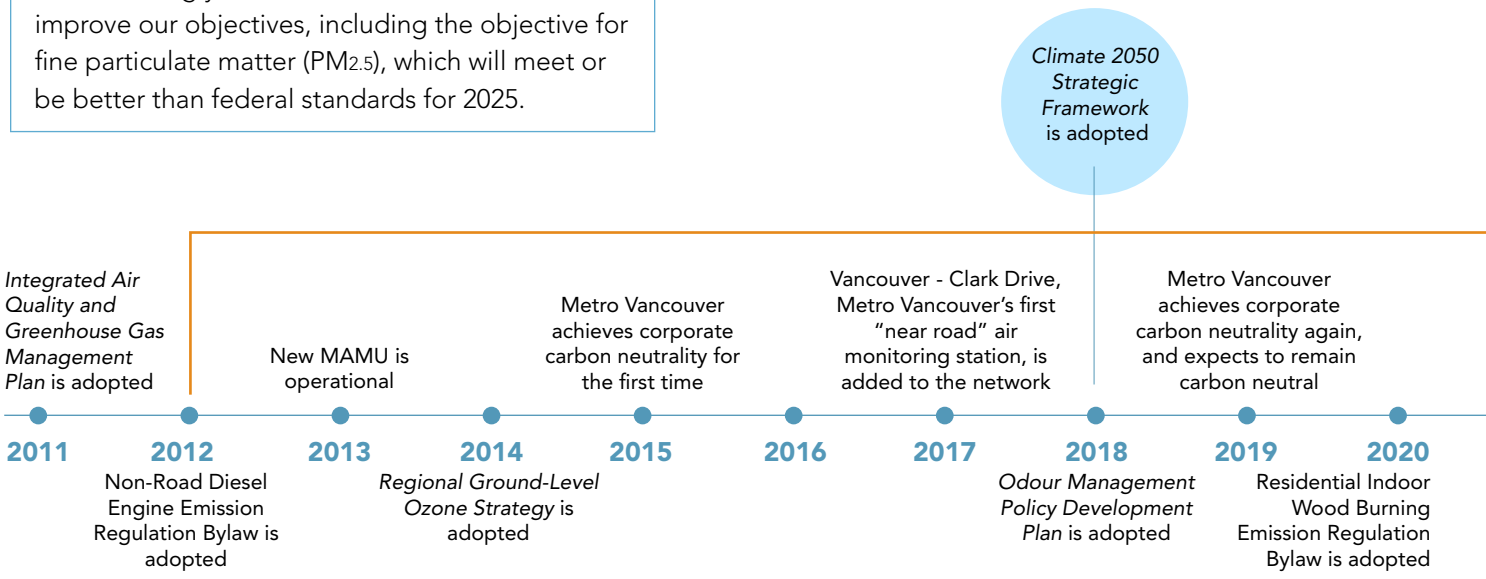
Air Quality Objectives

Air quality objectives are health-based targets for acceptable outdoor air pollutant concentrations. Over the last ten years, we've tightened our objectives to help drive air quality improvements. In the coming years, Metro Vancouver will further improve our objectives, including the objective for fine particulate matter ($PM_{2.5}$), which will meet or be better than federal standards for 2025.

Past, Present, and Future Air Quality and Climate Actions

Looking back over the past decade, Metro Vancouver has collaborated with other organizations to protect our air quality and climate by developing educational programs, policies, and regulations, including:

- programs to reduce energy use and emissions from buildings (see page 6 to learn more about the Strata Energy Advisor program for multi-unit homes);
- a wood stove exchange program to provide rebates for replacing old, inefficient wood-burning appliances with new, cleaner burning ones;
- an electric vehicle outreach program;
- bylaws to reduce emissions from non-road diesel engines and residential indoor wood burning appliances (learn more about new residential wood burning requirements on page 18 and regulation updates on page 20); and
- public services on air quality, such as providing real-time air quality data on www.AirMap.ca and www.ClearAirBC.ca, or issuing air quality advisories when air quality is poor.



What comes next?

As our region and climate changes, so can sources of air pollution. Emerging threats include:

- **Wildfires**: Four of the last six years (2015, 2017, 2018, 2020) have had significant air quality impacts from wildfire smoke. The Metro Vancouver region generally has good air quality, so short-term poor air quality events are especially noticeable. Climate projections for our region include warmer, drier and longer summers, which could lead to more intense and more frequent wildfire smoke impacts.
- **Ground-level ozone**: Ground-level ozone is formed by a chemical reaction between nitrogen oxides (NOx) and volatile organic compounds (VOC) during hot and sunny days. While ozone formation is not new in Metro Vancouver, new regional sources of these 'precursors' are leading to increased ozone in areas and at times of the year that typically don't experience high ozone concentrations. For example, wildfire smoke can transport a mix of chemicals that increases ozone formation.

Unexpected challenges, such as the **COVID-19 pandemic**, can also influence air quality: see page16 to learn more.

As new challenges emerge, Metro Vancouver is committed to taking bold actions to tackle them. Looking ahead, Metro Vancouver's new *Clean Air Plan* (page 8) lays out actions to protect our air quality for the next 10 years, and the *Climate 2050 Roadmaps* (page 4) outline how Metro Vancouver will reduce emissions by 45% from 2010 levels by 2030, and become a carbon neutral region by 2050. Furthermore, the *Regional Ground-Level Ozone Strategy* (RGLOS) will be refreshed to address new sources of ozone precursors.

Even with the progress made in the past decade, we can all do more for our air quality and climate. Evolving challenges require innovative responses, and Metro Vancouver will continue to adapt its strategies to protect our health and the environment for the next 10 years and beyond.

AIR POLLUTANT	AVERAGING PERIOD	METRO VANCOUVER AMBIENT AIR QUALITY OBJECTIVE		CANADIAN AMBIENT AIR QUALITY STANDARD
		2012 (ppb)*	**2021** (ppb)*	**2025** (ppb)*
Nitrogen dioxide (NO_2)	1-hour	107	60	42
Sulphur dioxide (SO_2)	1-hour	174	70	65
Ozone (O_3)	8-hour	65	62	60
Carbon monoxide (CO)	1-hour	26,500	13,000	n/a

*parts per billion



Mapping a Path to a Carbon Neutral Region

Climate change continues to be one of the foremost challenges facing the Metro Vancouver region and the world. Everyone can look at the recent experiences with the COVID-19 pandemic and see that both responsive and adaptive local actions are necessary to persist and thrive when faced with these global issues.

Metro Vancouver has committed to becoming a carbon neutral region by 2050 and has established a near-term target of a 45% greenhouse gas (GHG) emissions reduction by 2030. Through its overarching climate action strategy, *Climate 2050*, Metro Vancouver is developing *Climate 2050 Roadmaps* that will identify ways to guide the region's transition towards carbon neutrality and resiliency to climate change.

To inform the *Climate 2050* work, Metro Vancouver is modelling the impacts of different policies and potential actions on GHG emissions. Results confirm that collaboration between different levels of government, businesses, residents and communities, and other key partners will be essential to reduce GHG emissions to as close to zero as possible, with a small amount of emissions balanced out by projects that store carbon over long timeframes. Taking strong and urgent action now is critical in order for the region to avoid the worst impacts of climate change.

This modelling supports the *Climate 2050 Roadmaps* to identify the critical actions needed by the region on a pathway to carbon neutrality by 2050, as well as the development of Metro Vancouver's *Clean Air Plan*, which focuses on the air quality benefits of climate actions.

Achieving Corporate Carbon Neutrality

In 2019, Metro Vancouver achieved corporate carbon neutrality under the provincial Climate Action Revenue Incentive Program (CARIP). Metro Vancouver reduced its emissions and balanced its remaining carbon footprint with carbon credits from projects that avoid greenhouse gas (GHG) emissions, or increase carbon storage in natural ecosystems, including:

- Ecological restoration of Burns Bog (a joint effort with the City of Delta)
- Acquisition and conservation of forested land to expand regional parks
- Use of trenchless technology for sewer pipe installation

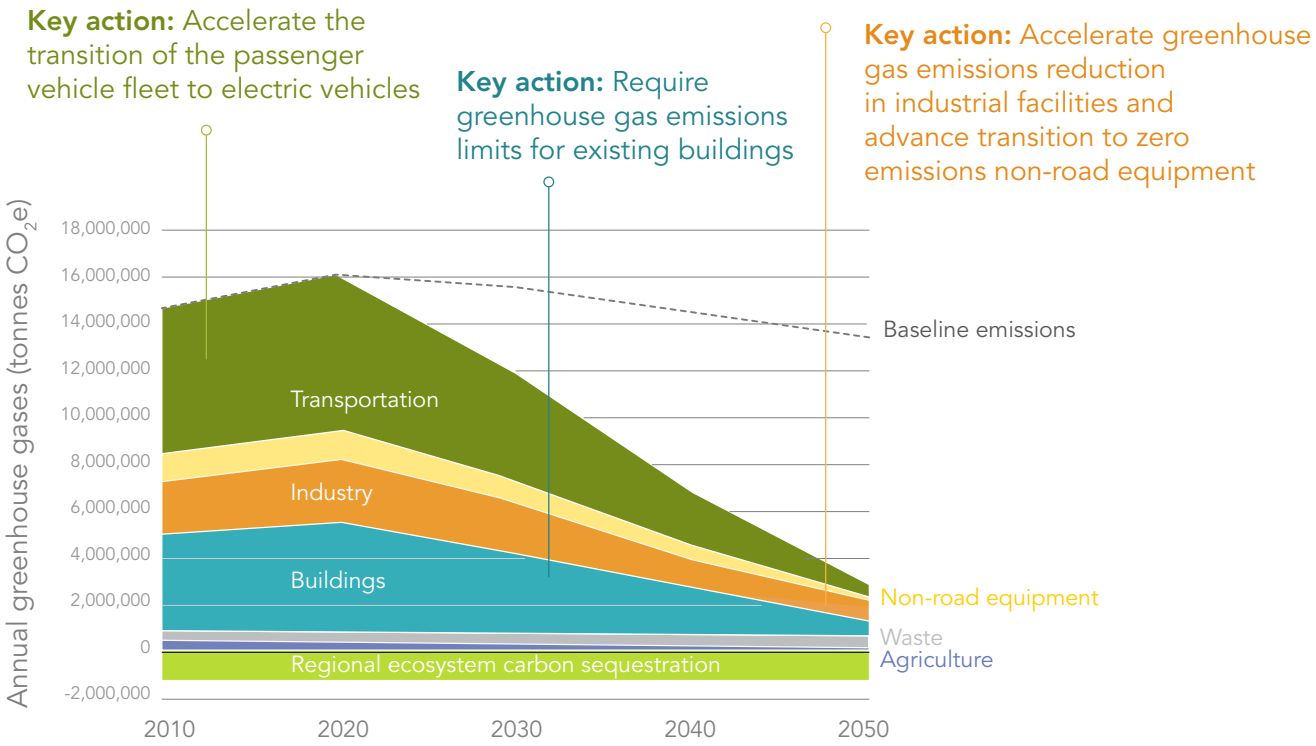
Achieving corporate carbon neutrality is an important milestone



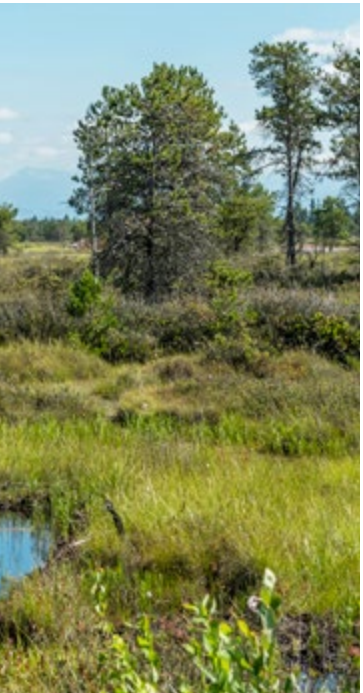
Have a say on the development of the *Climate 2050 Roadmaps*

Visit: www.metrovancouver.org/climate2050 | Email Climate2050@metrovancouver.org

Estimated Greenhouse Gas Emissions Reductions



To learn more about the *Clean Air Plan* and actions to protect our air quality and climate, see page 8.



for Metro Vancouver. Leadership on climate action serves as a 'call to action' for other organizations, businesses and residents alike to contribute to our target of regional carbon neutrality by 2050. As Metro Vancouver's corporate GHG emissions account for less than 1% of regional emissions, region-wide action is essential to meet this target. The *Climate 2050 Roadmaps* (see above), will focus on these actions as well as those that address adaptation to climate change.

Protecting Carbon Stored in Regional Park Lands

Conserving forest within a park can prevent the release of stored carbon that could be released if the land were developed. Acquiring and stewarding new park land will enable Metro Vancouver to ensure the carbon stored in the trees, plants and soils remains stored for decades to come, contributing to Metro Vancouver's corporate carbon neutrality.

Opening the Door to Greener Condos and Townhouses

Chances are that you or someone you know is reading this while perched in their condo or nestled in their townhouse. About one third of Metro Vancouver households live in multi-unit or 'strata' housing. Stratas account for about 20% of our regional greenhouse gas (GHG) emissions from buildings. This is about the same amount as heavy-duty vehicle emissions!

Yet, historically, strata buildings have been underserviced by energy efficiency programs because of the challenges with making collective decisions. But instead of seeing stratas as a barrier to GHG reductions, Metro Vancouver saw them as an opportunity.

Strata Energy Advisor Program

Metro Vancouver's Strata Energy Advisor pilot program provided professional energy advisory services to condo and townhouse stratas to assist with evaluating and developing energy efficiency projects. The program also helped Metro Vancouver understand barriers and opportunities for GHG reductions in strata buildings and learn how to support them to take on energy saving projects.

Strata Energy Advisor Program in numbers

- **20**-month pilot project
- **82** energy assessments and project business cases
- **38** completed energy saving projects
- **2265** tonnes of lifetime GHG reductions
- Over **$320,000** per year in utility cost savings to owners

How can my strata building get involved?

The pilot project wrapped up in 2019, and the lessons learned are informing the *Climate 2050 Buildings Roadmap*, which will include actions needed to reduce regional GHG emissions.

Metro Vancouver is investigating how to scale up the pilot project so more stratas can benefit from the assistance of professional energy advisors.

Learn more at www.strataenergyadvisor.ca.



Warming Up to Heat Pumps

The largest source of greenhouse gas emissions in the buildings sector comes from existing residential buildings. Roughly two-thirds of the buildings that are here today will still be here in 2050, when the Metro Vancouver region is aiming to reach carbon neutrality. Most of these homes burn natural gas for space or water heating, contributing to greenhouse gas emissions that are putting our planet in peril.

One climate-friendly solution that's becoming more popular among BC residents is installing an electric heat pump. Heat pumps can heat and cool your home using a fraction of the energy of other systems.

How does a heat pump work?

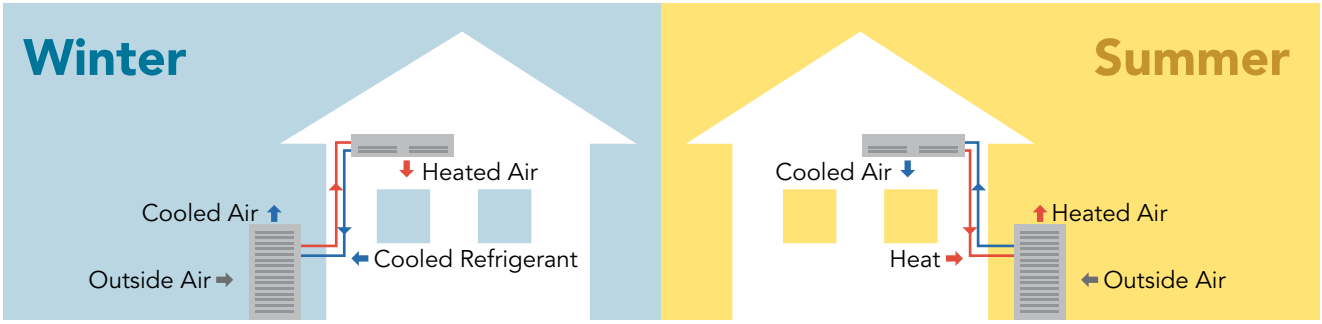
A heat pump works similarly to a refrigerator or air conditioner. In the winter, a heat pump extracts heat from the outside air or ground and brings it into your home. In the summer, it pulls heat from inside your home and moves it outside. By using refrigerants to help move the heat, heat pumps are by far the most energy efficient technology available for space heating and cooling and hot water heating. Depending on outdoor air temperatures, heat pumps can be up to 300-500% efficient. In contrast, electric baseboard heaters are typically 100% efficient, and a high performance natural gas furnace is about 95% efficient.

There are many different types of heat pump systems (for example, ducted vs. ductless systems), so there is bound to be one that is suitable for your home and local climate. Consult a professional contractor who has experience with different heat pump installations, and they will help you design the best system for you.

ADVANTAGES	DISADVANTAGES
Can both cool and heat a home	Higher upfront cost than a gas furnace
Highly energy-efficient	Efficiency reduced when it is below freezing outside
Low greenhouse gas emissions	Needs suitable space outside your home for the condenser unit

Learn more:

- Visit bchydro.com and search 'heat pump'
- BetterHomesBC.ca provides incentives, including heat pump rebates, for residents doing home renovations



Turning a Plan Into Action: How the *Clean Air Plan* Will Improve Air Quality and Reduce Greenhouse Gases

Metro Vancouver's residents generally experience good air quality. Climate change projections for the region for 2050 include longer, hotter and drier summers, warmer and wetter fall and winter seasons with decreased snowpack, and more extreme weather events, which can compromise public health and the environment, including our region's good air quality.

What is the *Clean Air Plan*?

Metro Vancouver, together with its member jurisdictions, has been taking action on air quality and greenhouse gas (GHG) emissions for decades. The *Clean Air Plan* was born out of a need to accelerate these actions to reduce our impacts on global climate change and to protect our health and the environment. Developed over the past two years with

Summary of Actions

Equity

Metro Vancouver will develop a strategic approach to introducing equity in air quality and climate change programs. This will include community input, health impact assessments and other equity evaluation tools so that all residents benefit from air quality and climate change programs.

Transportation

The transition to zero emission passenger and commercial vehicles will be supported by sales targets, improved emission standards, more renewable fuels and a charging and refueling strategy. Personal transportation choices will be supported by increased funding for transit and active transportation and improved parking policies. Longer-term clean fuel strategies and engine technologies will reduce rail, marine and aviation emissions.



input from residents, governments and stakeholders, the *Clean Air Plan* is Metro Vancouver's latest air quality and GHG management plan. It identifies how the Metro Vancouver region can improve air quality and reduce GHG emissions within the region over the next 10 years.

The *Clean Air Plan* complements *Climate 2050*, Metro Vancouver's overarching long-term strategy that will guide our region's policies and collective actions to transition to a carbon neutral and resilient region over the next 30 years. *Climate 2050* and the *Clean Air Plan* are tightly integrated, as GHGs and air contaminants can come from the same sources. The *Clean Air Plan* focuses on actions that reduce both GHGs and air pollutants.

If all the actions in the *Clean Air Plan* are successfully implemented:

- Social health benefits of up to $1 billion
- GHG emissions reduced by approximately 2 million tonnes by 2030

Next steps

The *Clean Air Plan* will be reviewed by the Metro Vancouver Board in 2021. Once adopted, it will drive new bold actions to improve air quality and reduce GHG emissions.



Industry & Business

Industry will benefit from cleaner fuels and better emission controls, supported by stronger emissions standards and regional collaboration. Replacement of older non-road equipment models will be accelerated with more stringent regulations as well as incentives.

Buildings

New and existing buildings will meet more stringent greenhouse gas standards and report on energy use and emissions. More households can benefit from retrofit programs by enhancing financial tools. Residential wood burning rules will reduce health impacts from fine particulate matter.

Agriculture

Agricultural equipment and greenhouses will reduce emissions through improved energy efficiency and shifting to renewable energy. Air quality impacts from burning vegetative waste will be reduced through alternative practices.

How the Air Quality Health Index Can Protect You

Metro Vancouver issues air quality advisories to inform residents about degraded air quality and what they can do to protect their health. An air quality advisory may be in effect for an entire day or longer, but conditions can change hour by hour. Here's how you can use the Air Quality Health Index (AQHI) to understand the health risk at any time.

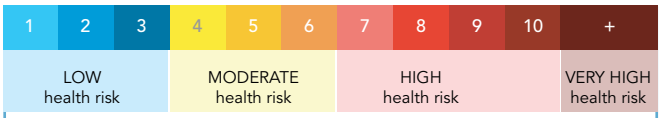
The AQHI is a Canadian health index designed to help people understand how air quality can affect their health, and how they can protect themselves when air quality is poor. It uses a scale of 1-10+ to indicate potential health risk and to recommend actions for reducing risk.

During wildfire events, smoke conditions can change quickly. The AQHI is available for six different areas in our airshed and is updated every hour to reflect current air quality conditions. For example, the graph below shows AQHI data from an air quality advisory in Metro Vancouver in September 2020. Although the advisory was in effect from September 8 to 18, the AQHI fluctuated during that time and there were short windows of cleaner air.

Hourly changes to the AQHI during an air quality advisory



* People with heart or breathing problems are at greater risk.
Follow your doctor's usual advice about exercising and managing your condition.



Air Quality Health Index (AQHI)

- It is the recommended tool for Metro Vancouver residents to understand health risk in the region.
- In BC it categorizes health risk based on the higher of:
  - The combined levels of ground-level ozone (O_3), nitrogen dioxide (NO_2) and fine particulate matter ($PM_{2.5}$).
  - $PM_{2.5}$ level during smoky conditions.
- An AQHI forecast is also available.

Where you find your index matters

Some websites or apps run by private companies display a health index, but these indices might not be based on the best scientific evidence and might not reflect typical air contaminant concentrations. For example, they could be based on someone's private air monitor inside their home beside their smoky stove. You certainly wouldn't want to use this data to inform your trip to the park with the kids.

Always use reputable sites to check your community's AQHI, such as www.Airmap.ca for Metro Vancouver, www.env.gov.bc.ca/epd/bcairquality/readings/find-stations-map.html for the rest of BC, or the national AQHI smartphone app open.alberta.ca/interact/aqhi-canada.

Air Quality in 2020

In 2020, the BC Centre for Disease Control noted that degraded air quality can increase susceptibility to COVID-19, as well as the severity of the infection, leading to further concerns for the health of Metro Vancouver residents during the summer wildfire season.

Metro Vancouver generally has good air quality, and air pollutant concentrations remained at levels that were better than air quality objectives for most of the summer. However, in September 2020, the region was under an air quality advisory for eleven days due to wildfire smoke from the west coast of the United States. A rare weather pattern with high winds and dry conditions rapidly increased the number and size of wildfires, leading to rapid smoke production which blanketed the Metro Vancouver region.

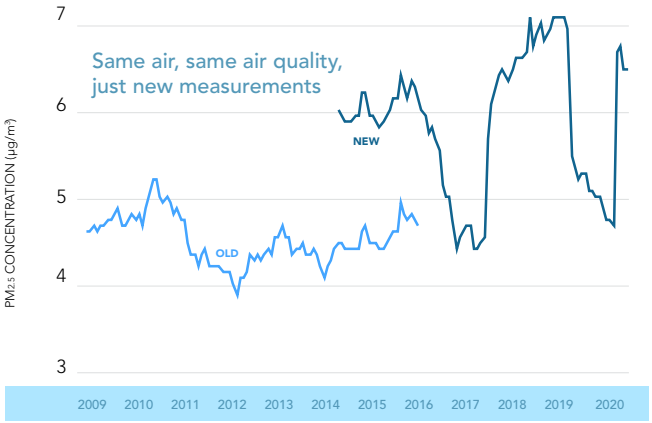
During two hot periods in 2020, the weather patterns and urban emissions increased the formation of ground-level ozone, leading to two ozone air quality advisories, one in late July and one in mid-August.

Air Quality Trends

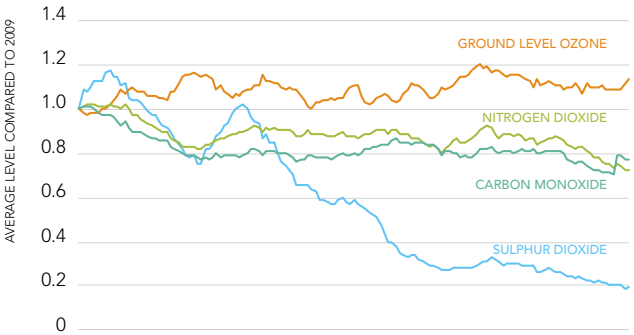
Trends charts (right) illustrate the change in average air quality across the region over time. Measurements from monitoring stations from Horseshoe Bay to Hope are averaged to represent the outdoor air quality typically experienced in the region.

Trends show that most air pollutant levels have been improving over the last decade, even while the region's population has grown. High concentrations of fine particulate matter in 2020 reflect the impacts of wildfire smoke in the region in September. Most gas phase air pollutants generally continued to decrease. Improvement of sulphur dioxide levels have been dramatic mainly due to strict lower sulphur requirements for marine fuels. Average levels of ground-level ozone have increased slightly despite reductions in some pollutants that create it. This is partly due to an increase in ozone formed outside Canada coming into our region. Peak ground-level ozone levels (not shown), which occur during hot and sunny summer afternoons, are better now than in the 1980s and early 1990s.

Trend in fine particulate matter

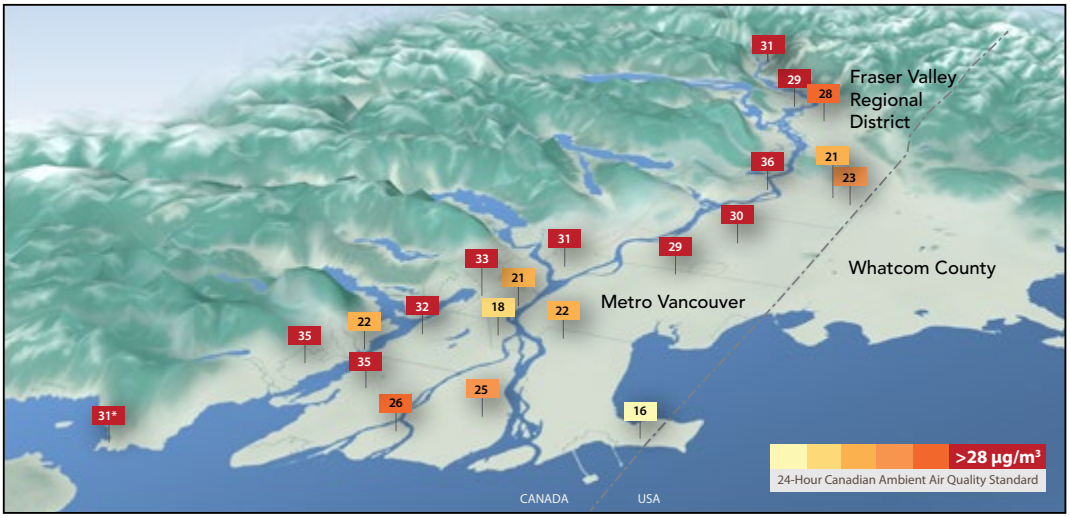


Trends in gas phase air pollutants



Air Quality in 2020 - Data Summary

FINE PARTICULATE MATTER IN 2020



*Based on incomplete data

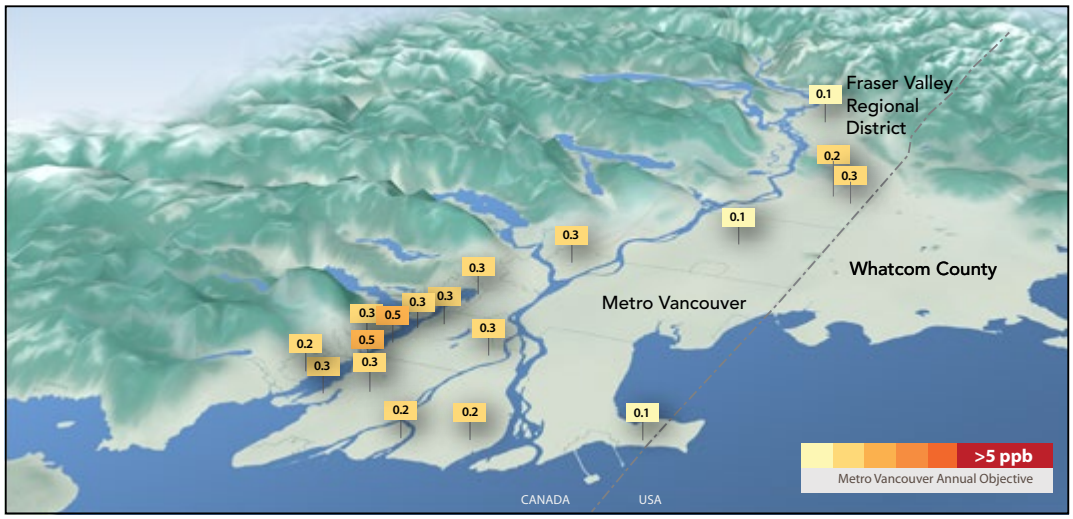
In 2020, fine particulate matter ($PM_{2.5}$) levels throughout the region were worse than the Canadian Ambient Air Quality Standard (calculated using data from 2018, 2019, and 2020) at more than half of monitoring stations, as shown on the map. This was a result of short term high concentrations in 2018 and 2020 largely due to smoke from out-of-region wildfires. Measurements averaged over 2020 were within Metro Vancouver's annual objective. Peak levels based on the highest 24-hour average were worse than the short-term objective (25 µg/m³) at all stations in 2020. Widespread exceedances occurred in September when the region was under an air quality advisory due to wildfire smoke. Exceedances of the short term objective also occurred in March, April, October and November, likely when the region was under an air quality advisory due to open-air burning and residential wood burning.

GROUND-LEVEL OZONE IN 2020



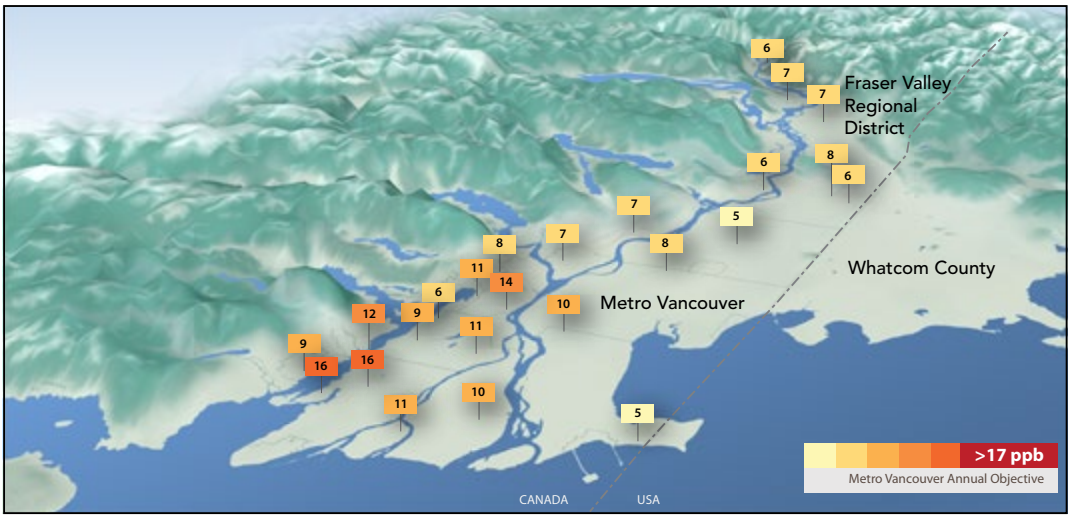
Ground-level ozone (O_3) forms when nitrogen oxides and volatile organic compounds react in the air in the presence of sunlight. The map above shows how measurements for 2020 compared to Metro Vancouver's 1-hour air quality objective. In 2020, elevated levels of O_3 were experienced in July and August with Chilliwack, Pitt Meadows, Mission and Abbotsford-Airport exceeding Metro Vancouver's 1-hour O_3 objective. These exceedances occurred briefly during hot, sunny weather.

SULPHUR DIOXIDE IN 2020



Average concentrations of sulphur dioxide for 2020 are shown on the map with all stations well below Metro Vancouver's annual objective of 5 ppb. Peak levels were better than Metro Vancouver's 1-hour objective of 70 ppb at all stations in 2020.

NITROGEN DIOXIDE IN 2020



Nitrogen dioxide (NO_2) concentrations were better than Metro Vancouver's long-term objective (17 ppb) at all monitoring stations, as shown on the map. The highest average NO_2 concentrations were measured in highly urbanized areas near busy roads. More than half of the regional emissions of nitrogen oxides (which includes NO_2) come from transportation sources. In 2020, NO_2 concentrations were better than Metro Vancouver's short-term objective (60 ppb) at all monitoring stations except for North Vancouver-Second Narrows which met the objective. Short-term measurements of NO_2 at North Vancouver-Second Narrows were influenced by local construction activity in 2020.

Improving Metro Vancouver's Air Monitoring Network


Metro Vancouver's Port Moody air monitoring station

Metro Vancouver regularly conducts an in-depth review of its ambient air quality monitoring network to ensure that the network continues to meet the needs of the region and to plan for future enhancement. One major outcome of the review is identifying emerging air quality technology and trends in the region.

Over the last few years, residents, researchers, and government agencies are becoming more interested in the use of small sensors, which have been the subject of Metro Vancouver's Air Aware project (see box). One part of the network review completed in 2021 examined the possible integration of these sensors into Metro Vancouver's regulatory monitoring network and how these inexpensive yet potentially less accurate sensors could supplement our understanding of local and regional air quality.

The 2021 network review also looked at the previous review's recommendations and found that most of the recommendations from the previous review were accomplished, which included more ground level ozone monitoring and developing 'Super Sites'. Super Sites measure more air contaminants than other stations. They monitor all the criteria air contaminants including sulphur oxides, nitrogen oxides, particulate matter, carbon monoxide, ammonia, ground level ozone, and volatile organic compounds; the chemical composition of particulate matter; black carbon; and visual air quality. This review has also demonstrated that Metro Vancouver's network is one of the more comprehensive regional monitoring networks in the world.

The 2021 network review made 13 recommendations, including:

- **Improve the spatial coverage of the current network**, specifically for areas south of the Fraser River, agricultural land in the Fraser Valley Regional District and areas that are not populated or have a very small population to better understand the impacts of urban emissions on the environment.
- **Integrate small air sensors into the monitoring network.** The current permanent network is comprised of sophisticated monitoring equipment to accurately measure air pollutants. With the increase in inexpensive yet less accurate small sensors, there is value in using these to supplement the spatial coverage of the permanent network. Small sensors can also support community-level monitoring and serve as educational and engagement tools. Other jurisdictions such as the US Environmental Protection Agency are exploring how to integrate measurements from sensors into their broader monitoring networks. For example, a pilot project demonstrated that during a wildfire event, sensors can show localized air quality data that is not captured by some existing air monitoring networks.

- **Begin continuous monitoring of carbon dioxide** (CO_2) at an existing air monitoring station. This will provide valuable information on local CO_2 concentrations and will be helpful in tracking changes as Metro Vancouver and other organizations in the region continue to implement policies to drive down greenhouse gas emissions.

Understanding air sensors

Find out how to choose and use the right sensor for your air monitoring needs, how sensors differ from the equipment used at government air monitoring stations, how to interpret the data, and more on Metro Vancouver's Air Aware website.

Visit metrovancouver.org and search 'Air Aware'.

Network News

An in-depth network review is completed regularly, but Metro Vancouver's air monitoring network evolves outside of these formal reviews, and is regularly upgraded to respond to new needs and technologies.

Air monitoring at Vancouver's MacLean Park: Metro Vancouver, supported by the Vancouver Fraser Port Authority, will be installing a new air monitor at MacLean Park in Vancouver's Strathcona neighbourhood. This compact pole-mounted station will allow air to be monitored in a location that didn't have enough space for a typical monitoring station, and will measure some of the same air pollutants as its larger counterparts, such as fine particulate matter ($PM_{2.5}$), nitrogen dioxide (NO_2) and sulfur dioxide (SO_2).

Equipment upgrades: Tiny particles in the air, known as particulate matter (PM), can have different health impacts depending on their size and composition. In 2013, Metro Vancouver upgraded its PM monitoring equipment to measure some PM that the previous equipment could not. Nearly 10 years later, Metro Vancouver is evaluating the latest technology for another upgrade within three years to further improve PM measurements.

Equipment wasn't the only change to the network: in 2020, the COVID-19 pandemic also required air quality technicians to change how they work. Deemed an essential service, the technicians followed provincial health guidance and comprehensive safety protocols, such as physical distancing and proper sanitization, when maintaining air monitoring stations to ensure the network continued to operate as usual. See page 16 for how the pandemic response affected regional air quality.

Where's MAMU?

MAMU, Metro Vancouver's Mobile Air Monitoring Unit, is used for specialized studies in locations that are not served by a permanent monitoring station, or to measure a specific pollutant. In April 2021, MAMU completed its 1-year deployment on Musqueam's Indian Reserve No. 2 lands in Vancouver. This monitoring will provide information on air quality in the Musqueam community and support Metro Vancouver's Iona Island Wastewater Treatment Plant Biosolids Dewatering Facility project.



COVID-19 & Air Quality: Learnings from an Involuntary Experiment

When the COVID-19 pandemic hit Metro Vancouver in March 2020, life in the region and around the world changed significantly. Many businesses either closed or shifted to work from home models. This drastic change in lifestyle was reflected in the region's air quality.

Air quality impacts

During March and April 2020, Metro Vancouver's near-road air quality monitoring station at Clark Drive and 11th Avenue in Vancouver recorded more than a 30% drop in traffic when compared to the same months in 2019. Other major traffic routes across the region saw similar reductions. Less traffic and fewer businesses operating meant less transportation-related emissions, such as nitrogen dioxide (NO_2), especially in dense urban areas.

However, not all air contaminants decreased in Metro Vancouver. Other contaminants associated with combustion, such as carbon monoxide (CO), saw some reductions but not as strongly as NO_2. Fine particulate matter even appeared to increase early on in the pandemic in residential and rural areas, especially in the evening hours. This was likely because of increased residential wood burning since more people were home. Fine particulate matter levels in these areas returned closer to previous years' concentrations once the weather warmed up and less wood burning occurred.

Some pandemic restrictions were relaxed by the Provincial Health Officer in late spring and early summer. Traffic data collected at Clark Drive also reflected these changes: after the significant reduction in traffic in March, April and May, a modest increase has been observed, but total traffic is still almost 15% below the same time period in 2019.

COVID-19 or the weather?

Determining the specific impact of COVID-19 on Metro Vancouver's regional air quality is very difficult even though the overwhelming evidence shows it improved. Air quality is influenced by many factors, such as emissions and the weather. For example, during the first week of major restrictions in BC, abnormal weather conditions trapped pollution close to the ground. Even with significantly less emissions in the region, these weather conditions led to higher than normal air contaminant concentrations. Over time, these 'blips' were smoothed out and a general trend of lower than usual air contaminant concentrations emerged. This illustrates how short-term weather patterns can temporarily influence air quality.

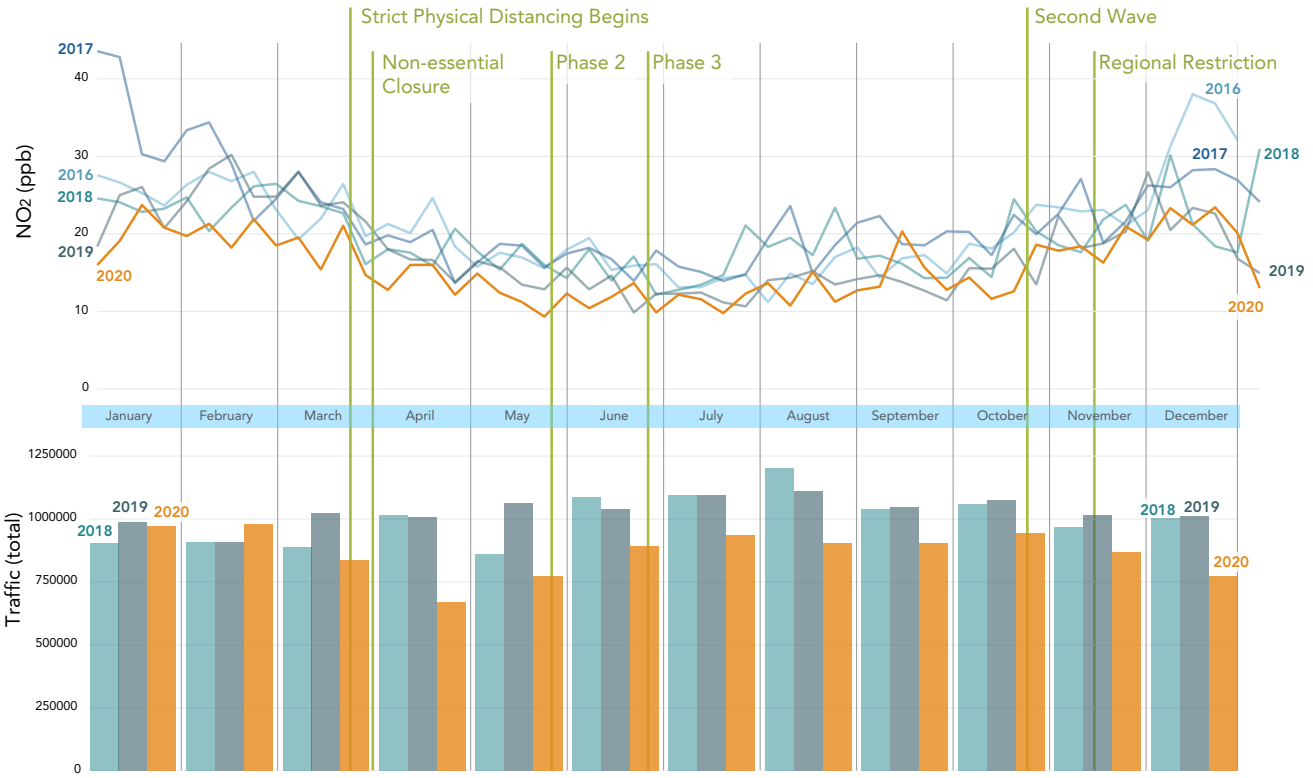
Protecting air quality, health, and the economy

A study[1] showed that in Europe, improvements in air quality may have averted over 2000 premature deaths in the short term and possibly over 20,000 deaths in the longer term. This study focused on reductions in fine particulate matter, which were more pronounced than what was experienced in the Metro Vancouver region, given our comparatively clean baseline. Nevertheless, the European study highlights how even small reductions in air quality concentrations can translate to significant improvements in health outcomes.

Metro Vancouver's air quality is typically very good but COVID-19 has provided us with an involuntary experiment which demonstrates how large reductions in emissions across the region could help to improve air quality. Transportation related activities accounted for nearly 30% of all NO_2 and greenhouse gas (GHG) emissions in Metro Vancouver in 2015. Work on Metro Vancouver's *Clean Air Plan* and *Climate 2050* strategy seeks to match or exceed the level of reductions observed during the pandemic, and are critical to setting a path for clean air and a carbon neutral region.

However, it is important to acknowledge the significant impact COVID-19 has had on the economy. Future policy development can use lessons from this pandemic but should balance improving air quality with maintaining a healthy economy.

Monthly average nitrogen dioxide (NO_2) concentrations by year at Vancouver's Clark Drive air monitoring station.



Monthly traffic counts by year at Vancouver's Clark Drive station.

1 Giani, P., Castruccio, S., Anav, A., Howard, D., Hu, W., & Crippa, P. (2020). Short-term and long-term health impacts of air pollution reductions from COVID-19 lockdowns in China and Europe: a modelling study. The Lancet Planetary Health, 4(10), e474-e482. doi:10.1016/S2542-5196(20)30224-2



Reducing Smoke from Residential Indoor Wood Burning

In 2020, Metro Vancouver introduced a new bylaw on residential indoor wood burning that aims to reduce the impacts of residential wood smoke on people's health and the environment. Wood smoke contains tiny particles that can penetrate deep into our lungs. The use of wood burning appliances, such as fireplaces and wood stoves in homes, is the main source of emissions of these particles in the region.

Under the bylaw, anyone using a residential indoor wood burning appliance must use best burning practices to minimize wood smoke emissions.

Use only clean, seasoned wood

Don't let your fire smoulder

Don't burn garbage, plastic or treated wood

Inspect and maintain your appliance

Burn small + hot fires

Additional requirements come into effect in stages.

From May 2021, residential indoor wood burning is prohibited from May 15 to September 15 each year, unless it is a home's sole source of heat, is in an off-grid home located outside the Urban Containment Boundary, or there is an emergency such as a power outage.

Starting in September 2022, users of residential indoor wood burning appliances must submit a declaration of compliance with best burning practices. Appliances inside the Urban Containment Boundary must also be registered. Only appliances that can meet emissions criteria, provide the sole source of heat, or use only manufactured firelogs can be registered.

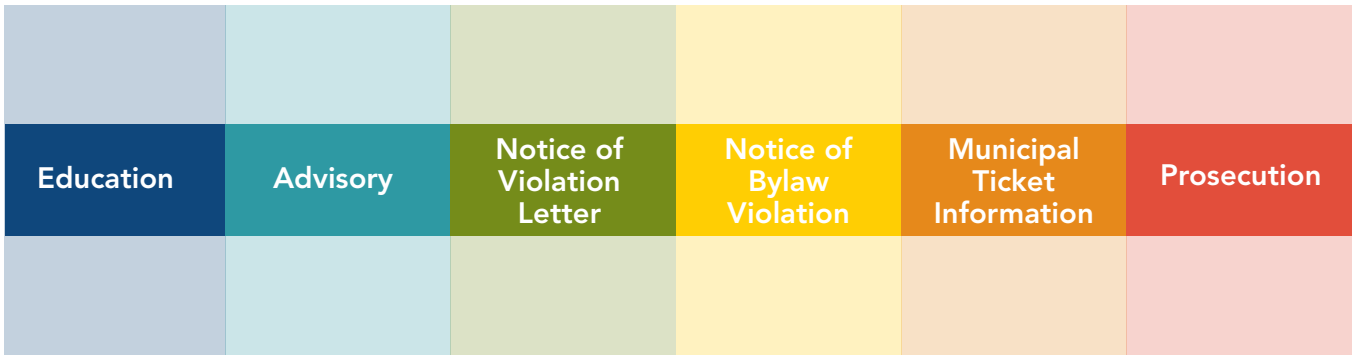
After September 2025, the use of unregistered appliances inside the Urban Containment Boundary will be prohibited unless they are used in low-income households, with the exception of in Lions Bay, where the prohibition will take effect in 2032.

The new bylaw does not prohibit residential indoor wood burning during an emergency, such as a power outage, and does not require the removal of wood burning appliances.

For more information about the bylaw, or to watch the video about the bylaw, go to metrovancouver.org and search 'residential wood burning'.

Starting with Education:

Metro Vancouver's Bylaw Compliance Continuum



Officers in Metro Vancouver's Environmental Regulation and Enforcement Division assess and promote compliance with Metro Vancouver permits and bylaws. Officers have a variety of compliance tools. For each situation, officers consider the public interest when deciding which tool will be the most effective, efficient, timely, and fair.

These tools fall under a 'compliance continuum' with proactive education at one end, and punitive ticketing or prosecution at the other.

The implementation of new bylaws, or changes to bylaws, begins with education. Bylaws are often phased in so outreach can occur before bylaw requirements take effect. In these early stages, education is the most effective and efficient means of achieving compliance.

As an example, Metro Vancouver developed an outreach program for the new Residential Indoor Wood Burning Bylaw, adopted in 2020, so that residents would receive advanced notice of bylaw requirements coming into effect in May 2021.

Even when bylaw requirements are in effect, and unless a non-compliance is serious, officers may issue a warning instead of a ticket. A warning could be a verbal advisory or a notice of violation letter, with guidance on how to comply. Warnings can be highly effective, efficient and timely. They are also fair because a resident, up to this point, might truly not have been aware of or understood bylaw requirements.

If non-compliances continue and the resident has had enough time to address them, officers may issue a Notice of Bylaw Violation. If the non-compliance is significantly impacting others, officers may issue tickets or recommend prosecution not only to achieve compliance, but to also deter others from breaking the law.

Metro Vancouver Officers use professional judgement to choose the most appropriate compliance tool that fits the seriousness of the non-compliance, results in the desired outcome, and is in the public interest.

New Requirements for Automotive Refinishing Facilities

Air contaminants from automotive refinishing facilities (autobody shops) can affect employee and public health. Using coatings and surface cleaners can release volatile organic compounds (VOCs), hazardous air pollutants, and particulate matter. Metro Vancouver's Automotive Refinishing Emission Regulation limits the release of air contaminants from these facilities.

In 2019, after consulting with the public, Metro Vancouver amended this regulation to further reduce emissions. Changes included:

- updating paint standards to meet national standards, and
- expanding the bylaw to include mobile refinishing operations and activities such as paint mixing, grinding, abrasive blasting and grease and oil removal.



In addition, starting in 2021, operators and technicians need to complete an environmental training course every two years. This new re-certification helps ensure anyone working in these facilities is aware of the regulatory requirements. Visit the British Columbia Institute of Technology (BCIT) Automotive Program website to learn more about their 'VOC – Clearing the Air' course.

For more information about the regulation, visit metrovancouver.org and search 'automotive refinishing facilities'.

Proposed Expansion of the Non-Road Diesel Engine Emission Regulation

Metro Vancouver's Non-Road Diesel Engine Emission Regulation aims to protect air quality and public health by reducing emissions from non-road diesel engines, such as construction and industrial equipment. The regulation encourages retiring or retrofitting older, higher-emitting engines.

Since the regulation was adopted in 2012:

296 higher-emitting engines were retired

88 retrofits were approved

Retirements have reduced diesel particulate matter emissions by more than 11 tonnes per year.

Metro Vancouver is looking to expand this regulation to further protect human health and the environment. Proposed changes include:

- Expanding current requirements to engines of other sizes and ages
- Restricting the use of older, higher-emitting engines around hospitals and care facilities
- Adding fees for other harmful emissions, such as nitrogen oxides

Learn more at metrovancouver.org and search 'non-road diesel engine proposed expansion'.

Reinventing the Emissions Inventory

Metro Vancouver is expanding its emissions inventory (EI) toolbox to build a more complete picture of the region's emissions. Every five years, Metro Vancouver compiles an inventory of air pollutant and greenhouse gas (GHG) emissions in the Lower Fraser Valley airshed. The last inventory was completed for 2015, and the 2020 EI is underway with some planned enhancements.

Annual Reporting of GHG Emissions

Metro Vancouver is speeding up its reporting of GHG emissions from a five-year schedule to annual GHG emissions reports, starting with 2019. Annual reporting will allow for more timely tracking of progress towards the region's emission reduction target of 45% below 2010 levels by 2030 and becoming carbon neutral by 2050. The annual report will include GHG emissions for the region and each of its member jurisdictions.

The first annual report will focus on transportation, buildings, and industry, which contribute more than 90% of the region's GHG emissions. These areas are also the subject of the first three *Climate 2050 Roadmaps* (see page 4 to learn more).

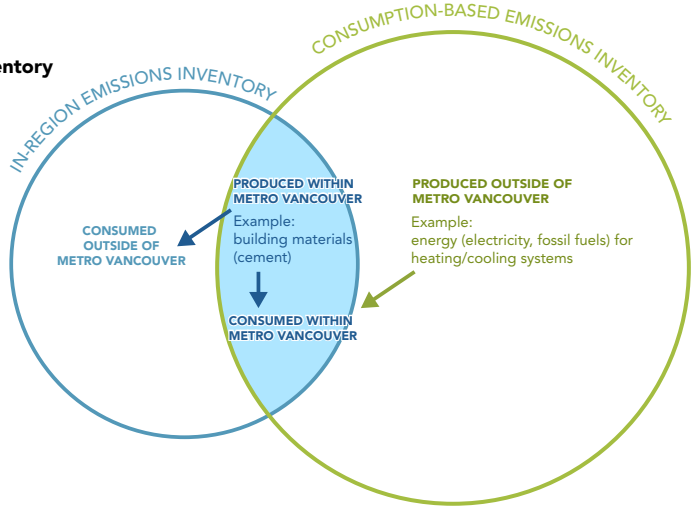
Consumption-Based Emissions Inventory

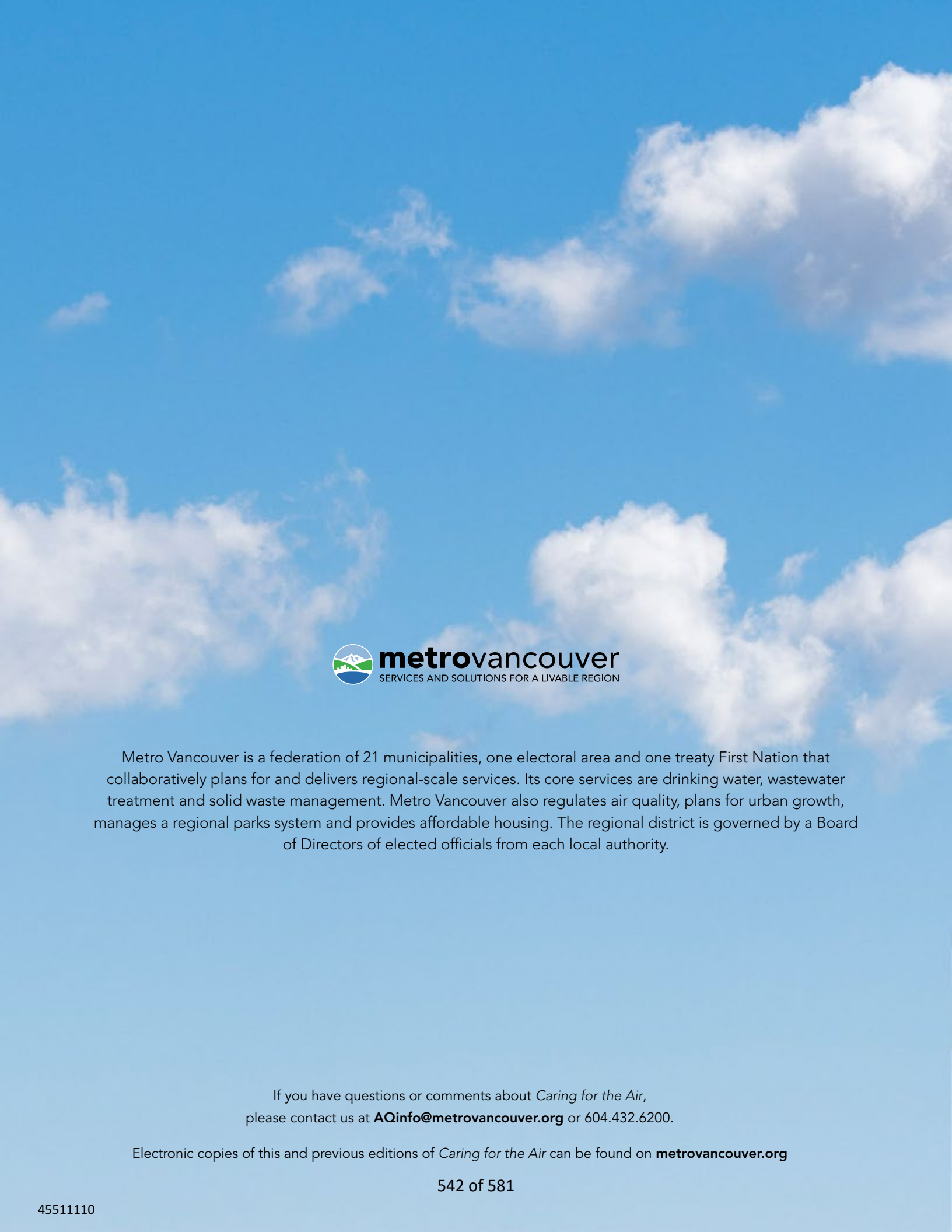
While our day-to-day activities, like driving and using a gas furnace, create GHG emissions in the region, we also create GHG emissions elsewhere when the products and services we use are created, shipped, or disposed. A consumption-based emissions inventory (CBEI) includes the GHG emissions generated from the production, transport, use and disposal of goods or services that we consume in the region, even if those emissions occur outside of the region.

Metro Vancouver is developing a CBEI to complement our five-year 'in-region' EI, which includes only GHG emissions that occur within the region. The CBEI will help us understand the global emissions resulting from our local consumption habits, and inform policies and processes that will support implementation of *Climate 2050* and the *Clean Air Plan*.

GHG emissions included in an in-region emissions inventory vs. a consumption-based emissions inventory

Example: GHG emissions from goods and services for a building





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SERVICES AND SOLUTIONS FOR A LIVABLE REGION

Metro Vancouver is a federation of 21 municipalities, one electoral area and one treaty First Nation that collaboratively plans for and delivers regional-scale services. Its core services are drinking water, wastewater treatment and solid waste management. Metro Vancouver also regulates air quality, plans for urban growth, manages a regional parks system and provides affordable housing. The regional district is governed by a Board of Directors of elected officials from each local authority.

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please contact us at **AQinfo@metrovancouver.org** or 604.432.6200.

Electronic copies of this and previous editions of *Caring for the Air* can be found on **metrovancouver.org**

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To: Finance and Intergovernment Committee

From: Mark Seinen, Senior Planner, Regional Planning and Housing Services

Date: June 2, 2021 Meeting Date: June 16, 2021

Subject: **Greater Vancouver Regional Fund – 2020 Annual Report**

RECOMMENDATION

That the MVRD Board receive for information the report dated June 2, 2021, titled "Greater Vancouver Regional Fund – 2020 Annual Report."

EXECUTIVE SUMMARY

TransLink has submitted its annual report containing budget and schedule information on active projects funded with federal gas tax funds through the Greater Vancouver Regional Fund as of December 31, 2020 in accordance with the *Federal Gas Tax Fund Expenditures Policy*. TransLink has successfully delivered the majority of the projects on or ahead of schedule with positive cost variances. Five projects are experiencing delays exceeding three months as a result of the COVID-19 pandemic. Approximately $1.74 billion in funds is anticipated to contribute to the capital investments identified in TransLink's Phase Two Investment Plan for the period 2018 to 2027.

PURPOSE

To present to the Finance and Intergovernment Committee and MVRD Board TransLink's 2020 annual report on active projects funded by federal gas tax funds through the Greater Vancouver Regional Fund (GVRF) in accordance with the *Federal Gas Tax Fund Expenditures Policy* (GVRF Policy).

BACKGROUND

In accordance with the GVRF Policy, adopted by the MVRD Board in 2016 and revised on February 28, 2020, TransLink is required to report to the MVRD Board on the status of projects funded through the GVRF for information (Attachment 1). This is the second annual report submitted to the MVRD Board following the revisions to the GVRF Policy, as previously the GVRF Policy required the completion of semi-annual reports. The annual reports are required to summarize the previous calendar year and are to be submitted by the end of the second quarter each year. They must include updates on: variances in budgeted and actual costs, expenditures to date, project schedule, risk assessment, state of purchased assets, and alignment with the GVRF evaluation criteria.

2020 GVRF ANNUAL REPORT

TransLink's 2020 annual report provides budget and schedule information on active projects with GVRF funding to the end of 2020 (Attachment 2).

Active Project Schedules

As of December 31, 2020, there were 36 active TransLink projects funded by the GVRF. The majority of these projects were on or ahead of schedule.

The following five projects were reported as being behind schedule by more than three months:

- 2020 Conventional Bus Replacement;
- 2020 Conventional Bus Expansion;
- 2020 HandyDART Vehicle Replacement;
- 2020 HandyDART Vehicle Expansion; and
- 2020 Community Shuttle Expansion.

In each case, project delays were the result of the COVID-19 pandemic (i.e. due to production delays or cost saving measures). The longest delay is anticipated for the 2020 Conventional Bus Expansion project; the delivery of 55 battery-electric buses will begin in May 2023, 29 months later than originally scheduled.

Active Project Costs

The 36 active projects funded by the GVRF had budgets totaling $972.6 million ($871.6 million from GVRF). Total expenditures to date were $960.6 million, with $856.5 million from the GVRF. The majority of active projects were reported as being under budget, with a total positive cost variance of $15.1 million for the GVRF funds. It is noted that any unspent GVRF funds at project completion are returned to the GVRF so that they may be used for future projects.

The following three projects were reported as having positive cost variances in excess of $1 million:

- SkyTrain Mark I Vehicle Refurbishment ($1.9 million);
- 2019 Community Shuttle Purchase Replacement ($1.7 million); and
- Metrotown Trolley Overhead Rectifier Replacement ($1.4 million).

At the end of 2020, there remained $415.8 million in unallocated GVRF funds available.

Risk Assessment

The known risks to the project delivery of active projects have been updated. TransLink has identified foreign exchange rate volatility, labour resources, bus subsystem integration and commissioning, building permit delays, and COVID-19 supply chain impacts all as risks. As of the end of 2020 there were no known factors that would significantly impact the deliverability of any active project.

Greater Vancouver Regional Fund Balance

TransLink provides a forecast of the GVRF balance as the Phase Two Investment Plan (2018-2027) is implemented. A total of $1.74 billion in GVRF funds is anticipated to contribute to the capital investments over the period 2018 to 2027. Assuming a renewal of the federal gas tax transfers in 2024, the forecasted balance in 2027 is projected to be drawn down to approximately $135 million.

ALTERNATIVES

This is an information report. No alternatives are presented.

FINANCIAL IMPLICATIONS

The processing of GVRF applications and annual reports is part of Regional Planning's regular activities and covered under the Board-approved Regional Planning budget. There are no financial implications associated with this report.

CONCLUSION

TransLink has submitted a GVRF annual report containing budget and schedule information on active projects funded with federal gas tax funds through the Greater Vancouver Regional Fund as of December 31, 2020. As per TransLink's report, the regional transportation authority has been successful in delivering the majority of the projects on or ahead of schedule and under budget, with a total positive cost variance of $15.1 million. Five projects are experiencing delays exceeding three months as a result of the COVID-19 pandemic. Approximately $1.74 billion in GVRF funds is anticipated to contribute to the capital investments identified in the Phase Two Investment Plan for the period 2018 to 2027.

Attachments *(45781817)*

1. Metro Vancouver's *Federal Gas Tax Fund Expenditures Policy*, revised February 28, 2020
2. TransLink, Report on Federal Gas Tax Funding received from the Greater Vancouver Regional Fund (GVRF), dated May 28, 2021

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BOARD POLICY

FEDERAL GAS TAX FUND EXPENDITURES

Effective Date: May 27, 2016 (revised February 28, 2020)

Approved By: MVRD Board

Policy No. FN-012

PURPOSE

The purpose of the *Federal Gas Tax Fund Expenditures Policy* is to identify the process through which the Metro Vancouver Regional District (MVRD) Board considers and approves expenditures from the Federal Gas Tax Fund – Greater Vancouver Regional Fund (GVRF) for regional transportation projects proposed by the South Coast British Columbia Transportation Authority (TransLink).

DEFINITIONS

"Eligible Regional Transportation Projects" means the following eligible project categories described in Schedule B of the Administrative Agreement on the Federal Gas Tax Fund in British Columbia and confirmed by the MVRD Board as follows:

- Local roads and bridges, including active transportation
- Public transit;

"Evaluation Criteria" means the performance measures that the MVRD Board uses to assess the merit of each project submitted by TransLink for GVRF funding, as described in the Federal Gas Tax Fund – Greater Vancouver Regional Fund Application Guide;

"Federal Gas Tax Fund" means the predictable, long-term, stable funding provided by the federal government as part of the *New Building Canada Plan* for Canadian municipalities to help them build and revitalize local public infrastructure;

"Greater Vancouver Regional Fund" means the 95% of the Metro Vancouver Regional District and its member municipalities' per-capita allocation that is pooled for eligible expenditures of regional transportation projects; and

"Information Requirements" means the information that must be provided by TransLink in order to allow for efficient and effective review of proposals by the MVRD Board, as described in the Federal Gas Tax Fund – Greater Vancouver Regional Fund Application Guide.

POLICY

As part of the *New Building Canada Plan*, the Government of Canada transfers funds to Canadian municipalities through the Federal Gas Tax Fund as a source of predictable, long-term funding for building and revitalizing public infrastructure. A renewed ten-year gas tax agreement, the Administrative Agreement on Federal Gas Tax Fund in British Columbia (2014 Agreement), came into effect in April, 2014 and extends the Federal Gas Tax Fund to 2024. It provides the framework for the delivery of federal funding to BC municipalities to help build and revitalize public infrastructure.

One of the three programs identified in the 2014 Agreement is the Greater Vancouver Regional Fund (GVRF). The GVRF pools 95% of MVRD member jurisdictions' per capita allocation of gas tax funds to support eligible regional transportation projects proposed and delivered by TransLink. The GVRF program aligns with the Metro Vancouver *Board Strategic Plan* by enabling the MVRD Board to play a key role in approving the use of these funds towards the advancement of the Mayors' Council Vision. Under this Policy, evaluation criteria have been established that will allow the Board to consider applications for the use of federal gas tax funds within the context of *Metro 2040: Shaping Our Future*, the *Regional Growth Strateg*y to ensure integration between transportation planning and regional land use planning.

The 2014 Agreement identifies how the funds are to be delivered and provides high-level criteria to identify eligible projects and expenditures. Under the 2014 Agreement the MVRD Board must approve all eligible projects proposed by TransLink for funding. UBCM may not transfer monies to TransLink for eligible projects until it has received an approved list from the MVRD Board.

In order to support MVRD Board decisions related to approving expenditures from the GVRF, a process has been defined to clarify the procedural steps through which TransLink is to propose regional transportation projects to the MVRD Board for funding from the GVRF. Information requirements, including evaluation criteria, have also been defined to support the evaluation of regional transportation projects. Proposals from TransLink for funding from the GVRF must follow the format and procedures set out in the Federal Gas Tax Fund – Greater Vancouver Regional Fund Application Guide (the Application Guide).

Application Process

The GVRF application review process will commence upon receipt of an application from TransLink staff. TransLink staff will strive to observe Metro Vancouver's committee report deadlines and ensure applications are sent with sufficient lead time for Metro Vancouver staff to review and provide staff-to-staff comments prior to finalizing the staff report to committee and Board.

The designated standing committee with responsibility for considering applications will review the submitted projects as described using the Application Guide and will make recommendations to the MVRD Board. The standing committee may request TransLink staff to make presentations as appropriate.

The MVRD Board will strive to make determinations in a timely manner. The MVRD Board will notify the Union of British Columbia Municipalities of the projects that it has approved for funding within seven business days of the decision.

Information Requirements

In order for TransLink proposals to be considered by the MVRD Board, they must include all of the required information and follow the format as specified in the Application Guide.

Proposals must be accompanied by TransLink's approved Capital Program listing all projects and funding sources, including any projects funded or anticipating funding from the GVRF. Proposals must demonstrate the consistency of projects with the approved Investment Plan. Proposals must also include a description of each project for which funding is requested as defined within the Project Description section, and must demonstrate compliance with evaluation criteria, both as defined within the Application Guide.

Evaluation Criteria

The Application Guide includes a set of evaluation criteria to allow for a detailed assessment of projects for which funding is requested. A description of how each proposed project achieves or works toward each criterion must be provided.

Two types of evaluation criteria are identified: Screening Criteria, which represent requirements that are mandatory for any project for which GVRF funding is requested; and Integrated Criteria, which allow for quantitative and qualitative assessments of proposed projects based on high priority objectives that reflect the intent of the Federal Gas Tax Fund, Metro Vancouver goals, and the Investment Plan.

Review of Federal Gas Tax Fund - Greater Vancouver Regional Fund Application Guide

The Application Guide may be reviewed and revised as necessary on an ongoing basis at the discretion of the MVRD Board. Metro Vancouver will consult with UBCM and TransLink.

GVRF Funding

TransLink will provide to the MVRD Board annual reports on projects that have received funding through the GVRF as of December 31st. Annual reports should be submitted no later than Q2 of the following year. At a minimum, the reports must include updates about variances in budgeted and actual costs, expenditures to date, project schedule, risk assessment, project progress, state of purchased assets, and alignment with the GVRF evaluation criteria.

TransLink need not request expenditure of all GVRF monies in any given year and may choose to apply the approved funding to a project over multiple years.

Following notification by the MVRD Board of projects approved for funding from the GVRF, UBCM will release funding for approved projects in a calendar year in one amount. The amount of funding released will be commensurate with the amount approved by the MVRD Board.

All proposals, MVRD Board decisions, and TransLink annual reports will be posted on a dedicated page on the Metro Vancouver website on an ongoing basis.

Ownership of Assets

The 2014 Agreement does not address the question of ownership of regional transportation assets purchased using GVRF funds. Typically, GVRF funds are combined with other sources of funding to

offset the cost of a package of improvements. When determining whether asset ownership is advisable, the following factors should be considered:

- Public Sector Accounting Principles do not allow ownership of a tangible capital asset to be divided among different parties. Ownership of the asset must rest with one body.

- Should the MVRD decide to become the owner of an asset purchased through GVRF funding, the MVRD will also have responsibility for the maintenance, replacement and disposal of those assets.

- Ownership of assets, including those acquired using GVRF funding, enable TransLink to borrow for its infrastructure needs in the open market. TransLink currently uses this borrowing power to access funds to operate and maintain the regional transit system.

At its discretion, the MVRD Board shall consider the ownership of a regional transportation asset on a case by case basis with consideration given to the above factors.

Disposition of Assets

The 2014 Agreement includes a provision that attaches conditions to the use of revenues generated from the sale, lease, encumbrance, or other form of disposal of gas tax-funded projects that are disposed of within five years of their completion. All such revenues must be invested by TransLink into eligible projects that have been approved by the MVRD Board.

For any assets purchased by TransLink using funds from the GVRF, TransLink will be required to report back annually on the state of the purchased asset in the annual report, including the disposition of any asset and the value of the gas tax funds returned to the GVRF based on the residual value of the disposed asset.

If and when revenues come available from assets that are disposed of by TransLink within five years of a project's completion, the use of such revenues must be approved by the MVRD Board using the same process and Application Guide as for new GVRF funds.

Scope Changes and Unspent Funds

Expenditures from the GVRF for any specific project proposed by TransLink are associated solely with the project as described through the Application Guide, and approved by the MVRD Board. Should at any time, the project undergo changes or modifications, or should a project require greater funds from the GVRF than anticipated, a new project proposal must be submitted by TransLink to the MVRD using the same process as was undertaken for the original proposal.

Should any project approved by Metro Vancouver for expenditure from the GVRF result in unspent funds, these funds must be returned to the GVRF.

To: **Jerry Dobrovolny, Chief Administrative Officer, Metro Vancouver**

From: **Christine Dacre, Chief Financial Officer, Financial Services, TransLink**

Date: **TBD**

Subject: **Report on Federal Gas Tax Funding Received from the Greater Vancouver Regional Fund (GVRF)**

PURPOSE

The "Federal Gas Tax Fund Expenditures Policy", approved by the Board of Directors of the Metro Vancouver Regional District (MVRD Board) on May 27, 2016 and amended February 28, 2020, requires TransLink to report to Metro Vancouver on active projects that have received funding from the Greater Vancouver Regional Fund (GVRF) through the Federal Gas Tax Fund (FGTF) program.

The report frequency is annual and has the following reporting objectives:

A. Project budget to actual cost variances;
B. Project expenditures to date;
C. Project progress;
D. Current project schedule;
E. Overall risk assessment; and,
F. Alignment with Evaluation Criteria.

This report will provide historical information on active projects with GVRF funding as at December 31, 2020.

BACKGROUND

Since the FGTF program began in 2005, TransLink has received $1,457.7 million in funding to expand and modernise the transit network. Interest earned on funds received, which must be used for approved GVRF projects, totalled $57.7 million at December 31, 2020. Also, there was $415.8 million in unapproved GVRF funds available for TransLink to apply for as at December 31, 2020.

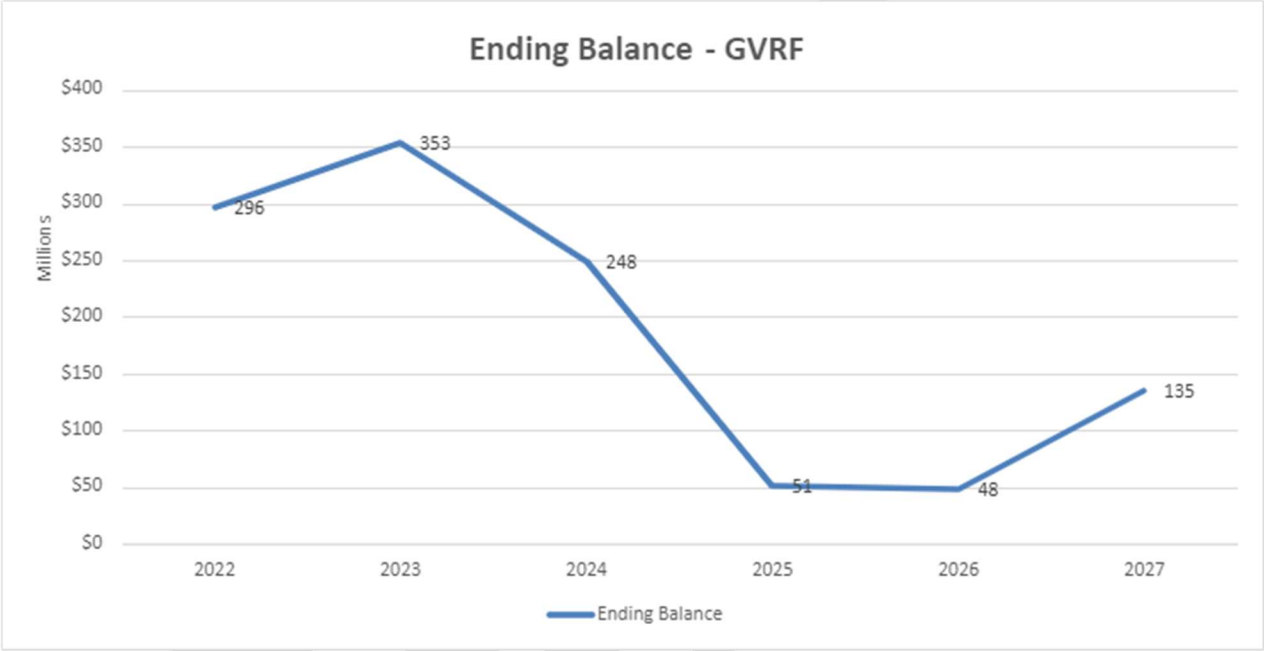
Delivering the 10-Year Vision

The 10-Year Vision for Metro Vancouver Transit and Transportation, adopted by the Mayors' Council and TransLink Board in 2014, assumes the GVRF funding will continue to support investments in transit throughout Metro Vancouver. To support the 10-Year Vision, TransLink's 2018-2027 Investment Plan approved in June 2018 (2018 Investment Plan) forecasts $1.74 billion[1] in capital contributions from the GVRF. The 2018 Investment Plan assumes GVRF funding to support bus fleet expansion and modernization projects, SkyTrain rehabilitation and other transit infrastructure improvements. As the 10-Year Vision is implemented through subsequent investment plans, it is expected that the GVRF will continue to be a major source of funding for fleet and other investments.

[1] Forecasted amount assumes the FGTF program is renewed in 2024.

TransLink expects to fully utilize GVRF funding to support the 10-Year Vision through implementation of the 2018 Investment Plan and subsequent investment plans. Figure 1 below shows the projected GVRF balance for the next 6 years after implementing the 2018 Investment Plan, with the assumption that the FGTF program will be renewed in 2024. The development of the upcoming 2022-2031 Investment plan will see changes to the below utilization graph due to adoption of the Low Carbon Fleet Strategy by the Mayors' Council in 2021. An updated long-term plan for the GVRF will be provided to the MVRD Board in later half of 2021 once the 2022 Investment Plan is further refined, which will update the graph below through 2031.

Figure 1 – Estimated GVRF Balance for the Next 6 Years



Future usage is anticipated to include:

- Electrification of the bus fleet in accordance with the Low Carbon Fleet strategy;
- Continued procurement for bus expansion and modernization;
- Rehabilitation of SkyTrain cars;
- Other transit infrastructure improvements.

TransLink is currently evaluating additional options for future usage as part of the ongoing Investment Plan update process.

Active Projects

As of December 31, 2020, there were 36 active projects funded by the GVRF, with a total budget of $972.6 million and approved GVRF funding of $871.6 million. Table 1 is a summary of the total project costs and funding as at December 31, 2020.

Table 1 – Summary of total project costs and GVRF funding as of December 31, 2020

	Budget As at Dec 31, 2020	Final Forecast Cost As at Dec 31, 2020	Variance[1] As at Dec 31, 2020
Total Project cost	$972.6	$960.6	$12.0
Ineligible Costs under GVRF Funding[2]	(101.0)	(104.1)	3.1
Eligible GVRF Funding	$871.6	$856.5	$15.1

1. Variance from total project approved budget vs. Final Forecast Cost at December 2020.
2. Ineligible costs represent mainly expenditures incurred by TransLink that are not eligible to be claimed under GVRF such as internal labour charges, overhead, internal training and maintenance costs.

Table 2 provides a detailed breakdown of active projects with GVRF funding, including budget, final forecast cost (FFC) and expenditures-to-date as of December 31, 2020. Included in the table are projects that are substantially complete, which have been implemented or are in-service, but remain active to reflect outstanding charges and holdbacks to be addressed prior to project close-out.

Table 2 – List of active projects with GVRF funding as of December 31, 2020

Active Projects with GVRF Funding (Dollars in millions)	Budget	Expenditures to Dec 31, 2020	FFC	Forecast to Budget Variance	Approved Funding	Funding Used up to Dec 31, 2020	Total Forecast Funding	Funding Variance
Hamilton Transit Centre	135.367	135.057	135.057	0.310	84.978	84.978	84.978	-
2nd SeaBus Replacement	21.183	20.124	21.183	-	19.697	19.285	19.697	-
SkyTrain Mark I Vehicle Refurbishment	27.994	26.121	26.121	1.873	24.360	14.501	24.360	-
2014 Conventional Bus	25.400	25.035	25.035	0.365	24.391	24.391	24.391	-
2014 HandyDART Vehicle	8.000	7.594	7.594	0.406	7.523	7.523	7.523	-
Surrey Transit Centre - CNG Facility Retrofit	16.300	15.797	15.797	0.503	4.000	4.000	4.000	-
Metrotown - Trolley Overhead Rectifier Replacement	5.765	4.379	4.379	1.386	4.725	4.233	4.233	0.492
Automated Train Control Equipment Replacement	5.100	4.834	4.834	0.266	4.500	4.500	4.500	-
2016 Conventional 40' Bus Replacement	59.307	58.876	59.276	0.031	57.264	56.220	57.264	-

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Active Projects with GVRF Funding (Dollars in millions)	Budget	Expenditures to Dec 31, 2020	FFC	Forecast to Budget Variance	Approved Funding	Funding Used up to Dec 31, 2020	Total Forecast Funding	Funding Variance
2016 Conventional 60' Bus Replacement	32.542	32.283	32.283	0.259	25.360	25.360	25.360	-
2016 Community Shuttle Vehicle Replacement	3.142	3.112	3.112	0.030	3.560	3.075	3.075	0.485
2017 Conventional Bus Replacement	111.145	110.565	110.810	0.334	105.985	104.349	105.985	-
2017 HandyDART Vehicle Replacement	4.900	4.307	4.313	0.587	5.013	4.208	4.214	0.799
2018 Conventional Bus Replacement	65.835	65.046	65.531	0.304	61.925	61.925	61.925	-
2018 40’ Conventional Bus Purchases - Expansion	91.900	91.550	91.550	0.350	85.584	85.584	85.584	-
2018 60’ Conventional Bus Purchases - Expansion	15.860	15.590	15.590	0.270	17.316	15.404	15.404	1.912
Electric Battery Bus Purchases - Pilot	10.000	8.681	9.435	0.565	6.892	6.892	6.892	-
2018 HandyDART Vehicle Replacement	5.620	5.123	5.128	0.492	5.605	5.048	5.053	0.552
2018 HandyDART Vehicle Purchases - Expansion	1.900	1.802	1.802	0.098	2.193	1.778	1.778	0.415
2018 Community Shuttle Vehicle Replacement	4.100	3.722	3.722	0.378	3.830	3.620	3.620	0.210
2018 Community Shuttle Vehicle Purchases - Expansion	2.240	2.101	2.101	0.139	3.175	2.057	2.057	1.118
2019 Double Decker Bus Purchase – Replacement	35.152	33.181	35.226	(0.073)	30.000	30.000	30.000	-
2019 Conventional Bus Expansion - double decker	6.114	6.062	6.083	0.032	5.670	5.846	5.670	-
2019 Conventional Bus Expansion - 60' hybrid	69.116	68.529	68.759	0.357	68.130	66.085	68.130	-
2019 HandyDART Vehicle Purchase – Replacement	5.750	5.372	5.372	0.378	5.200	5.200	5.200	-
2019 HandyDART Vehicle Purchase – Expansion	1.550	1.419	1.419	0.131	1.350	1.350	1.350	-

Active Projects with GVRF Funding (Dollars in millions)	Budget	Expenditures to Dec 31, 2020	FFC	Forecast to Budget Variance	Approved Funding	Funding Used up to Dec 31, 2020	Total Forecast Funding	Funding Variance
2019 Community Shuttle Purchase – Replacement	12.619	10.891	10.891	1.728	10.800	9.537	10.800	-
2020 Conventional - Replacement	32.500	3.377	32.367	0.133	31.590	2.956	31.590	-
2020 Conventional - Expansion	100.740	0.126	100.836	(0.096)	97.784	0.016	97.784	-
2020 HandyDart - Replacement	6.300	-	6.300	-	6.130	-	6.130	-
2020 HandyDart - Expansion	1.600	-	1.600	-	1.559	-	1.559	-
2020 Community Shuttle - Expansion	2.471	-	2.100	0.371	2.391	-	2.100	0.291
2021 Conventional 60-ft and 40-ft Bus Purchase – Expansion	16.440	-	16.440	-	15.856	-	15.856	-
2021 HandyDART Vehicle Purchase – Replacement	6.500	-	6.498	0.003	6.380	-	6.380	-
2021 Community Shuttle Vehicle Purchase – Replacement	12.119	-	12.119	-	13.690	-	12.119	1.571
Mark 1 500-800 Refurbishment	10.000	-	9.943	0.057	17.230	-	9.943	7.287 Note 1
Total	**972.571**	**770.655**	**960.604**	**11.967**	**871.637**	**659.919**	**856.503**	**15.133**

Note 1: Project scope for the Mark I 500-800 refurbishment project has changed, approved GVRF funding will be amended.

A. Project Budget to Actual Costs Variance

Majority of projects have favorable variances compared to budget. See Table 2 for detailed list of active projects and breakdown of variances from current forecast and approved budget. Below is a discussion of the projects with variances between budgeted and FFC greater than $1 million as of December 31, 2020:

SkyTrain Mark I Vehicle Refurbishment – This project is substantially complete as of December 31, 2020 with a positive variance of $1.9 million between the budgeted cost and the FFC. This is mainly attributable to the cost of labour required for the refurbishment being less than the budgeted amount. As a large portion of this project's labour cost is made up of internal labour that is ineligible for GVRF funding the project has utilized the full funding allocated amount of $24.4 million. There are no unspent funds to be netted against future applications for GVRF for this project.

2019 Community Shuttle Purchase Replacement - This project is substantially complete as of December 31, 2020 with a positive variance of $1.7 million between the budgeted cost and the FFC.

This is due primarily to not needing to draw down on contingency as well as savings in purchase price of each vehicle. The project has utilized the full funding allocated amount of $10.8 million. If at the completion of the project a positive variance remains, any unspent funds will be netted against future applications for GVRF.

Metrotown – Trolley Overhead Rectifier Replacement – The project is on track to be delivered without the need to draw down on contingency resulting in a forecasted surplus of $1.4 million and funding variance of $0.5 million. If at the completion of the project a positive variance remains, any unspent funds will be netted against future applications for GVRF.

Please refer to Table 2 for the detailed breakdown of other project variances.

B. Project Expenditures to Date for Active Projects

Total active project costs were $770.7 million as of December 31, 2020, with $659.9 million in funding coming from the GVRF. Table 2 is a summary of the total active project costs and funding as of December 31, 2020:

Table 3 - Greater Vancouver Regional Fund ($millions)

	Expenditures to date as of December 31, 2020
Total Project Costs	$770.7
Ineligible Costs Under Approved GVRF Funding	(110.8)
Expenditure of GVRF Funding	$659.9

Ineligible costs represent expenditures incurred by TransLink that are not eligible to be claimed under GVRF such as internal labour charges, overhead, land, internal training and maintenance costs.

C. Project Progress

Table 4 provides an update on the progress of approved projects and whether they had proceeded as intended as at December 31, 2020. All projects require Specific Project Approval (SPA) during which they are reviewed by TransLink's Capital Management Committee to ensure fiscal responsibility and overall alignment with the Regional Transportation Strategy. Projects are required to obtain SPA approval first before any commitment is made with an external party.

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Table 4 – Summary of project progress for active projects with GVRF funding

Project Schedule	Number of Projects	FFC ($ millions)
Delays greater than 3 months	5	$143.2
On or ahead of schedule	4	45.0
Substantially completed projects	27	772.4
	36	$960.6

Table 5 provides a detailed breakdown of closed projects with GVRF funding, including budget, final forecast cost (FFC) and expenditures-to-date as of December 31, 2020.

Table 5 - Projects closed since the prior year report

Closed Projects with GVRF Funding (Dollars in millions)	Budget	Expenditures to Dec 31, 2020	FFC	Forecast to Budget Variance	Approved Funding	Total Funding Used	Funding Variance
Equipment for Deferred Retirement Program	3.150	0.782	0.782	2.368	6.120	0.745	5.375

D. Current Project Schedule

Table 6 shows an estimate for each project schedule based on current forecast in-service dates as at December 31, 2020 and the approximate delay in months when compared to original forecast in-service dates. Schedule delays can be caused by numerous reasons, such as delay in equipment delivery from vendors or project complexity. Below is a schedule summary for all active projects as at December 31, 2020:

Table 6 – Project schedule summary

Active Projects with GVRF Funding (Dollars in millions)	Forecast In-service Date	Actual In-service Date	Delay/(Early) delivery in months (approx.)	Substantially Completed	Stage of project progress	Whether proceeded as intended
Hamilton Transit Centre	September 2016	September 2016	0	Yes	Substantially completed; already in-service	Yes, SPA approved in March 2012
2nd SeaBus Replacement	December 2014	December 2014	0	Yes	Substantially completed; already in-service	Yes, SPA approved in April 2011
SkyTrain Mark I Vehicle Refurbishment	April 2020	August 2020	4	Yes	Substantially completed; already in-service	Yes, SPA approved in September 2012

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Active Projects with GVRF Funding (Dollars in millions)	Forecast In-service Date	Actual In-service Date	Delay/(Early) delivery in months (approx.)	Substantially Completed	Stage of project progress	Whether proceeded as intended
2014 Conventional Bus	March 2016	February 2015	-12	Yes	Substantially completed; already in-service	Yes, SPA approved in May 2013
2014 HandyDART Vehicle	May 2016	April 2015	-12	Yes	Substantially completed; already in-service	Yes, SPA approved in May 2013
Surrey Transit Centre - CNG Facility Retrofit	April 2017	March 2018	12	Yes	Substantially completed; already in-service	Yes, SPA approved in March 2015
Metrotown - Trolley Overhead Rectifier Replacement	December 2017	June 2020	30	Yes	Project delayed due to revised plan. One of two rectifier stations, Willingdon East, was erected and in commission in 2019. The second rectifier station, Willingdon West, was in commission by end of 2020. Project is now complete.	Yes, SPA approved in December 2014
Automated Train Control Equipment Replacement	August 2017	November 2017	3	Yes	Substantially completed; already in-service	Yes, SPA approved in August 2015
2016 Conventional 40' Bus Replacement	June 2018	January 2020	19	Yes	Substantially completed; all 20 vehicles have been accepted and in service.	Yes, SPA approved in October 2016
2016 Conventional 60' Bus Replacement	December 2016	May 2017	5	Yes	Substantially complete; already in-service	Yes, SPA approved in October 2017
2016 Community Shuttle Vehicle Replacement	October 2017	October 2017		Yes	Substantially completed; all 20 vehicles have been accepted and in service.	Yes, SPA approved in October 2016
2017 Conventional Bus Replacement	April 2018	June 2019	14	Yes	Substantially completed; already in-service	Yes, SPA approved in November 2016
2017 HandyDART Vehicle Replacement	March 2018	March 2018	0	Yes	Substantially completed; already in-service	Yes, SPA approved in February 2017
2018 Conventional Bus Replacement	March 2019	December 2019	9	Yes	Substantially completed; already in-service	Yes, SPA approved in June 2017
2018 40’ Conventional Bus Purchases - Expansion	January 2019	April 2019	3	Yes	Substantially completed; already in-service	Yes, SPA approved in July 2017
2018 60’ Conventional Bus Purchases - Expansion	March 2019	June 2019	3	Yes	Substantially completed; already in-service	Yes, SPA approved in October 2017

Electric Battery Bus Purchases - Pilot	December 2018	September 2019	8	Yes	Substantially completed; already in-service	Yes, SPA approved in September 2017
2018 HandyDART Vehicle Replacement	October 2018	October 2018	0	Yes	Substantially completed; already in-service	Yes, SPA approved in September 2017
2018 HandyDART Vehicle Purchases - Expansion	September 2018	September 2018	0	Yes	Substantially completed; already in-service	Yes, SPA approved in October 2017
2018 Community Shuttle Vehicle Replacement	December 2018	March 2020	15	Yes	All buses have been delivered and the project is substantially complete.	Yes, SPA approved in August 2017
2018 Community Shuttle Vehicle Purchases - Expansion	December 2018	April 2019	4	Yes	Substantially completed; already in-service	Yes, SPA approved in August 2017
2019 Double Decker Bus Purchase – Replacement	September 2020	September 2020	0	Yes	Substantially completed; already in-service	Yes, SPA approved in Apr 2018
2019 Conventional Bus Expansion - double decker	September 2019	June 2020	9	Yes	All buses have been delivered and the project is substantially complete.	Yes, SPA approved in March 2018
2019 Conventional Bus Expansion - 60' hybrid	September 2019	June 2020	9	Yes	All buses have been delivered and the project is substantially complete.	Yes, SPA approved in March 2018
2019 HandyDART Vehicle Purchase – Replacement	September 2019	June 2019	-4	Yes	Substantially completed; already in-service	Yes, SPA approved in May 2018
2019 HandyDART Vehicle Purchase – Expansion	September 2019	June 2019	-4	Yes	Substantially completed; already in-service	Yes, SPA approved in May 2018
2019 Community Shuttle Purchase – Replacement	December 2019	April 2020	4	Yes	Substantially completed; already in-service	Yes, SPA approved in August 2018
2020 Conventional - Replacement	March 2021	November 2021	8	No	Delivery of buses are expected to arrive starting late August 2021 through November 2021.	Yes, SPA approved in May 2019
2020 Conventional - Expansion	December 2020	May 2023	29	No	Sixty-foot diesel-electric hybrid buses will begin arriving in August 2021. One pilot forty-foot battery-electric bus will arrive in Q2 2022 with the remaining schedule to arrive in Q2 2023.	Yes, SPA approved in May 2019

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2020 HandyDart - Replacement	May 2021	December 2021	7	No	Arrival of buses have been pushed into 2021 due to delay at the production facilities caused by the Covid 19 pandemic.	Yes, SPA approved in Jan 2020
2020 HandyDart - Expansion	January 2021	December 2021	11	No	Arrival of buses have been pushed into 2021 due to delay at the production facilities caused by the Covid 19 pandemic.	Yes, SPA approved in Jan 2020
2020 Community Shuttle - Expansion	January 2021	March 2022	13	No	Vehicle expansion programs being delayed as a cost saving measure due to COVID-19. Expansion projects will be further assessed in 2021.	No, Project was SPA approved in Nov 2019 but is now on hold
2021 Conventional 60-ft and 40-ft Bus Purchase – Expansion	November 2022	November 2022	0	No	Diesel-electric hybrid buses are being delayed as a cost saving measure due to COVID-19. Expansion projects will be further assessed in 2021. The battery - electric buses scheduled to arrive in Q4 2022.	No – Diesel-electric buses are on hold. Battery-electric buses were SPA approved in Mar 2020
2021 HandyDART Vehicle Purchase – Replacement	November 2021	December 2021	1	No	HandyDART vehicles are scheduled to arrive in Q4 2021.	Yes - SPA approved in Oct 2020
2021 Community Shuttle Vehicle Purchase – Replacement	September 2021	November 2021	2	No	Shuttles have started to arrive in Q1 of 2021. All shuttles are expected to arrive by November 2021.	Yes - SPA approved in Oct 2020
Mark 1 500-800 Refurbishment	December 2021	December 2021	0	No	The project scope has been reduced based on the vehicle condition. A funding amendment will be submitted.	Yes - SPA approved in Aug 2020

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Table 7 – List of Active Projects with Schedule Delays Greater than 3 Months:

Project	Delay in Months	FFC ($ millions)	Reason for Delay
2020 Conventional Bus Replacement	8	32.4	Delay in project is due to delay at the production facilities caused by the COVID-19 pandemic. Buses are expected to start arriving in August 2021.
2020 Conventional Bus Expansion	29	100.8	Delay in delivery of 55 60ft buses due to delay at the production facilities caused by the COVID-19 pandemic. Buses are expected to start arriving in August 2021. One pilot battery-electric bus will arrive in May 2022 with the remaining starting to arrive in May 2023. The delay on the battery-electric buses is due to a delay in contract being awarded as well as production slow down due to the COVID-19 pandemic.
2020 HandyDART Vehicle Replacement	7	6.3	Delay in project is due to delay at the production facilities caused by the COVID-19 pandemic.
2020 HandyDART Vehicle Expansion	11	1.6	Delay in project is due to delay at the production facilities caused by the COVID-19 pandemic.
2020 Community Shuttle Expansion	13	2.1	Vehicle expansion programs being delayed as a cost saving measure due to COVID-19. Expansion projects will be further assessed in 2021.

E. Overall Risk Assessment

TransLink follows standard project management practices and provides an internal oversight structure for each capital project, including projects utilizing GVRF funding. The higher the project's risk profile (measured as a function of risk, business value, size and complexity), the greater the degree of rigour that is applied to its governance model.

Specific project risks are identified prior to project initiation and listed in the project risk register. Monthly reports on risks and issues are provided to TransLink's Project Management Office (PMO). In addition, projects with increased complexity and/or elevated risk profile would also have a specific project steering committee assigned. Below is a list of known risks and actions taken for active projects receiving GVRF funding:

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RISK TITLE	RISK DESCRIPTION (EVENT)	CAUSE OF RISK	ACTION TAKEN
Foreign Exchange Rate	Deterioration of the Canadian/foreign currency exchange rate may cause vehicle and equipment pricing to exceed project budget	Currency conversion volatility between the Canadian Dollar and foreign currencies	Exercise contract options as quickly as possible and build contingency into project budgets.
Labour Resources	As a specialized skillset is needed for certain positions, the production may be lower than planned, impacting the completion date.	Challenges with labour resource availability and staff turnover.	Project managers to monitor output, execute project focused training if required and provide for overtime as needed.
Bus Subsystem Integration and Commissioning	Installation and integration issues between new bus type and bus subsystems (electric and double decker buses)	New interfaces, new technology (electric), added deck, taller vehicles.	Work with manufacturers to try and identify any potential issues prior to taking delivery of buses. Allow for extra inspection time.
Building Permits	Delays in obtaining permits from various municipalities required before construction can commence.	Municipalities have jurisdiction over sites where construction is required.	Continuous engagement with municipalities to generate support. Hire consultants to manage process if needed.
COVID-19	The global COVID-19 pandemic has affected supply chains and slowed production at factories.	Business suspensions to slow the spread of the COVID-19 virus. Social distancing rules that reduce productivity.	Continuous engagement with manufacturers to keep aware of schedule delays and building in extra time into the project schedule to accommodate potential delays.

F. Alignment with Evaluation Criteria

The "Federal Gas Tax Fund Expenditures Policy" includes a list of criteria (Evaluation Criteria) that is used by Metro Vancouver to evaluate whether a regional transportation project proposed by TransLink for GVRF funding merits approval during the application process. Two types of Evaluation Criteria are identified:

1) Screening Criteria, which represents requirements that are mandatory for any project for which GVRF funding is requested; and
2) Integrated Criteria, which allows for a qualitative assessment of the proposed project based on high priority objectives that reflect the intent of the GVRF as well as of Metro Vancouver goals.

TransLink concludes that the current group of active projects with GVRF funding meets the Evaluation Criteria because:

- The projects are either expansion or replacements to existing public transit network;
- Project expenditures claimed under the GVRF funding meets the eligibility criteria as defined in Schedule C of the 2014 Administrative Agreement;
- The projects are included in TransLink's Phase Two of the 10 Year Vision 2018-2027 Investment Plan, which advances the goals identified in TransLink's long-term Regional Transportation Strategy, and supports goals identified in Metro Vancouver's Regional Growth Strategy, Metro Vancouver 2040: Shaping Our Future (Metro 2040);
- The projects are consistent with TransLink's corporate policies, such as sustainability, environmental and emissions policy;
- The projects support the Regional Growth Strategy by aligning with the five strategic goals in Metro 2040 and demonstrating tangible benefits to the overall performance of Urban Centers and Frequent Transit Development Areas;
- The projects provide tangible beneficial effects on vehicle kilometres travelled and congestion, transit mode share and ridership, transit passenger congestion, and transportation safety;
- The projects meet the Regional Environmental Objectives by aligning with Metro Vancouver's Integrated Air Quality and Greenhouse Gas Management Plan (IAQGGMP) and demonstrating tangible beneficial effects on reducing greenhouse gas and common air contaminant emissions; and
- The projects support regional economic development and demonstrate tangible beneficial effects on transportation performance.

CONCLUSION

TransLink has delivered majority of projects funded via the GVRF as required. TransLink will continue to ensure that all active projects funded by GVRF will meet the requirements as defined by the "Federal Gas Tax Fund Expenditures Policy".

DRAFT

To: **Jerry Dobrovolny, Chief Administrative Officer, Metro Vancouver**

From: **Christine Dacre, Chief Financial Officer, TransLink**

Date: **May 28, 2021**

Subject: **Report on Federal Gas Tax Funding Received from the Greater Vancouver Regional Fund (GVRF)**

PURPOSE

The "Federal Gas Tax Fund Expenditures Policy", approved by the Board of Directors of the Metro Vancouver Regional District (MVRD Board) on May 27, 2016 and amended February 28, 2020, requires TransLink to report to Metro Vancouver on active projects that have received funding from the Greater Vancouver Regional Fund (GVRF) through the Federal Gas Tax Fund (FGTF) program.

The report frequency is annual and has the following reporting objectives:

A. Project budget to actual cost variances;
B. Project expenditures to date;
C. Project progress;
D. Current project schedule and state of purchased assets;
E. Overall risk assessment;
F. Alignment with Evaluation Criteria.

This report will provide historical information on active projects with GVRF funding as at December 31, 2020.

BACKGROUND

Since the FGTF program began in 2005, TransLink has received $1,457.7 million in funding to expand and modernise the transit network. Interest earned on funds received, which must be used for approved GVRF projects, totalled $57.7 million at December 31, 2020. Also, there was $415.8 million in unapproved GVRF funds available for TransLink to apply for as at December 31, 2020.

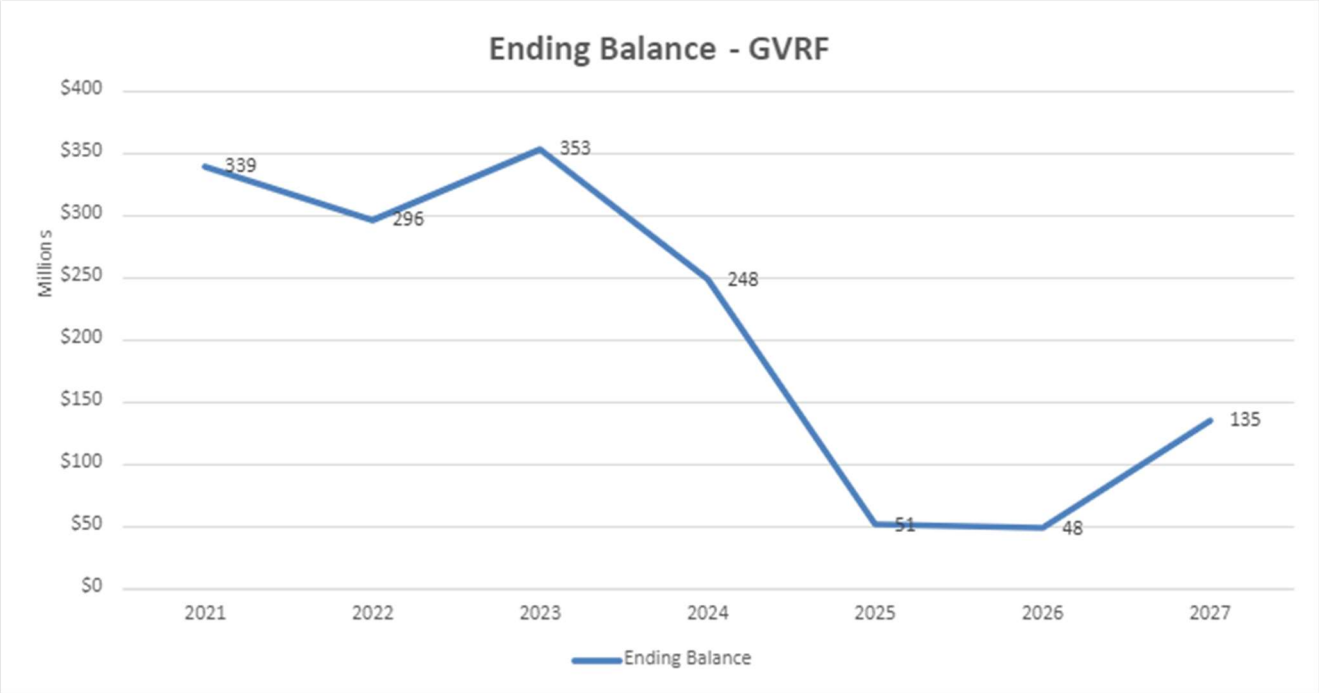
Delivering the 10-Year Mayors' Vision

The 10-Year Mayors' Vision for Metro Vancouver Transit and Transportation, adopted by the Mayors' Council and TransLink Board in 2014, assumes the GVRF funding will continue to support investments in transit throughout Metro Vancouver. To support the 10-Year Mayors' Vision, TransLink's 2018-2027 Investment Plan approved in June 2018 (2018 Investment Plan) forecasts $1.74 billion [1] in capital contributions from the GVRF. The 2018 Investment Plan assumes GVRF funding to support bus fleet expansion and modernization projects, SkyTrain rehabilitation and other transit infrastructure improvements. As the 10-Year Mayors' Vision is implemented through subsequent investment plans, it is expected that the GVRF will continue to be a major source of funding for fleet and other investments.

[1] Forecasted amount assumes the FGTF program is renewed in 2024.

TransLink expects to fully utilize GVRF funding to support the 10-Year Mayors' Vision through implementation of the 2018 Investment Plan and subsequent investment plans. Figure 1 below shows the projected GVRF balance for the next seven years after implementing the 2018 Investment Plan, with the assumption that the FGTF program will be renewed in 2024. The development of the upcoming 2022-2031 Investment plan will see changes to the below utilization graph due to adoption of the Low Carbon Fleet Strategy by the Mayors' Council in 2021. An updated long-term plan for the GVRF will be provided to the MVRD Board in later half of 2021 once the 2022 Investment Plan is further refined, which will update the graph below through 2031.

Figure 1 – Estimated GVRF Balance for the Next 7 Years



Future usage is anticipated to include:

- Electrification of the bus fleet and supporting infrastructure in accordance with the Low Carbon Fleet strategy;
- Continued procurement for bus expansion and modernization;
- Rehabilitation of SkyTrain cars;
- Other transit infrastructure improvements.

TransLink is currently evaluating additional options for future usage as part of the ongoing Investment Plan update process.

Active Projects

As of December 31, 2020, there were 36 active projects funded by the GVRF, with a total budget of $972.6 million and approved GVRF funding of $871.6 million. Table 1 is a summary of the total project costs and funding as at December 31, 2020.

Table 1 – Summary of total project costs and GVRF funding as of December 31, 2020

	Budget as at Dec 31, 2020	Final Forecast Cost as at Dec 31, 2020	Variance[1] as at Dec 31, 2020
Total Project cost	$972.6	$960.6	$12.0
Ineligible Costs under GVRF Funding[2]	(101.0)	(104.1)	3.1
Eligible GVRF Funding	$871.6	$856.5	$15.1

1. Variance from total project approved budget vs. Final Forecast Cost at December 2020.
2. Ineligible costs represent mainly expenditures incurred by TransLink that are not eligible to be claimed under GVRF such as internal labour charges, overhead, internal training and maintenance costs.

Table 2 provides a detailed breakdown of active projects with GVRF funding, including budget, final forecast cost (FFC) and expenditures-to-date as of December 31, 2020. Included in the table are projects that are substantially complete, which have been implemented or are in-service, but remain active to reflect outstanding charges and holdbacks to be addressed prior to project close-out.

Table 2 – List of active projects with GVRF funding as of December 31, 2020

Active Projects with GVRF Funding (Dollars in millions)	Budget	Expenditures to Dec 31, 2020	FFC	Forecast to Budget Variance	Approved Funding	Funding Used up to Dec 31, 2020	Total Forecast Funding	Funding Variance
Hamilton Transit Centre	135.367	135.057	135.057	0.310	84.978	84.978	84.978	-
2nd SeaBus Replacement	21.183	20.124	21.183	-	19.697	19.285	19.697	-
SkyTrain Mark I Vehicle Refurbishment	27.994	26.121	26.121	1.873	24.360	14.501	24.360	-
2014 Conventional Bus	25.400	25.035	25.035	0.365	24.391	24.391	24.391	-
2014 HandyDART Vehicle	8.000	7.594	7.594	0.406	7.523	7.523	7.523	-
Surrey Transit Centre - CNG Facility Retrofit	16.300	15.797	15.797	0.503	4.000	4.000	4.000	-
Metrotown - Trolley Overhead Rectifier Replacement	5.765	4.379	4.379	1.386	4.725	4.233	4.233	0.492
Automated Train Control Equipment Replacement	5.100	4.834	4.834	0.266	4.500	4.500	4.500	-
2016 Conventional 40' Bus Replacement	59.307	58.876	59.276	0.031	57.264	56.220	57.264	-
2016 Conventional 60' Bus Replacement	32.542	32.283	32.283	0.259	25.360	25.360	25.360	-

Active Projects with GVRF Funding (Dollars in millions)	Budget	Expenditures to Dec 31, 2020	FFC	Forecast to Budget Variance	Approved Funding	Funding Used up to Dec 31, 2020	Total Forecast Funding	Funding Variance
2016 Community Shuttle Vehicle Replacement	3.142	3.112	3.112	0.030	3.560	3.075	3.075	0.485
2017 Conventional Bus Replacement	111.145	110.565	110.810	0.334	105.985	104.349	105.985	-
2017 HandyDART Vehicle Replacement	4.900	4.307	4.313	0.587	5.013	4.208	4.214	0.799
2018 Conventional Bus Replacement	65.835	65.046	65.531	0.304	61.925	61.925	61.925	-
2018 40' Conventional Bus Purchases - Expansion	91.900	91.550	91.550	0.350	85.584	85.584	85.584	-
2018 60' Conventional Bus Purchases - Expansion	15.860	15.590	15.590	0.270	17.316	15.404	15.404	1.912
Electric Battery Bus Purchases - Pilot	10.000	8.681	9.435	0.565	6.892	6.892	6.892	-
2018 HandyDART Vehicle Replacement	5.620	5.123	5.128	0.492	5.605	5.048	5.053	0.552
2018 HandyDART Vehicle Purchases - Expansion	1.900	1.802	1.802	0.098	2.193	1.778	1.778	0.415
2018 Community Shuttle Vehicle Replacement	4.100	3.722	3.722	0.378	3.830	3.620	3.620	0.210
2018 Community Shuttle Vehicle Purchases - Expansion	2.240	2.101	2.101	0.139	3.175	2.057	2.057	1.118
2019 Double Decker Bus Purchase – Replacement	35.152	33.181	35.226	(0.073)	30.000	30.000	30.000	-
2019 Conventional Bus Expansion - double decker	6.114	6.062	6.083	0.032	5.670	5.846	5.670	-
2019 Conventional Bus Expansion - 60' hybrid	69.116	68.529	68.759	0.357	68.130	66.085	68.130	-
2019 HandyDART Vehicle Purchase – Replacement	5.750	5.372	5.372	0.378	5.200	5.200	5.200	-
2019 HandyDART Vehicle Purchase – Expansion	1.550	1.419	1.419	0.131	1.350	1.350	1.350	-
2019 Community Shuttle Purchase – Replacement	12.619	10.891	10.891	1.728	10.800	9.537	10.800	-

Active Projects with GVRF Funding (Dollars in millions)	Budget	Expenditures to Dec 31, 2020	FFC	Forecast to Budget Variance	Approved Funding	Funding Used up to Dec 31, 2020	Total Forecast Funding	Funding Variance
2020 Conventional - Replacement	32.500	3.377	32.367	0.133	31.590	2.956	31.590	-
2020 Conventional - Expansion	100.740	0.126	100.836	(0.096)	97.784	0.016	97.784	-
2020 HandyDart - Replacement	6.300	-	6.300	-	6.130	-	6.130	-
2020 HandyDart - Expansion	1.600	-	1.600	-	1.559	-	1.559	-
2020 Community Shuttle - Expansion	2.471	-	2.100	0.371	2.391	-	2.100	0.291
2021 Conventional 60-ft and 40-ft Bus Purchase – Expansion	16.440	-	16.440	-	15.856	-	15.856	-
2021 HandyDART Vehicle Purchase – Replacement	6.500	-	6.498	0.003	6.380	-	6.380	-
2021 Community Shuttle Vehicle Purchase – Replacement	12.119	-	12.119	-	13.690	-	12.119	1.571
Mark 1 500-800 Refurbishment	10.000	-	9.943	0.057	17.230	-	9.943	7.287[Note 1]
Total	**972.571**	**770.655**	**960.604**	**11.967**	**871.637**	**659.919**	**856.503**	**15.133**

Note 1: Project scope for the Mark I 500-800 refurbishment project has changed, approved GVRF funding will be amended.

A. Project Budget to Actual Costs Variance

Majority of projects have favorable variances compared to budget. See Table 2 for detailed list of active projects and breakdown of variances from current forecast and approved budget. Below is a discussion of the projects with variances between budgeted and FFC greater than $1 million as of December 31, 2020.

SkyTrain Mark I Vehicle Refurbishment – This project is substantially complete as of December 31, 2020 with a positive variance of $1.9 million between the budgeted cost and the FFC. This is mainly attributable to the cost of labour required for the refurbishment being less than the budgeted amount. As a large portion of this project's labour cost is made up of internal labour that is ineligible for GVRF funding the project has utilized the full funding allocated amount of $24.4 million. There are no unspent funds to be netted against future applications for GVRF.

Metrotown – Trolley Overhead Rectifier Replacement – The project is on track to be delivered without the need to draw down on contingency, resulting in a forecasted surplus of $1.4 million and funding variance of $0.5 million. If at the completion of the project a positive variance remains, any unspent funds will be netted against future applications for GVRF.

2019 Community Shuttle Purchase Replacement - This project is substantially complete as of December 31, 2020 with a positive variance of $1.7 million between the budgeted cost and the FFC. This is due primarily to not needing to draw down on contingency as well as savings in purchase price of each vehicle. The project has utilized the full allocated funding amount of $10.9 million. If at the completion of the project a positive variance remains, any unspent funds will be netted against future applications for GVRF.

Please refer to Table 2 for the detailed breakdown of other project variances.

B. Project Expenditures to Date for Active Projects

Total active project costs were $770.7 million as of December 31, 2020, with $659.9 million in funding coming from the GVRF. Table 3 is a summary of the total active project costs and funding as of December 31, 2020:

Table 3 - Greater Vancouver Regional Fund ($millions)

	Expenditures to date as of December 31, 2020
Total Project Costs	$770.7
Ineligible Costs Under Approved GVRF Funding	(110.8)
Expenditure of GVRF Funding	$659.9

Ineligible costs represent expenditures incurred by TransLink that are not eligible to be claimed under GVRF such as internal labour charges, overhead, land, internal training and maintenance costs.

C. Project Progress

Table 4 provides an update on the progress of approved projects and whether they had proceeded as intended as at December 31, 2020. All projects require Specific Project Approval (SPA) during which they are reviewed by TransLink's Capital Management Committee to ensure fiscal responsibility and overall alignment with the Regional Transportation Strategy. Projects are required to obtain SPA approval before any commitments are made with an external party.

Table 4 – Summary of project progress for active projects with GVRF funding

Project Schedule	Number of Projects	FFC ($ millions)
Delays greater than 3 months	5	$143.2
On or ahead of schedule	4	45.0
Substantially completed projects	27	772.4
	36	$960.6

Table 5 provides a detailed breakdown of closed projects with GVRF funding, including budget, final forecast cost (FFC) and expenditures-to-date as of December 31, 2020.

Table 5 - Projects closed since the prior year report

Closed Projects with GVRF Funding (Dollars in millions)	Budget	Expenditures to Dec 31, 2020	FFC	Forecast to Budget Variance	Approved Funding	Total Funding Used	Funding Variance
Equipment for Deferred Retirement Program	3.150	0.782	0.782	2.368	6.120	0.745	5.375

D. Current Project Schedule

Table 6 shows an estimate for each project schedule based on forecast in-service dates as at December 31, 2020 and the approximate delay in months when compared to original forecast in-service dates. Schedule delays can be caused by numerous reasons, such as delay in equipment delivery from vendors or project complexity. Below is a schedule summary for all active projects as at December 31, 2020.

Table 6 – Project schedule summary

Active Projects with GVRF Funding (Dollars in millions)	Forecast In-service Date	Actual In-service Date	Delay/(Early) delivery in months (approx.)	Substantially Completed (Note 2)	Stage of project progress	Whether proceeded as intended	Estimated Useful Life (years)
Hamilton Transit Centre	September 2016	September 2016	0	Yes	Substantially completed; already in-service	Yes, SPA approved in March 2012	50
2nd SeaBus Replacement	December 2014	December 2014	0	Yes	Substantially completed; already in-service	Yes, SPA approved in April 2011	30
SkyTrain Mark I Vehicle Refurbishment	April 2020	August 2020	4	Yes	Substantially completed; already in-service	Yes, SPA approved in September 2012	30
2014 Conventional Bus	March 2016	February 2015	(12)	Yes	Substantially completed; already in-service	Yes, SPA approved in May 2013	17
2014 HandyDART Vehicle	May 2016	April 2015	(12)	Yes	Substantially completed; already in-service	Yes, SPA approved in May 2013	7
Surrey Transit Centre - CNG Facility Retrofit	April 2017	March 2018	12	Yes	Substantially completed; already in-service	Yes, SPA approved in March 2015	50

Active Projects with GVRF Funding (Dollars in millions)	Forecast In-service Date	Actual In-service Date	Delay/(Early) delivery in months (approx.)	Substantially Completed (Note 2)	Stage of project progress	Whether proceeded as intended	Estimated Useful Life (years)
Metrotown - Trolley Overhead Rectifier Replacement	December 2017	June 2020	30	Yes	Project delayed due to revised plan. One of two rectifier stations, Willingdon East, was erected and in commission in 2019. The second rectifier station, Willingdon West, was in commission by end of 2020. Project is now complete.	Yes, SPA approved in December 2014	20
Automated Train Control Equipment Replacement	August 2017	November 2017	3	Yes	Substantially completed; already in-service	Yes, SPA approved in August 2015	25
2016 Conventional 40' Bus Replacement	June 2018	January 2020	19	Yes	Substantially completed; all 20 vehicles have been accepted and in service.	Yes, SPA approved in October 2016	17
2016 Conventional 60' Bus Replacement	December 2016	May 2017	5	Yes			17
2016 Community Shuttle Vehicle Replacement	October 2017	October 2017	0	Yes	Substantially completed; all 20 vehicles have been accepted and in service.	Yes, SPA approved in October 2016	5
2017 Conventional Bus Replacement	April 2018	June 2019	14	Yes	Substantially completed; already in-service	Yes, SPA approved in November 2016	17
2017 HandyDART Vehicle Replacement	March 2018	March 2018	0	Yes	Substantially completed; already in-service	Yes, SPA approved in February 2017	7
2018 Conventional Bus Replacement	March 2019	December 2019	9	Yes	Substantially completed; already in-service	Yes, SPA approved in June 2017	17

Active Projects with GVRF Funding (Dollars in millions)	Forecast In-service Date	Actual In-service Date	Delay/(Early) delivery in months (approx.)	Substantially Completed (Note 2)	Stage of project progress	Whether proceeded as intended	Estimated Useful Life (years)
2018 40' Conventional Bus Purchases - Expansion	January 2019	April 2019	3	Yes	Substantially completed; already in-service	Yes, SPA approved in July 2017	17
2018 60' Conventional Bus Purchases - Expansion	March 2019	June 2019	3	Yes	Substantially completed; already in-service	Yes, SPA approved in October 2017	17
Electric Battery Bus Purchases - Pilot	December 2018	September 2019	8	Yes	Substantially completed; already in-service	Yes, SPA approved in September 2017	17
2018 HandyDART Vehicle Replacement	October 2018	October 2018	0	Yes	Substantially completed; already in-service	Yes, SPA approved in September 2017	7
2018 HandyDART Vehicle Purchases - Expansion	September 2018	September 2018	0	Yes	Substantially completed; already in-service	Yes, SPA approved in October 2017	7
2018 Community Shuttle Vehicle Replacement	December 2018	March 2020	15	Yes	All buses have been delivered and the project is substantially complete.	Yes, SPA approved in August 2017	5
2018 Community Shuttle Vehicle Purchases - Expansion	December 2018	April 2019	4	Yes	Substantially completed; already in-service	Yes, SPA approved in August 2017	5
2019 Double Decker Bus Purchase – Replacement	September 2020	September 2020	0	Yes	Substantially completed; already in-service	Yes, SPA approved in April 2018	17
2019 Conventional Bus Expansion - double decker	September 2019	June 2020	9	Yes	All buses have been delivered and the project is substantially complete.	Yes, SPA approved in March 2018	17
2019 Conventional Bus Expansion - 60' hybrid	September 2019	June 2020	9	Yes	All buses have been delivered and the project is substantially complete.	Yes, SPA approved in March 2018	17
2019 HandyDART Vehicle Purchase – Replacement	September 2019	June 2019	(4)	Yes	Substantially completed; already in-service	Yes, SPA approved in May 2018	7

Active Projects with GVRF Funding (Dollars in millions)	Forecast In-service Date	Actual In-service Date	Delay/(Early) delivery in months (approx.)	Substantially Completed (Note 2)	Stage of project progress	Whether proceeded as intended	Estimated Useful Life (years)
2019 HandyDART Vehicle Purchase – Expansion	September 2019	June 2019	(4)	Yes	Substantially completed; already in-service	Yes, SPA approved in May 2018	7
2019 Community Shuttle Purchase – Replacement	December 2019	April 2020	4	Yes	Substantially completed; already in-service	Yes, SPA approved in August 2018	5
2020 Conventional - Replacement	March 2021	November 2021	8	No	Delivery of buses are expected to arrive starting late August 2021 through November 2021.	Yes, SPA approved in May 2019	17
2020 Conventional - Expansion	December 2020	May 2023	29	No	Sixty-foot diesel-electric hybrid buses will begin arriving in August 2021. One pilot forty-foot battery-electric bus will arrive in Q2 2022 with the remaining schedule to arrive in Q2 2023.	Yes, SPA approved in May 2019	17
2020 HandyDart - Replacement	May 2021	December 2021	7	No	Arrival of buses have been pushed into 2021 due to delay at the production facilities caused by the COVID-19 pandemic.	Yes, SPA approved in January 2020	7
2020 HandyDart - Expansion	January 2021	December 2021	11	No	Arrival of buses have been pushed into 2021 due to delay at the production facilities caused by the COVID-19 pandemic.	Yes, SPA approved in January 2020	7

Active Projects with GVRF Funding (Dollars in millions)	Forecast In-service Date	Actual In-service Date	Delay/(Early) delivery in months (approx.)	Substantially Completed (Note 2)	Stage of project progress	Whether proceeded as intended	Estimated Useful Life (years)
2020 Community Shuttle - Expansion	January 2021	March 2022	13	No	Vehicle expansion programs being delayed as a cost saving measure due to COVID-19 pending an assessment of ridership recovery. Expansion projects will be further assessed in 2021.	Yes - SPA approved in November 2019	5
2021 Conventional 60-ft and 40-ft Bus Purchase – Expansion	November 2022	November 2022	0	No	Diesel-electric hybrid buses are being delayed as a cost saving measure due to COVID-19 pending an assessment of ridership recovery. Expansion projects will be further assessed in 2021. The battery - electric buses scheduled to arrive in Q4 2022.	Yes - SPA approved in March 2020	17
2021 HandyDART Vehicle Purchase – Replacement	November 2021	December 2021	1	No	HandyDART vehicles are scheduled to arrive in Q4 2021.	Yes - SPA approved in October 2020	7
2021 Community Shuttle Vehicle Purchase – Replacement	September 2021	November 2021	2	No	Shuttles have started to arrive in Q1 of 2021. All shuttles are expected to arrive by November 2021.	Yes - SPA approved in October 2020	5

Active Projects with GVRF Funding (Dollars in millions)	Forecast In-service Date	Actual In-service Date	Delay/(Early) delivery in months (approx.)	Substantially Completed (Note 2)	Stage of project progress	Whether proceeded as intended	Estimated Useful Life (years)
Mark I 500-800 Refurbishment	December 2021	December 2021	0	No	The project scope has been reduced based on the vehicle condition. A funding amendment will be submitted.	Yes - SPA approved in August 2020	5

All assets from in-service projects per Table 6 above are currently in use by TransLink operations with the estimated useful lives as noted above.

Table 7 – List of Active Projects with Schedule Delays Greater than 3 Months

Project	Delay in Months	FFC ($ millions)	Reason for Delay
2020 Conventional Bus Replacement	8	32.4	Delay in project is due to delay at the production facilities caused by the COVID-19 pandemic. Buses are expected to start arriving in August 2021.
2020 Conventional Bus Expansion	29	100.8	Delay in delivery of 55 60ft buses is due to delay at the production facilities caused by the COVID-19 pandemic. Buses are expected to start arriving in August 2021. One pilot battery-electric bus will arrive in May 2022 with the remaining starting to arrive in May 2023. The delay on the battery-electric buses is due to a delay in contract being awarded as well as production slow down due to the COVID-19 pandemic.
2020 HandyDART Vehicle Replacement	7	6.3	Delay in project is due to delay at the production facilities caused by the COVID-19 pandemic.
2020 HandyDART Vehicle Expansion	11	1.6	Delay in project is due to delay at the production facilities caused by the COVID-19 pandemic.
2020 Community Shuttle Expansion	13	2.1	Vehicle expansion programs being delayed as a cost saving measure due to COVID-19 pending an assessment of ridership recovery. Expansion projects will be further assessed in 2021.

E. Overall Risk Assessment

TransLink follows standard project management practices and provides an internal oversight structure for each capital project, including projects utilizing GVRF funding. The higher the project's risk profile (measured as a function of risk, business value, size and complexity), the greater the degree of rigour that is applied to its governance model.

Specific project risks are identified prior to project initiation and listed in the project risk register. Monthly reports on risks and issues are provided to TransLink's Project Management Office (PMO). In addition, projects with increased complexity and/or elevated risk profile would also have a specific project steering committee assigned. Below is a list of known risks and actions taken for active projects receiving GVRF funding:

RISK TITLE	RISK DESCRIPTION (EVENT)	CAUSE OF RISK	ACTION TAKEN
Foreign Exchange Rate	Deterioration of the Canadian/foreign currency exchange rate may cause vehicle and equipment pricing to exceed project budget	Currency conversion volatility between the Canadian Dollar and foreign currencies	Exercise contract options as quickly as possible and build contingency into project budgets.
Labour Resources	As a specialized skillset is needed for certain positions, the production may be lower than planned, impacting the completion date.	Challenges with labour resource availability and staff turnover.	Project managers to monitor output, execute project focused training if required and provide for overtime as needed.
Bus Subsystem Integration and Commissioning	Installation and integration issues between new bus type and bus subsystems (electric and double decker buses)	New interfaces, new technology (electric), added deck, taller vehicles.	Work with manufacturers to identify any potential issues prior to taking delivery of buses. Allow for extra inspection time.
Building Permits	Delays in obtaining permits from various municipalities required before construction can commence.	Municipalities have jurisdiction over sites where construction is required.	Continuous engagement with municipalities to generate support. Hire consultants to manage process if needed.
COVID-19	The global COVID-19 pandemic has affected supply chains and slowed production at factories.	Business suspensions to slow the spread of the COVID-19 virus. Social distancing rules that reduce productivity.	Continuous engagement with manufacturers to keep aware of schedule delays and building in extra time into the project schedule to accommodate potential delays.

F. Alignment with Evaluation Criteria

The "Federal Gas Tax Fund Expenditures Policy" includes a list of criteria (Evaluation Criteria) that is used by Metro Vancouver to evaluate whether a regional transportation project proposed by TransLink for GVRF funding merits approval during the application process. Two types of Evaluation Criteria are identified:

1) Screening Criteria, which represents requirements that are mandatory for any project for which GVRF funding is requested; and
2) Integrated Criteria, which allows for a qualitative assessment of the proposed project based on high priority objectives that reflect the intent of the GVRF as well as of Metro Vancouver goals.

TransLink concludes that the current group of active projects with GVRF funding meets the Evaluation Criteria because:

- The projects are either expansion or replacements to existing public transit network;
- Project expenditures claimed under the GVRF funding meet the eligibility criteria as defined in Schedule C of the 2014 Administrative Agreement;

  The projects are included in TransLink's Phase Two of the 10 Year Mayors' Vision 2018-2027 Investment Plan, which advances the goals identified in TransLink's long-term Regional Transportation Strategy, and supports goals identified in Metro Vancouver's Regional Growth Strategy, Metro Vancouver 2040: Shaping Our Future (Metro 2040);
- The projects are consistent with TransLink's corporate policies, such as sustainability, environmental and emissions policy;
- The projects support the Regional Growth Strategy by aligning with the five strategic goals in Metro 2040 and demonstrating tangible benefits to the overall performance of Urban Centers and Frequent Transit Development Areas;
- The projects provide tangible beneficial effects on vehicle kilometres travelled and congestion, transit mode share and ridership, transit passenger congestion, and transportation safety;
- The projects meet the Regional Environmental Objectives by aligning with Metro Vancouver's Integrated Air Quality and Greenhouse Gas Management Plan (IAQGGMP) and demonstrating tangible beneficial effects on reducing greenhouse gas and common air contaminant emissions; and
- The projects support regional economic development and demonstrate tangible beneficial effects on transportation performance.

CONCLUSION

TransLink has delivered majority of projects funded via the GVRF as required. TransLink will continue to ensure that all active projects funded by GVRF will meet the requirements as defined by the "Federal Gas Tax Fund Expenditures Policy".

To: Finance and Intergovernment Committee

From: Chris Plagnol, Corporate Officer

Date: June 2, 2021 Meeting Date: June 16, 2021

Subject: **MVRD Procedure Amending Bylaw No. 1322, 2021**

RECOMMENDATION

That the MVRD Board:

a) give first, second and third reading to *Metro Vancouver Regional District Procedure Amending Bylaw Number 1322, 2021*; and
b) pass and finally adopt *Metro Vancouver Regional District Procedure Amending Bylaw Number 1322, 2021.*

EXECUTIVE SUMMARY

Recently in April 2021, delegations requested to speak at committee and board meetings in relation to specific contract awards. Concerns were expressed about the propriety of hearing delegations during a procurement process. To ensure the fairness of the procurement process, it is proposed that delegations not be permitted to speak if their applications relate to an ongoing contract award matter. To remedy this situation, an amendment to the *Procedure Bylaw* is proposed whereby such delegation applications will be denied.

PURPOSE

To seek Board approval of the *Metro Vancouver Regional District Procedure Amending Bylaw Number 1322, 2021,* a bylaw to limit the participation of delegations wishing to speak at board or committee meetings about ongoing contract awards.

BACKGROUND

At its meeting held April 16, 2021, the Zero Waste Committee heard delegations in relation to a contract award, including proponents who had participated in that particular procurement process. Delegations also applied to speak to the same contract award when it was considered by the GVSDD Board at its meeting held April 30, 2021. To avoid interference with the procurement process, staff are bringing forward an amendment to the delegation provisions of the *Procedure Bylaw* to deny all applications requesting to appear as delegations in relation to ongoing contract awards.

This report brings forward a proposed amendment to the *Procedure Bylaw* outlining a change in the delegation process for the Board's consideration.

PROPOSED BYLAW AMENDMENT

The Board's *Procedure Bylaw* establishes the general proceedings to be followed by the Boards and Committees in conducting their business.

Delegation Application Process

The Board's *Procedure Bylaw* currently includes provisions (in part 13) setting out the rules related to hearing delegations. In brief, to speak to a committee or a board, an applicant must first apply. If the application is received before the established deadline, and the subject matter is within the purview of the regional district, and within the specific committee's terms of reference or relates to a specific report on the agenda, the delegation is approved, notwithstanding other rules that may apply. Beyond those provisions, there are no other specific report types (such as procurement-related matters) for which delegation applications will not be approved.

Procurement Process

Metro Vancouver's procurement documents are specific in setting out the rules of procedure related to the procurement process to ensure that it is fair. This includes avoiding lobbying or other forms of influence on the process. Consequently, it is suggested that the hearing of delegations should be restricted if their applications relate to a contract award matter.

Some member municipalities include restrictions in their procedure bylaws on hearing delegations that relate to contract awards and other procurement matters. Amending Metro Vancouver's *Procedure Bylaw* would be in keeping with these restrictions.

Proposed Bylaw Provision

To address the concern of delegations speaking to ongoing contract award reports, the current provision for delegations could be restricted in the *Procedure Bylaw*. It is proposed that the General Provisions set out in section 13.4 of the *Procedure Bylaw* be amended to include a restriction criterion on delegations applying to speak at a board or committee meeting. The following provision is proposed:

> A request to appear as a delegation at a board or committee meeting will not be accepted if it relates to a public procurement process for the provision of goods, services or construction for Metro Vancouver Regional District between the time that such procurement process has been posted and the time any resulting contract or proposal call has been awarded, or other final decision made.

This proposed bylaw amendment would authorize staff to better evaluate delegation applications, and deny those related to contract awards.

ALTERNATIVES

1. That the MVRD Board:
   a) give first, second and third reading to *Metro Vancouver Regional District Procedure Amending Bylaw Number 1322, 2021;* and
   b) pass and finally adopt *Metro Vancouver Regional District Procedure Amending Bylaw Number 1322, 2021.*

2. That the MVRD Board refer the report dated June 2, 2021, titled *Metro Vancouver Regional District Procedure Amending Bylaw Number 1322, 2021* to staff for further options related to the delegation process.

FINANCIAL IMPLICATIONS

The proposed amendment to the *Procedure Bylaw* does not have a financial impact.

CONCLUSION

The Board's *Procedure Bylaw* sets out provisions to approve delegations wishing to speak at a board or committee meeting. However, recent events brought to light that delegations requesting to speak to ongoing contract award reports should be denied in the name of fairness to the procurement process. To remedy this situation, it is proposed that the delegation section of the Procedure Bylaw be amended to include such a restriction. On that basis, staff recommend Alternative 1.

Attachments

1. Metro Vancouver Regional District Procedure Amending Bylaw Number 1322, 2021

References

1. *Metro Vancouver Regional District Procedure Bylaw Number 1205, as amended (*Unofficial Consolidation)

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METRO VANCOUVER REGIONAL DISTRICT
BYLAW NUMBER 1322, 2021

A Bylaw to amend "Metro Vancouver Regional District Procedure Bylaw Number 1205, 2014"

WHEREAS the Board of Directors of the Metro Vancouver Regional District has adopted "Metro Vancouver Regional District Procedure Bylaw Number 1205, 2014", a bylaw to regulate the proceedings of the Metro Vancouver Regional District Board and Committees; and

WHEREAS the Board of Directors of the Metro Vancouver Regional District wishes to amend "Metro Vancouver Regional District Procedure Bylaw Number 1205, 2014";

NOW THEREFORE the Board of Directors of the Metro Vancouver Regional District enacts as follows:

1. The "Metro Vancouver Regional District Procedure Bylaw Number 1205, 2014" (the "Bylaw") is hereby amended as follows:

   a) In Part 13 (Delegations), by adding a new section 13.4.2, as follows:

      13.4.2 A request to appear as a delegation at a board or committee meeting will not be accepted if it relates to a public procurement process for the provision of goods, services or construction for Metro Vancouver Regional District between the time that such procurement process has been posted and the time any resulting contract or proposal call has been awarded, or other final decision made.

2. This bylaw shall be cited as "Metro Vancouver Regional District Procedure Amending Bylaw Number 1322, 2021".

Read a first, second and third time this _____ day of _____, 2021.

Passed and finally adopted this _____ day of _____, 2021.

_____
Sav Dhaliwal, Chair

_____
Chris Plagnol, Corporate Officer

COMMITTEE INFORMATION ITEMS AND DELEGATION SUMMARIES

Metro Vancouver Regional District
Board Meeting Date – Friday, June 25, 2021

This information item, listing recent information received by committee, is provided for the MVRD Board's information. Please access a complete PDF package here.

Climate Action Committee – June 11, 2021

Delegation Summaries:
No delegations presented

Information Items:
5.3 Alternatives to Agricultural Open-Air Burning in Metro Vancouver
5.6 Sectoral GHG Reduction Targets Update and Comparison

Regional Parks Committee – June 16, 2021

Delegation Summaries:
3.1 Pierce McNeal, Canadian Pacific Trials Association

Information Items:
5.1 Kanaka Creek Regional Park Interpretive Art Mural Project

Finance and Intergovernment Committee – June 16, 2021

Delegation Summaries:
5.1 Nathan Davidowicz

Information Items:
No information items presented

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