To: Metro Vancouver Massey Crossing Task Force,
C/O Board and Information Services,
#4730 Kingsway, Burnaby,
BC, Canada, V5H 0C6,
delegations@metrovancouver.org
gvrdsec@metrovancouver.org
604-432-6250, 604.432.6284

From: Mr Roderick V. Louis,
[redacted]
White Rock, BC,
Canada, [redacted]
[redacted]
[redacted]

July 15-2019

1-page;

<u>Delegation executive summary</u>:

Pls regard this as a request that:

- That the task force passes a motion that would require that a letter is sent from the task force (and or MV's Finance and Intergovernment Committee, or the MV GVRD Board) to BC's Minister of Transportation and Infrastructure requesting that:

A) A comprehensive structural assessment of the existing Massey Tunnel is conducted by a qualified engineering and construction firm with an objective of establishing:

a) the likely remaining use-able lifespan of the tunnel if major refurbishments are conducted;

b) the nature of such refurbishments;

c) a schedule for such refurbishments

d) estimated costs of such refurbishments

e) the likely remaining use-able lifespan of the existing tunnel *<u>without</u>* major refurbishments

B) Metro Vancouver is provided with copies of whatever reports are produced as a result of the above referenced structural assessment of the Massey Tunnel;

C) The general public is provided access to copies of whatever reports are produced as a result of the above referenced structural assessment of the Massey Tunnel;

D) The province consults with the Metro Vancouver public regarding the Massey Tunnel's replacement, to ascertain whether there is public support for the future Massey Crossing (Tunnel or Bridge) having:

- bus-only (and commercial vehicle-only) lanes; and

- bicycle and pedestrian lanes;
==========

Sincerely,

_____
Roderick V. Louis,

To: Metro Vancouver Regional Planning Committee,
C/O Board and Information Services,
#4730 Kingsway, Burnaby,
BC, Canada, V5H 0C6,
delegations@metrovancouver.org
gvrdsec@metrovancouver.org
604-432-6250, 604.432.6284

From: Mr Roderick V. Louis,
[redacted]
White Rock, BC,
Canada, [redacted]

September 03-2019

Delegation executive summary for Sept 13-2019 committee meeting:

I attended the July 26-2019 MV GVRD Board meeting as a Delegation:
http://www.metrovancouver.org/boards/search/Pages/default.aspx , Or
http://www.metrovancouver.org/boards/GVRD/RD_2019-Jul-26_AGE.pdf

…and spoke to agenda Item ***3.2 Metro 2050 Engagement Plan* report** to request that the board would pass a motion to adopt the ***Metro 2050 Engagement Plan*** (as outlined in the report), but with amendments that would require MV to conduct 3, separate, public hearings (or 1 public hearing on 3 separate days) at 3 separate locations… instead of conducting just 1 public hearing at a single location…

After deliberation among board members, and a motion to action an amended version of my request, the board referred the matter to staff to prepare a report on the potential benefits, potential costs and feasibility of facilitating 1 public hearing on 3 separate days, at 3 separate locations (3 different Metro Vancouver member cities).

The board directed that the to-be-written staff report and its recommendations would go to the MV *Regional Planning Committee* for their consideration, and potential recommendation to the MV GVRD board…

Pls regard this as a request that MV's Regional Planning Committee will:

- Pass a motion recommending that, in regards to the public engagement methods that are to be utilized for the development of ***Metro Vancouver 2050***- the MV GVRD Board passes a motion that requires MV to:

1) Plan for and facilitate at least 1 Public Hearing that is to be convened on 3 separate days, at 3 separate locations (IE: at 3 different Metro Vancouver member cities).

2) Ensure that 1 of the 3 separately convened parts of the Public Hearing is substantially focused on subject matters that concern the South of Fraser sub-region, (and its future economic development needs; transportation, housing and related issues);

3) Conduct at least 1 of the 3 Regional Public Hearings at a South of Fraser location;

4) Conduct at least 1 of the 3 Regional Public Hearings at another long neglected (or inequitably developed) area, such as North Vancouver or Maple Ridge;
==========

Sincerely,

_____
Roderick V. Louis,

metrovancouver
SERVICES AND SOLUTIONS FOR A LIVABLE REGION

To: Regional Planning Committee

From: Erin Rennie, Senior Planner, Regional Planning

Date: August 19, 2019 Meeting Date: September 13, 2019

Subject: ***Metro 2040* Urban Centre and Frequent Transit Development Area Policy Review – Policy Directions for Consideration**

RECOMMENDATION

That the Regional Planning Committee receive for information the report dated August 19, 2019, titled "*Metro 2040* Urban Centre and Frequent Transit Development Area Policy Review – Policy Directions for Consideration."

PURPOSE

To provide the Regional Planning Committee with an opportunity to review and provide feedback on high-level, draft policy directions under consideration as part of the *Metro Vancouver 2040: Shaping our Future (Metro 2040)* Urban Centre and Frequent Transit Development Area (FTDA) Policy Review.

BACKGROUND

At its May 3, 2019 meeting, the Regional Planning Committee received a verbal update on stakeholder engagement activities led by Regional Planning Staff to support the Urban Centre and Frequent Transit Development Area Policy Review during the spring and summer of 2019. Themes emerging from the stakeholder engagement activities have been used to develop high-level policy directions for consideration through the development of *Metro 2050*, the update to *Metro 2040*. These draft policy directions are presented in this report for consideration and feedback from the members of the Regional Planning Committee.

URBAN CENTRES AND FREQUENT TRANSIT DEVELOPMENT AREA POLICY REVIEW

Urban Centres and FTDAs are critical concepts in realizing the regional vision as articulated in *Metro 2040*. Focusing growth in a network of complete communities linked by transit has been a long standing and successful strategy for regional planning in Metro Vancouver. Urban Centres are the primary focal points for concentrated growth, while FTDAs, a newer regional planning tool, are additional locations for more concentrated growth along frequent transit corridors. While Urban Centres and FTDAs are largely a growth management success, since the adoption of *Metro 2040,* several issues with the Urban Centres and FTDA policies have been identified through a Metro Vancouver review of regional context statements, and by local governments and other stakeholders. The development of Metro 2050, the update to *Metro 2040*, presents an opportunity to make improvements to the way growth is shaped in this region.

POLICY REVIEW – CHALLENGES

The following challenges were identified at the outset of the *Metro 2040* Urban Centre and FTDA Policy Review (Reference 1):

- the criteria for identifying Urban Centres or FTDAs are unclear and the distinction between the different centre types is unclear;
- the expectation for growth in different types of Urban Centres and FTDAs is unclear and inconsistent;
- FTDAs are emerging inconsistently across the region and more slowly than anticipated; and
- the benefit of identifying an area as an FTDA is sometimes unclear to member jurisdictions.

POLICY DIRECTIONS

The following draft policy directions have been developed to address each of the aforementioned challenges. These directions are intentionally presented as broad concepts with little detail. Feedback from Regional Planning Committee members will help to narrow down which policy directions to select for further refinement throughout the fall of 2019.

These policy directions have been developed through a variety of policy analysis and engagement activities including the preparation of the Centres and Corridors Literature Review and Case Studies (Reference 2), the 2016 Urban Centre and FTDA Data Profiles (Reference 3), and the Stakeholder Engagement Workshops (Reference 4).

Addressing Challenge #1: The criteria for identifying an Urban Centre or FTDA are unclear and the distinction between the different centre types is unclear

1. **Set quantifiable criteria for identifying each Centre type:** Select a handful of indicators and set quantifiable criteria for the identification / establishment of each Centre type. These criteria may include a limit to the creation and reclassification of certain types of Centres in hazard-prone areas including climate change risk.

2. **Develop policies to guide changes in Centre type:** Develop minimum qualifications, limitations, and an administrative process whereby a municipality could reclassify a Centre / FTDA from one Centre type to another.

3. **Define Local Centres:** provide more clarity on the definition and role of Local Centres. Clarify requirements for municipalities to identify Local Centres in the regional growth strategy. There would be no targets for Local Centres.

Addressing Challenge #2: The expectations for growth in different types of Urban Centres and FTDAs are unclear and inconsistent.

4. **New Urban Centre Type:** Add a new centre type, which would be centres identified for regionally-significant levels of residential or employment growth, but not necessarily

municipal centres of activity. Existing Municipal Town Centres and some FTDAs could be converted to this new type of centre if they are expected to experience high levels of dwelling unit and / or job growth. Municipal Town Centres that do not re-classify to the new centre type would maintain the current *Metro 2040* status and the primary role in the region would be hubs of activity within municipalities. This new type of centre would have very high expectations with regards to transit-oriented design including low parking provision, high cycling facility expectations, high intersection density expectations, and high affordable housing / rental housing expectations. They would differ from Regional City Centres in that they would not be the sub-regional centre of activity.

5. **Refine Growth Targets:** Current targets for dwelling unit and employment growth are regional. For example, there is a target for the percentage of growth the federation would like to see for all Regional City Centres collectively. This policy direction seeks to add growth targets for each centre type by municipality, subregion, and region. These could be reported through *Metro 2040* Dashboard.

6. **In addition to growth targets, set other kinds of targets for each Centre type:** Select appropriate indicators with a direct relationship to transit ridership (e.g. job density, rental / ownership mix, intersection density) and require municipalities to set targets relative to these indicators in their respective Official Community Plans (OCPs). These could be reported through the *Metro 2040* Dashboard.

7. **Set Qualitative Expectations for Each Centre Type:** Similar to existing *Metro 2040* policies but with additional planning considerations (e.g. green infrastructure requirements or area planning requirements).

8. **Set Minimum Expectations for All Centre Types:** this would include many of the existing policies in *Metro 2040* including dwelling unit and job growth, as well as the addition of new expectations related to the provision of green infrastructure, housing mix, complete community elements, etc.

Addressing Challenge #3: FTDAs are emerging inconsistently across the region and more slowly than anticipated.

9. **Split FTDAs into Two Transit-oriented Centre Types:**

    a. **Corridor-shaped centre type for FTN:** Add a new centre type which would specifically be linear areas along frequent bus corridors (i.e. no more than 400m from corridor rights-of-way) highlighted for growth at medium densities. This centre type would include expectations related to transit priority measures and affordable / rental housing. Within this centre type municipalities may differentiate the level of

development priority, from Low to Medium and High. Areas outside the FTN would not be eligible for identification regionally under this centre type.

b. **Nodal-shaped Centre type for Rapid Transit Stations:** Add a new centre type which would form nodal growth areas around rapid transit stations. Station Areas would include expectations related to regionally-significant levels of growth, access-to-transit strategies, managed parking supply, and affordable / rental housing.

c. **Transition existing FTDAs to New Centre Types:** Do not identify any new FTDAs. Existing FTDAs could be grandfathered or become one of the other centre types if they meet the new identification criteria.

10. **Formalize the Frequent Transit Network Corridor geography:** Update the regional growth strategy map to reflect a buffer area of 400m from the Frequent Transit Network and 800m from rapid transit stations. This geography would not be a growth overlay in *Metro 2050*, but would be identified in policy as potentially good locations for transit-oriented growth, subject to local context and municipal land use plans. *Metro 2050* would update the region-wide dwelling unit and employment targets for growth in the FTNC and would monitor that growth (note that current targets are based on this geography). Member jurisdictions would be encouraged to identify corridor and station area FTDAs within or adjacent to the corridor geography.

Addressing Challenge #4: The benefit of identifying an area as an FTDA is sometimes unclear to municipalities.

11. **Plan for Phased Growth:** Encourage municipalities to do more to establish general growth priority sequencing between centres and corridors in their respective OCPs. This means the OCP would indicate how growth would be phased between the different centres within a municipality. This would include procedures for coordinating with regional utilities and transit provision to support more efficient and cost effective infrastructure planning to support local growth aspirations.

12. **Sharing Long-term Growth Planning Concepts:** Develop procedures for sharing long-term growth planning ideas between municipalities and regional utilities and transit providers.

13. **Corridor Coordination Policy in OCPs:** Require cross-municipal coordination policies for municipalities with major corridors that cross or run along municipal borders. This may include coordination with regional utilities providers and TransLink. In some ways this is being already undertaken through TransLink's Supportive Policy Agreements.

Additional Policy Directions to explore:

14. **Update Regional Growth Targets to more Directly Support Regional Objectives:** Current *Metro 2040* growth targets were set using an analysis of planned and projected "trend-forward" capacity and growth pattern, and as a result are achievable, but less aspirational. This draft policy direction proposes to align revised regional growth targets to be more ambitious in order to support broader regional objectives such as greenhouse gas emission reductions, vehicle kilometres travelled reductions, or mode shift objectives.

15. **Explore Policy Needs for General Urban Areas Outside of Urban Centres and FTDAs:** Consider providing growth management guidance for General Urban areas outside of Urban Centres and FTDAs. For example, non-residential major trip generators, introducing missing middle housing choices, complete community elements, etc.

RPAC FEEDBACK ON POLICY DIRECTIONS

The above policy directions were presented to the Regional Planning Advisory Committee (RPAC) at its July 2019 meeting for feedback. RPAC members submitted a variety of comments including:

Strong support for:

- further differentiating centre types from one another through more quantifiable criteria;
- further defining local centres;
- updating the regional growth targets and adding other types of targets for Urban Centres and FTDAs;
- exploring policy guidance for growth in General Urban areas outside of Urban Centres and FTDAs; and
- coordinating growth in corridors across municipal boundaries.

Moderate support with some cautions for:

- adding a new type of Urban Centre and splitting the FTDA type into two;
- setting expectations and growth targets for each centre type; and
- defining policies for changing centre types.

Concerns with:

- planning for phased growth; and
- sharing long term growth planning concepts.

RPAC members had also expressed concerns with a previous iteration of #10 "Formalize the Frequent Transit Network Corridor geography" which would have defined the area as a growth overlay. This has since been revised to be a proposal to simply monitor and report out on growth in a network of transit corridors, with no targets or expectations on municipalities.

NEXT STEPS

Feedback from the Regional Planning Committee at this conceptual level will guide staff's further work and refinement of the policy directions over the fall of 2019 with more detailed policy language to be presented in late 2019/early 2020. Given the number of policy directions and feedback received from RPAC, staff would appreciate Committee member feedback and input focused on four of the draft policy directions listed above and will provide a presentation at the Committee meeting to guide that discussion. The four policy directions are:

4. New Urban Centre Type
5. Refine Growth Targets
9. Split FTDAs into Two Transit-oriented Centre Types: Corridor-shaped centre type for FTN and Nodal-shaped Centre type for Rapid Transit Stations:
14. Update Regional Growth Targets to more Directly Support Regional Objectives

ALTERNATIVES

This is an information report. No alternatives are presented.

FINANCIAL IMPLICATIONS

There are no financial implications. The policy review is part of the Regional Planning 2019 work plan and budget.

SUMMARY / CONCLUSION

The *Metro 2040* Urban Centre and FTDA Policy Review is a multi-year initiative to explore opportunities to enhance the regional growth framework, focusing specifically on identifying improvement to the region's growth structuring tools (i.e. Urban Centres and FTDAs).

The Policy Review was scoped to specifically address four key challenges:

1. the criteria for identifying an Urban Centre or FTDA are unclear and the distinction between the different centre types is unclear;
2. the expectations for growth in Urban Centres and FTDAs are unclear and inconsistent;
3. FTDAs are emerging inconsistently across the region and more slowly than anticipated; and
4. the benefits of identifying an area as an FTDA are sometimes unclear to municipalities.

Policy analysis work including the Centres and Corridors Literature Review and Case Studies, the 2016 Urban Centre and FTDA Data Profiles, and the Stakeholder Engagement Workshops have informed the development of new policy directions that are now being presented to Regional Planning Committee for consideration and feedback. It is anticipated that the policy directions will be further refined and developed in more detail and presented again in late 2019/early 2020 and used as a key input into *Metro 2050*.

References

1. Regional Planning Committee report titled "Urban Centres and Frequent Transit Development Area Policy Review – Update" dated June 9, 2017 *(See agenda item 5.4)*

2. Regional Planning Committee report titled "Centres and Corridors Literature Review and Case Studies – Urban Centres and Frequent Transit Development Areas Policy Review" dated March 9, 2018 *(See agenda item 5.4)*
3. Regional Planning Committee report titled "2016 Urban Centre and Frequent Transit Development Area Data Profiles and Dashboard" dated July 5, 2019 *(See agenda item 5.4)*
4. Regional Planning Committee report titled "Urban Centre and Frequent Transit Development Area Policy Review Update" dated July 5, 2019 *(See agenda item 5.5)*

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SERVICES AND SOLUTIONS FOR A LIVABLE REGION

To: Regional Planning Committee

From: Laurie Bates-Frymel, Senior Planner, Regional Planning

Date: August 12, 2019 Meeting Date: September 13, 2019

Subject: **Update on *Metro 2040* Environment Policy Review – Forum Results and Policies from Other Jurisdictions**

RECOMMENDATION
That the Regional Planning Committee receive for information the report dated August 12, 2019, titled "Update on *Metro 2040* Environment Policy Review – Forum Results and Policies from Other Jurisdictions".

PURPOSE
To provide the Regional Planning Committee with highlights from the Environmental Land Use Policy Forum held on June 6, 2019 and a summary of the consultant's background research, which will inform the *Metro 2040* Environment Policy Review.

BACKGROUND
On April 5, 2019, the Regional Planning Committee received a report titled "*Metro 2040* Environment Policy Review – Scope and Process". In that report, staff committed to providing the Committee with an update on the review in the Fall of 2019. This report summarizes the policy forum held in early June 2019, and relays the results of a consultant's study that investigated and reported on environmental land use policies in other areas.

ENVIRONMENTAL LAND USE POLICY FORUM
On June 6, 2019, Regional Planning staff hosted a half-day forum to engage with subject matter experts and discuss the following three potential gaps in regional environmental land use policies that have been identified to date through the *Metro 2040* Environment Policy Review:

1. Improving How We Protect Our Ecologically Important Areas,
2. Exploring Biodiversity-led Regional Green Infrastructure, and
3. Linking Green Space in Urban Areas to Human Health.

This policy forum brought together 38 individuals - 17 from member jurisdictions, with the remainder representing academia, consulting practice, the Federal Government, a local health authority, and Metro Vancouver's Regional Parks and Liquid Waste Services. Participants generated many innovative ideas to improve stewardship of the region's environment. Ideas that are within the scope of the *Metro 2040* Environment Policy Review will be considered as part of the review, with the other ideas helping to inform municipal efforts related to environmental stewardship.

The results from the Forum are highlighted in the "Summary Notes: Environmental Land Use Policy Forum dated June 6, 2019" (Reference 1), and summarized below.

1. 'Improving How We Protect Our Ecologically Important Areas'

Key ideas / themes:

- General support for implementing additional mechanisms to protect, enhance and connect sensitive ecosystems, such as:
    - establish a vision for a 'sustainable amount' of land needed for protection and restoration (e.g. nature needs half), set targets and timelines;
    - support member jurisdictions in prioritizing both high and low quality ecosystems across the region for protection and restoration;
    - secure sensitive ecosystems: land acquisition through a regional conservation fund with potential funding sources coming from development cost charges, a green levy, density bonusing, downsizing, or cost sharing with senior governments, non-profits or private entities;
    - integrate the Sensitive Ecosystem Inventory into *Metro 2040*;
    - change Official Community Plan policies and zoning bylaws to incorporate stronger protection measures and larger buffers for lands of high ecological value;
    - provide guidelines and incentives (e.g. tax breaks, payment for ecosystem services) for land owners or stewardship groups to protect and restore ecosystem quality; and
    - establish minimum greenspace requirements (e.g. minimum % canopy cover for any development).
- Create easy tools to place a value on ecosystem services provided by ecologically important areas and include in municipal accounting.
- Improve information about ecosystem services (including health and economic benefits) to the public, Councils, colleagues and other stakeholders.
- Where possible, apply consistent policies and approaches across the region.

Challenges identified included achieving improved protection, including the fact that land values are too high to acquire many sensitive ecosystems and that consensus on attaining a consistent regional approach will take time and political will.

2. 'Exploring Biodiversity-led Regional Green Infrastructure'

Key ideas / themes:

- General support for strengthening biodiversity and green infrastructure policies in *Metro 2040* and Official Community Plans.
- General support for a regional planning approach / vision to be developed collaboratively:
    - including multiple disciplines (i.e. planners, engineers, biologists, landscape architects), health authorities, other levels of government, land owners, TransLink, and academics;
    - First Nations participation desired, and they may be able to obtain federal infrastructure funding.

- Metro Vancouver could coordinate pilot projects and could have a role in monitoring / reporting out.
- Must inform the public, Councils, colleagues and other stakeholders:
    - develop a common definition of green infrastructure; and
    - emphasize co-benefits of connectivity for wildlife and people (e.g., 'climate resiliency' and / or 'health' focus may resonate better than 'biodiversity').
- There is a need for funding and practical implementation tools (e.g. model bylaws and policies, guidelines, best practices, development / engineering standards) that have been developed collaboratively with member jurisdictions. They should not be prescriptive.
    - For funding applications, regional scale projects and those with co-benefits are usually preferred.

Participants identified challenges and gaps including: that data is needed to help prioritize areas for protection and restoration across the region; targeted, sustained funding is needed for design and installation of built green infrastructure; and there is a lack of clarity on responsibility for ongoing maintenance.

3. 'Linking Green Space in Urban Areas to Human Health'

Key ideas / themes:

- General agreement on the need to increase the priority of green space in urban areas (especially new developments) for many reasons, not just health.
    - Community, land use and environmental planners need to work together, and with health authorities.
    - Look for restoration opportunities when updating utilities.
- Turn research into useful data and advice / tools for planners:
    - rank public green space and health levels across the region;
    - set green space targets for municipalities to meet or exceed, require reporting (similar to housing targets);
    - performance-based planning / road / town centre standards, green zoning bylaws;
    - need best practices to optimize health and ecological benefits of green spaces; and
    - overlay ecosystem data with My Health My Community dataset to find opportunities to improve health outcomes for vulnerable groups (e.g. children, elderly, marginalized).
- Increase awareness about the benefits of green space in urban areas:
    - inform councils and public - local stats are needed as are clear links to other local priorities / co-benefits (e.g., economics, food security, climate adaptation, equity) to appeal to different values and justify municipal role;
    - community based social marketing (identify barriers to behaviour change); and
    - translate education materials into several different languages.

Participants identified the following challenges: lack of capacity and competing priorities (e.g. affordable housing, climate change mitigation); and ongoing research gaps about health benefits from exposure to different types of green infrastructure (e.g. green roofs versus street trees versus regional parks).

REVIEW OF ENVIRONMENTAL LAND USE POLICIES FROM OTHER JURISDICTIONS

EcoPlan International was retained to conduct a review of environmental land use policies in regional plans from other jurisdictions, for consideration during the *Metro 2040* Environment Policy Review. EcoPlan reviewed 25 plans from several countries to find common policy themes and examples of best practice on policy integration on seven planning topics. A few key highlights are profiled below.

- The benefits of nature were mentioned in most regional plans. Plans from Comox Valley Regional District and Greater Golden Horseshoe specifically used the term 'ecosystem services'.
- Most plans strive to include strong development controls (e.g. minimum density thresholds, expected growth allocations for sub-regional areas) as critical tools to protect important ecological lands.
- Several plans recognize the need to maximize ecological function by retaining large buffers around natural features and restoring degraded ecosystems. Biodiversity conservation plans for BC's Okanagan region and Melbourne, Australia were seen as solid examples.
- Most plans did not include policies for development in existing natural hazard areas.
- Auckland 2050 includes several progressive green infrastructure policies aimed at delivering greater resilience, long-term cost savings and quality environmental outcomes.
- Emerging trends that support protection, enhancement and restoration:
    - 'Blue infrastructure' (uses water sensitive urban design principles) in addition to green infrastructure. Policies in Greater Manchester's Plan for Homes, Jobs, and the Environment could be used as models.
    - Health benefits from exposure to green space in urban areas and the need for access featured prominently in Minneapolis 2040 and Portland Urban Forest Management Plan.
    - Climate change adaptation was a strong focus in plans from Helsinki, Stockholm and Capital Regional District.
- Agricultural lands were also seen as important environmental lands in plans from the Greater Golden Horseshoe, Greater Montreal and Comox Valley Regional District.
- Ecological performance monitoring is generally not a strong feature in regional plans, compared to monitoring for other focus areas such as the economy, infrastructure, and housing.

The overall findings from the review of plans from other jurisdictions have been summarized in Attachment 1.

NEXT STEPS

Staff propose to use the input from the Environmental Land Use Policy Forum and the examples of policies from other jurisdictions to develop policy options for Regional Planning Committee consideration over the coming months (Figure 1).

Figure 1: *Metro 2040* Environment Policy Review Process and Timelines

RPL = Regional Planning Committee, RPAC = Regional Planning Advisory Committee, ENV = Regional Planning Advisory Committee - Environment Subcommittee

The *Metro 2040* Environment Policy Review clearly has connections to the *Metro 2040* Climate Change, Agriculture, Rural Lands, and Complete Communities Policy Reviews. Staff are working to coordinate with other *Metro 2040* Policy Review leads and ongoing development of the *Climate 2050* Nature & Ecosystems Roadmap. Staff will provide updates on those processes during upcoming meetings.

ALTERNATIVES

This is an information report. No alternatives are presented.

FINANCIAL IMPLICATIONS

The Environmental Land Use Policy Forum and the consultant's study cost approximately $4,000 and $10,000, respectively. Both were budgeted through the Board-approved 2019 Regional Planning budget. There are no other financial implications to this report.

SUMMARY / CONCLUSION

This report provides the Regional Planning Committee with highlights from the Environmental Land Use Policy Forum held on June 6, 2019. The Forum generated some innovative ideas about how Metro Vancouver and member jurisdictions can work together to better protect ecologically important areas, plan for biodiversity-led regional green infrastructure, and enhance green spaces in urban areas to improve human health.

This report also relays a summary of a consultant's review of environmental land use policies in plans from other areas. The Study identified several opportunities to enhance regional and local policies on ecosystem services, important environmental lands, sensitive ecosystems, natural hazard areas, ecological connectivity, regional green infrastructure, and urban green spaces.

Input from the Forum and the consultant's report will inform the development of policy options for the Regional Planning Advisory Committee's consideration in the Fall of 2019, as part of the *Metro 2040* Environment Policy Review.

Attachment

Table: Summary of How Environmental Land Use Topics are Embedded in Policy in Other Jurisdictions (EcoPlan International, June 2019)

References

1. Summary Notes: Environmental Land Use Policy Forum dated June 6, 2019
   (see agenda item 4.2, attachment 1)
2. Review of Environmental Land Use Policies from Other Jurisdictions dated June 2019
   (see agenda item 4.2, attachment 2)

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Summary of How Environmental Land Use Topics are Embedded in Policy in Other Jurisdictions (EcoPlan International, June 2019)

Planning Topic	Comments	Themes	Example Plans
Ecosystem Services	The benefits of nature are mentioned in most plans, although terms such as 'ecosystem services' are not yet regularly used. Building a strong rationale for protecting urban green spaces will require a full accounting of ecosystem service benefits.	1. Protect and enhance lands that provide ecosystem benefits. 2. Protect and enhance natural heritage, hydrologic, and landform systems, features, and functions. 3. Maximize and embrace ecosystem benefits.	• *Comox Valley Regional District Regional Growth Strategy* • *Growth Plan for the Greater Golden Horseshoe*
Important Environmental Lands	Most plans strive to include strong development controls – such as minimum density thresholds and expected growth allocations for sub-regional areas – which are seen as critical to protecting important ecological lands.	1. Manage diverse landscapes appropriately and effectively through land use designations. 2. Protect and enhance biodiversity that supports ecosystem services. 3. No loss of environmental and cultural heritage areas.	• *King County Washington 2016 Comprehensive Plan* • *Greater Golden Horseshoe Greenbelt Plan (2017)* • *Plan regional nature 2016 - 2020 en Region de Bruxelles-Capitale*
Sensitive Ecosystems	Several plans recognize the need to: a) retain large buffers around natural features (e.g. 120 metres) and b) restore degraded ecosystems and places of cultural significance, with maximization of ecological function / integrity as the desired outcome.	1. Conserve sensitive ecosystems. 2. Mitigate the negative impacts of development on sensitive ecosystems. 3. Develop a buffer between sensitive ecosystems and adjacent uses. 4. Use scientific and technical information to make decisions.	• *Melbourne and Biodiversity Conservation Strategy for Growth Corridors* • *Keeping Nature in Our Future: A Biodiversity Conservation Strategy for the Okanagan Region*
Natural Hazard Areas	*Policy gap* - Most plans focus on new developments avoiding Natural Hazard Areas, while few address development in existing Natural Hazard Areas. This could become an important policy gap in the context of climate change.	1. Adopt development practices and patterns that avoid exposure to natural threats. 2. Anticipate threats augmented by climate change.	• *Auckland Plan 2050* • *County of San Diego General Plan (2011)*

Planning Topic	Comments	Themes	Example Plans
Ecological Connectivity	*Policy gap* - Most plans focus on preventing the erosion of the existing ecological networks by intensifying growth in existing development areas, rather than enhancing the network.	1. Develop a network that structurally connects natural features. 2. Use ecological function as a guide for developing connectivity.	• *Plan regional nature 2016 - 2020 en Region de Bruxelles-Capitale* • *King County Washington 2016 Comprehensive Plan* • *Greater Golden Horseshoe Greenbelt Plan (2017)*
Regional Green Infrastructure	*Policy gap* - Substantial policy overlap with ecological connectivity. Several plans incorporated water sensitive urban design principles (i.e. 'blue infrastructure') along with green infrastructure.	1. Develop a connected network of green Infrastructure. 2. Use green infrastructure to protect, enhance and embrace ecosystem services.	• *Auckland 2050* • *Greater Manchester's Plan for Homes, Jobs, and the Environment* • *Capital Regional District Regional Growth Strategy*
Urban Green Spaces	Improved health is being recognized as an emerging urban green space benefit, as well as the importance of equal and just access to green spaces. *Minneapolis 2040* and *Portland Urban Forest Management Plan* provide strong examples of green space policy language related to health and equity.	1. Develop a connected network of urban green spaces linked with surrounding landscapes. 2. Ensure green spaces serve a variety of functions.	• *Plan regional nature 2016 - 2020 en Region de Bruxelles-Capitales* • *The Greater Newcastle Metropolitan Plan 2036*

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SERVICES AND SOLUTIONS FOR A LIVABLE REGION

To: Regional Planning Committee

From: Josephine Clark, Environment Planner, Regional Planning

Date: July 31, 2019 Meeting Date: September 13, 2019

Subject: ***Metro 2040* and Protecting Ecologically Important Areas**

RECOMMENDATION
That the Regional Planning Committee receive for information the report dated July 31, 2019, titled "*Metro 2040* and Protecting Ecologically Important Areas".

PURPOSE
To provide the Regional Planning Committee with the analysis from the updated Metro Vancouver Sensitive Ecosystem Inventory in relation to the update to the environmental objectives and policies of *Metro Vancouver 2040: Shaping our Future (Metro 2040)*, the regional growth strategy.

BACKGROUND
In support of the comprehensive update to *Metro 2040*, staff are conducting the *Metro 2040* Environmental Policy Review to determine if, and to what extent, the policies in the regional growth strategy can be adjusted to better support the region's shared environmental goals.

The Sensitive Ecosystem Inventory (SEI) is a GIS inventory of ecologically significant lands across the region. The first 5-year update of the Inventory was completed in 2018 and quantified the amount, rate and type of ecosystem loss observed during the 5-year period between 2009 and 2014. This report considers the loss of ecologically important areas in relation to *Metro 2040's* environmental objectives and policies and to inform the comprehensive update to *Metro 2040*.

***METRO 2040* AND PROTECTING ECOLOGICALLY IMPORTANT AREAS**
Metro Vancouver's Sensitive Ecosystem Inventory
The results from the first 5-year update of the SEI were provided to the Climate Action Committee and MVRD Board in June 2018 (Reference 1). Those results documented a total recorded loss of 1,640 hectares (ha) (or 0.9%) of sensitive and modified ecosystems in the region. Almost 1,190 ha of this loss occurred within the Regional Core (i.e. the more urbanized part of the region that excludes the large protected areas in the northern parts of the region, the estuaries, and intertidal areas). The Regional Core is most relevant to the *Metro 2040* Environmental Policy Review as it is where municipal and regional decisions and actions related to changing land uses will have the most impact (see Attachment for a map). The ecosystem types with the highest losses were determined to be: Mature Forest (80 to 250 years old), Young Forest (30 to 80 years old), Old Field, Riparian, and Wetland areas.

Further analysis on the causes of the observed losses and changes in ecosystem quality were provided to Climate Action Committee and MVRD Board in May 2019 (Reference 2). That analysis summarized

that, at the regional level, logging activities resulted in the highest losses (24%), followed by agriculture (18%), and residential development (13%). Loss at the Regional Core level showed a similar pattern, except that very little logging took place in that area. It should be noted that 90% of losses attributed to agriculture were for the Old Field modified ecosystem class. These are sites within the ALR that were long-term fallow, but that have now been returned to agricultural production.

Ecosystem quality was assessed and found to have decreased slightly over the 5-year period for the region as a whole and for the Regional Core, with a change of -0.3% and -0.7% respectively. The analysis also provided sub-regional breakdowns of information from the SEI (Reference 2).

Ecosystem Loss within *Metro 2040's* Land Use Designations

Charts 1 and 2 below provide information from the SEI on ecosystem occurrence and loss, in relation to *Metro 2040's* land use designations. Chart 1 shows the distribution of sensitive and modified ecosystems across the designations, and Chart 2 shows how much loss was observed over 5 years.

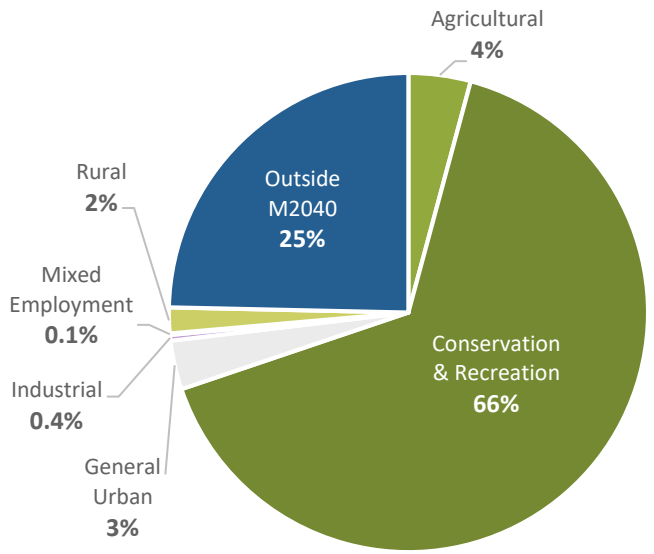

Chart 1 – Location of Sensitive and Modified Ecosystems in relation to Metro 2040 designations

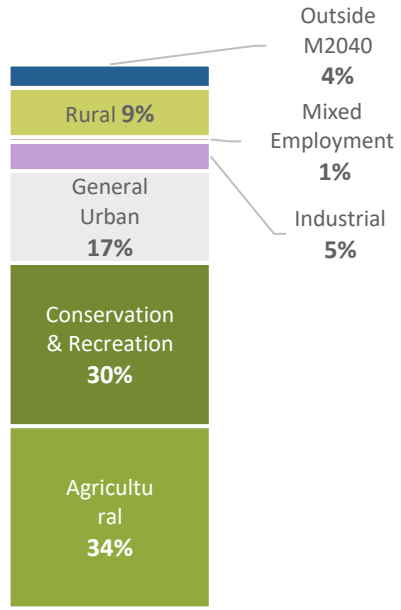

Chart 2 – Loss of Sensitive and Modified Ecosystems in relation to Metro 2040 designations

Charts 1 and 2 show that some *Metro 2040* designations contain a relatively small proportion of the region's sensitive and modified ecosystems but a high proportion of the loss occurred within those designations. For example:

- 4% of sensitive or modified ecosystems are found within the Agricultural land use designation but 34% of loss occurred here (causes explored below), and;
- 3% of sensitive or modified ecosystems are found within the General Urban designation but 17% of loss occurred here.

Notably, 30% of all ecosystem loss occurred within the Conservation and Recreation designation and this too is explored in detail below.

Causes of Ecosystem Loss within *Metro 2040* Land Use Designations
As part of the SEI update process, the causes of ecosystem loss were documented. Section 1 of the attachment provides breakdowns of the causes of loss observed within each *Metro 2040* land use designation.

Key points to note:

- Ecosystem loss on lands with an **Agricultural** regional land use designation totaled 549 ha with just over half being due to agriculture[1] (53%; 291 ha). The remaining 258 ha of loss was due to other activities including clearing or mowing (no clear use), transportation and communication, utilities, and residential development. Almost half of all ecosystem loss on Agricultural lands was not directly related to agriculture. However, some loss attributed to other causes may still be related to agricultural operations, e.g. building farm residences would have been recorded as 'Residential' for the loss type. Further analysis of the SEI with the Regional Agricultural Land Use Inventory would be helpful in understanding the relationship between important ecological areas and agricultural lands.
- A total of 490 ha of sensitive and modified ecosystems have been lost on lands with a **Conservation and Recreation** regional land use designation. 76%, or 375 ha, of this loss was due to logging, as Crown Lands are subject to forest tenures for timber harvesting and are included in this regional designation. The remaining 115 ha within Conservation and Recreation lands was to other activities including utilities, clearing or mowing (no clear use), extraction activities, transportation and communication, and recreation.
- Loss on lands with a **General Urban** regional land use designation totaled 276 ha and was primarily due to residential development (57%; 156 ha), along with clearing and mowing (no clear use), transportation and communications, and due to land use being in transition (i.e. development is in process).
- Loss on lands with a **Rural** regional land use designation (148 ha) was to clearing and mowing (34%; 51 ha) and residential development (30%; 45 ha), along with utilities, extraction activities, and logging.

What is the *Metro 2040* Conservation and Recreation Designation?
Before looking more in-depth at ecosystem loss on Conservation and Recreation lands, a brief review of the Conservation and Recreation land use designation is provided in support of the *Metro 2040* Environment Policy Review.

The stated purpose of the Conservation and Recreation land use designation is to "*protect significant ecological and recreation assets, including: drinking watersheds, conservation areas, wildlife management areas and ecological reserves, forests, wetlands, riparian corridors, major parks and*

[1] Land used for agricultural production. Includes cultivated field crops, farm infrastructure, and crop cover structures.

recreation areas, ski hills and other tourist recreation areas". The SEI was created after the adoption of *Metro 2040*, and therefore it was not used to determine which lands should be included within the Conservation and Recreation designation. However, there is still a close connection between the two. About 87% of Conservation and Recreation lands are sensitive or modified ecosystems, and these mostly fall within parks and protected areas, or they are Crown Lands, some of which are subject to forest tenures for timber harvesting.

This leaves over 16,000 ha of land that are designated Conservation and Recreation, but are not a sensitive or modified ecosystem. These areas include:

- A landfill and quarry;
- Utilities, including a wastewater and drinking water treatment plants, and utility lines;
- Railway lines and roads, including highways, and causeways to port and ferry terminals;
- Open greenspace within parks, sports fields, golf courses and other outside sport clubs; and
- Young vegetation from earlier logging activities.

A review of compatible uses for the Conservation and Recreation land use designation may be appropriate as part of the *Metro 2040* Environment Policy Review given that some activities seem incongruous with the stated purpose of the designation. Secondly, some inconsistencies are noted when looking at lands that have been included in the Conservation and Recreation designation across the region. For example, when *Metro 2040* was being drafted, some member jurisdictions chose to include most parks and areas of greenspace in the regional land use designation while others incorporated only the largest or most 'regionally' significant. Finally, connectivity of natural features is a key objective of *Metro 2040's* Goal 3 (Strategy 3.2 'Protect and enhance natural features and their connectivity'), but is not reflected with consistency in the Conservation and Recreation designation. Across much of the region, Conservation and Recreation areas are disconnected from each other.

Ecosystem Loss and Conservation and Recreation Lands
Attachment 1, Section 2, provides a breakdown of losses on Conservation and Recreation lands inside and outside the Regional Core.

Ecosystem Loss outside the Regional Core
The most significant cause of loss on Conservation and Recreation lands was documented as logging (76%). All logging occurred outside the Regional Core, within the academic research forests and commercial logging operations. Given that logging activities will be ongoing, future updates of the SEI can be expected to report similarly large losses of forest ecosystems from the *Metro 2040* designation with conservation as its stated purpose. Some other regional districts with significant natural resource industries have a designation specifically for natural resource management areas which may be worth considering for the update to *Metro 2040*. Without this kind of separation, any successes achieved by member jurisdictions in reducing ecosystem losses within the Conservation and Recreation designation may be dwarfed by losses due to logging activities which are beyond the control of local governments. Currently, *Metro 2040* does not explicitly list forestry or other natural resource extraction as an acceptable activity within the Conservation and Recreation designation. If these activities remain within the Conservation and Recreation designation after the *Metro 2040* update has concluded, a more complete listing of activities permitted within this designation, including forestry and extractive industries, should be considered.

Ecosystem Loss within the Regional Core
Only 9% of the documented losses occurred on Conservation and Recreation lands within the Regional Core (Attachment 1, Section 2). The causes of loss were due to a wide range of activities including road building, recreation-related activities, widening utility corridors, industrial activities and residential development.

Often the actual development occurred adjacent to Conservation and Recreation lands, but clearing of vegetation associated with the development fell on lands with a Conservation and Recreation designation (e.g. providing a turfed area of green space adjacent to a housing development, or clearing trees alongside a new road). Strategy 3.1.4(c) of *Metro 2040* states that municipalities will *"include policies, where appropriate, that effectively buffer Conservation and Recreation areas from activities in adjacent areas"*. A discussion on what tools member jurisdictions use to reduce ecosystem losses from activities in adjacent areas may help to determine if any revisions to this policy are warranted.

Ecosystem Loss within Urban Lands
As outlined above and shown in Attachment 1, Section 1, ecosystem losses within the urban designations (i.e. General Urban, Industrial, and Mixed Employment) occurred due to a range of activities associated with urban development, including development of housing and transportation infrastructure. These losses are not unexpected as this is where development has been planned, and it is where regional growth will continue to be accommodated. *Metro 2040* includes broad policies intended to *"Protect and enhance natural features and their connectivity"* (Strategy 3.2) but it is not clear how these policies affect sensitive ecosystems located on land planned for urban development. A key question for consideration as part of the *Metro 2040* update is how to better protect important ecological areas both within the Conservation and Recreation designation as well as within regional urban land use designations.

Looking to the future, there are over 17,000 ha of sensitive and modified ecosystems that fall outside of the Conservation and Recreation regional land use designation, and 7,100 ha of these ecosystems lie within the regional urban designations. Not all of these ecosystems are at risk of development; a proportion will be protected within municipal parks not included in the Conservation and Recreation designation, or indirectly protected due to geographical constraints such as steep slopes or riparian areas. However, several thousand hectares of important ecological areas are likely at risk from future development within the urban areas. Metro Vancouver's growth projections assume that by 2040, the remaining General Urban designated, but as yet undeveloped areas within the Urban Containment Boundary, will be "fully developed"[2]. These areas alone contain over 2,400 ha of sensitive and modified ecosystems and without intervention it is likely that they will be partially or fully lost. Member jurisdictions use a range of tools to protect sensitive ecosystems through the development process, including riparian setbacks and environmental Development Permit Areas, but currently these are applied in the absence of a consistent regional approach.

[2] For this analysis, 80% of District of West Vancouver's upper lands special study area was not included within the area considered developable, given the District's commitment to transfer much of this area to the Conservation and Recreation designation.

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

FINANCIAL IMPLICATIONS
Costs associated with the Metro Vancouver SEI update were included in MVRD Board-approved Regional Planning program budgets and work plans. The SEI update cost $18,500 in consultant fees over four years (2015 to 2018) to conduct field and map checking for quality assurance. The majority of work associated with updating the SEI was completed by staff as part of the Regional Planning annual work program.

SUMMARY / CONCLUSION
Metro 2040 was developed in the absence of regional information about ecologically important areas. The comprehensive update to *Metro 2040* provides an opportunity to better integrate sensitive and modified ecosystems into the regional growth strategy. This report provides the Regional Planning Committee with information on ecosystem occurrence and loss in relation to *Metro 2040's* land use designations which could inform policy development for the strategy's update.

The Metro Vancouver Sensitive Ecosystem Inventory has demonstrated that important ecological areas are present within all regional land use designations, not just within the Conservation and Recreation designation. The speed and scale of loss documented during the SEI update should be of concern and suggests a need to assess and strengthen protection efforts through regional planning processes.

While ecosystem losses on Conservation and Recreation lands due to activities such as logging are beyond the jurisdiction of local governments, consideration is needed as part of the *Metro 2040* update about whether there is a mechanism and regional role to protect sensitive ecosystems that fall on land slated for development within the urban land use designations. Member jurisdictions use a range of tools to protect sensitive ecosystems through the development process, including riparian setbacks and environmental Development Permit Areas, but currently these are applied in the absence of a consistent regional approach. Without additional measures, thousands of hectares of sensitive and modified ecosystems are at risk over the coming decades as the anticipated regional growth is accommodated.

Attachment
Metro 2040 and Protecting Ecologically Important Areas Supporting Information

References
1. Climate Action Committee report titled "Update of the Metro Vancouver Sensitive Ecosystem Inventory", dated, June 6, 2018 *(See agenda item 5.4)*
2. Climate Action Committee report titled "Sensitive Ecosystem Inventory – Sub-Regional Profiles and Assessment of Ecosystem Loss", dated, April 10, 2019 *(See agenda item 5.7)*

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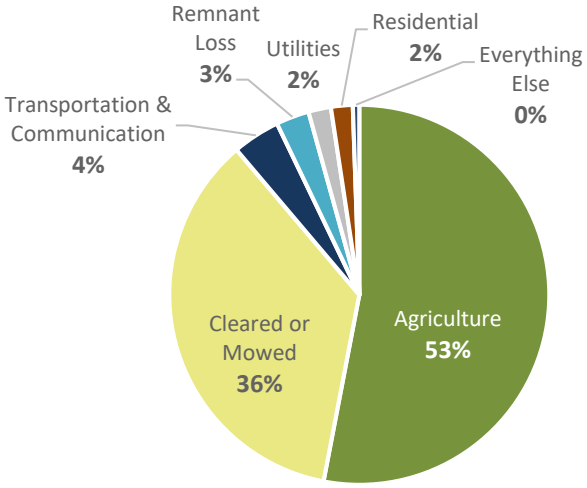
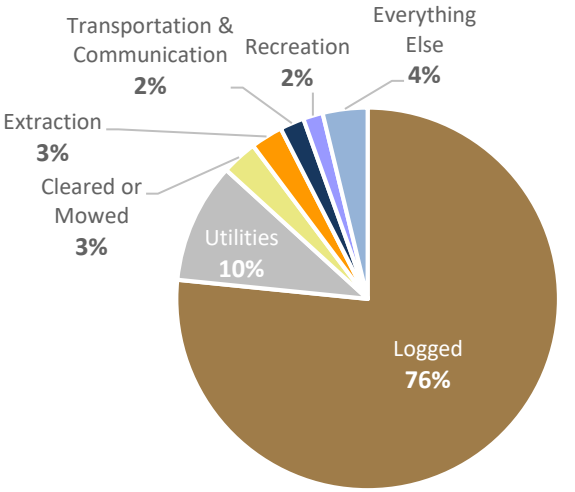
Metro 2040 and Protecting Ecologically Important Areas – Supporting Information

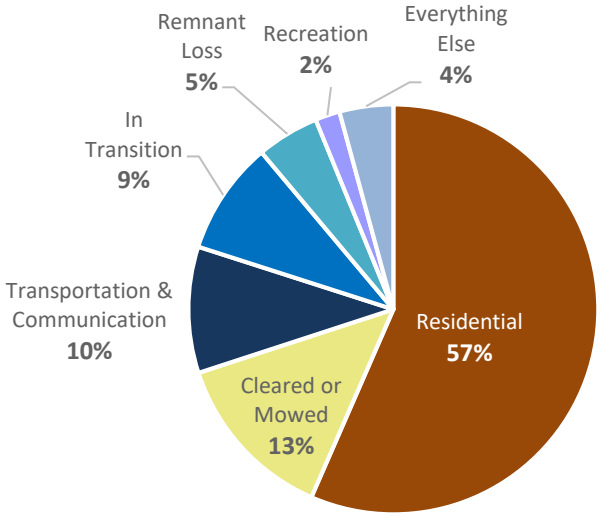
Section 1: Causes of Ecosystem Loss within Metro 2040 Land Use Designations



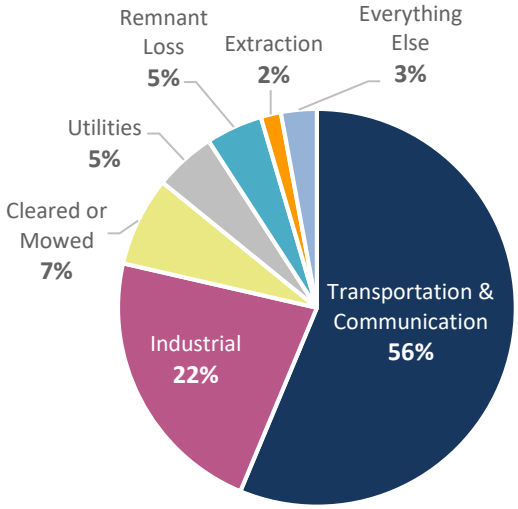
Loss within Agricultural
Total = 549 ha



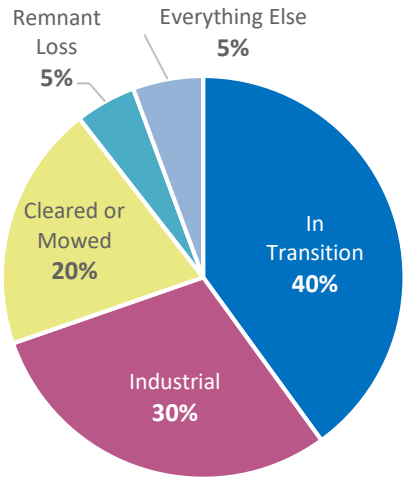
Loss within Conservation & Recreation
Total = 490 ha



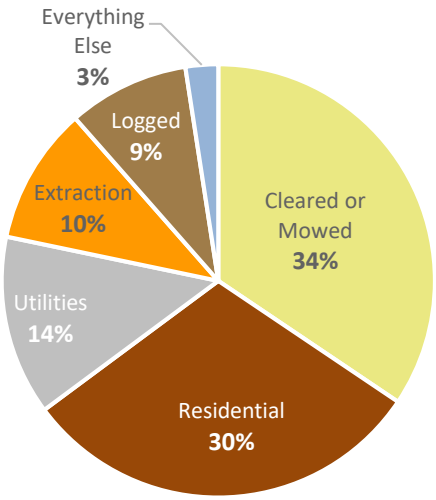
Loss within General Urban
Total = 276 ha



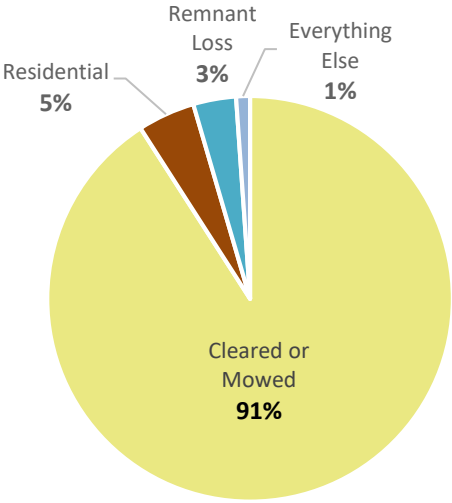
Loss within Industrial
Total = 88 ha



Loss within Mixed Employment
Total = 15 ha

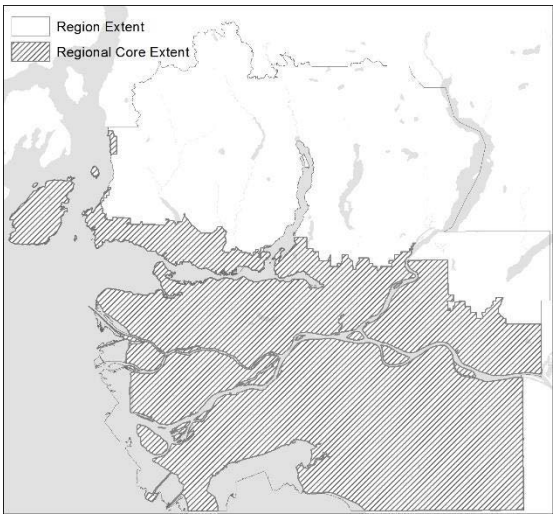


Loss within Rural
Total = 148 ha

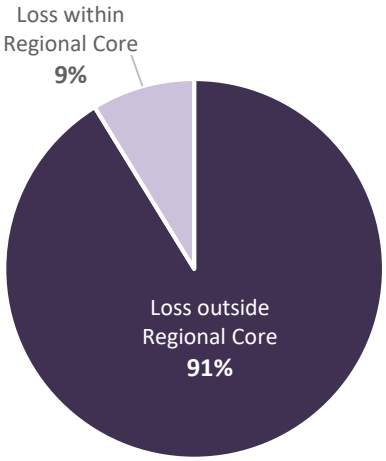


Loss Outside Metro 2040 area
Total = 70 ha

Section 2: Causes of Loss within Conservation & Recreation Lands

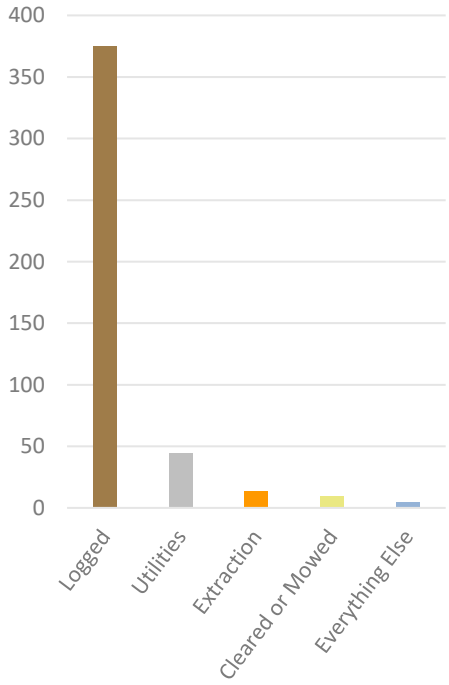


Region and Regional Core Extents

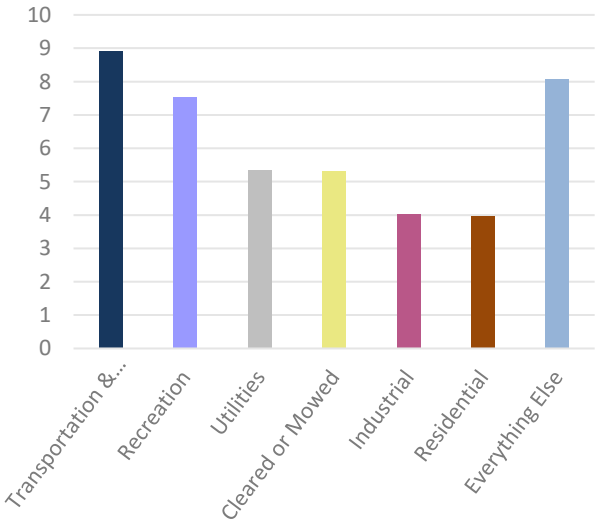


Ecosystem loss within and outside the Regional Core

Total = 490 ha



Causes of loss outside the Regional Core
Total = 447 ha



Causes of loss within the Regional Core
Total = 43 ha

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SERVICES AND SOLUTIONS FOR A LIVABLE REGION

To: Regional Planning Committee

From: James Stiver, Manager, Growth Management and Transportation, Regional Planning

Date: August 16, 2019 Meeting Date: September 13, 2019

Subject: **Regional Context Statements – Update on the Required 5-Year Review for Member Jurisdictions**

RECOMMENDATION
That the Regional Planning Committee receive for information the report dated August 16, 2019, titled "Regional Context Statements – Updated on the Required 5-Year Review for Member Jurisdictions".

PURPOSE
To provide the Regional Planning Committee with an update on the status of Regional Context Statements in relation to required 5-year reviews.

BACKGROUND
Section 446 of the *Local Government Act* requires that each municipality in a regional district adopt a Regional Context Statement (RCS) as part of its Official Community Plan (OCP) and the RCS must also be accepted by the MVRD Board. When the MVRD Board considers acceptance of an RCS, it is expected that it be "generally consistent" with the goals, strategies, actions, and parcel-based regional land use designations in *Metro Vancouver 2040: Shaping our Future (Metro 2040)*, the regional growth strategy.

As per Section 448 of the *Act*, a municipality's Board-accepted RCS must be reviewed at least once every five years, and either be submitted for continued acceptance if no changes are proposed, or be submitted for acceptance with proposed changes. This report provides an update on the status of RCSs in relation to required 5-year reviews for those members signatory to *Metro 2040*.

Regional Context Statements
An RCS must identify the relationship between a municipality's OCP and the regional growth strategy, and how the OCP is, or will be made, consistent with the regional growth strategy over time. RCSs are the linking document that shows how a municipality's aspirations, as expressed in its OCP, align with and support the regional vision.

Updates to Regional Context Statements
Subsection 448(1)(c) of the *Local Government Act* requires that each municipality review its respective RCS at least once every five years after its latest acceptance by the Board and, if no amendment is proposed, to submit the RCS to the Board for its continued acceptance.

The five-year review provides an opportunity for the member jurisdiction to consider if any changes have occurred to its OCP and related planning that would benefit from an amendment to the RCS. It is an opportunity to highlight any work a municipality has undertaken that demonstrates greater alignment with the regional vision. However, if there are no proposed amendments, a Council may opt to pass a resolution stating that consideration was given to the RCS, that there are no proposed amendments, and that it should be forwarded to the MVRD Board for consideration of reacceptance.

Table 1 denotes the status of 5-year RCS reviews for all member jurisdictions.

Table 1 - RCS 5-Year Review Dates and Status

Municipality	RCS Initially Accepted by MVRD Board	RCS 5 Year Review Date	MVRD Board RCS Acceptance Date
Village of Anmore	Jul. 11, 2014	Jul. 11, 2019	Mar. 29, 2019
Village of Belcarra	Jul. 29, 2011	Jul. 29, 2016*	
City of Burnaby	Nov. 15, 2013	Nov. 15, 2018	Jan. 25, 2019
City of Coquitlam	Oct. 11, 2013	Oct. 11, 2018*	
City of Delta	Sep. 27, 2013	Sep. 27, 2018*	
City of Langley	Jul. 26, 2013	Jul. 26, 2018*	
Township of Langley	Nov. 25, 2016	Nov. 25, 2021	
Village of Lions Bay	Apr. 29, 2016	Apr. 29, 2021	
City of Maple Ridge	Sep. 27, 2013	Sep. 27, 2018	Oct 26, 2018
City of New Westminster	Sep. 22, 2017	Sep. 22 2022	
City of North Vancouver	Feb. 13, 2015	Feb. 13, 2020	
District of North Vancouver	May 23, 2014	May 23, 2019	
City of Pitt Meadows	Nov. 15, 2013	Nov. 15, 2018	April 26, 2019
City of Port Coquitlam	July 26, 2013	July 26, 2018*	
City of Port Moody	May 15, 2015	May 15, 2020	
City of Richmond	Nov. 16, 2012	Nov. 16, 2017	Mar. 17, 2018
City of Surrey	Sept. 19, 2014	Sept. 19, 2019	
City of Vancouver	July 26, 2013	July 26, 2018*	In process
District of West Vancouver	Feb. 13, 2015	Feb. 13, 2020	
City of White Rock	Jul. 28, 2017	Jul. 28, 2022	

*5-year review past due

It should be noted that since the acceptance of member jurisdiction RCSs, a number of member municipalities have submitted updates to RCSs as that were triggered as a result of updates to OCPs and other related planning activities. This was done separate from the required 5-year RCS review process, and is also required by Subsection 448(1)(b) of the *Local Government Act*.

Staff note that there has been ongoing communication between Regional Planning staff and Regional Planning Advisory Committee members regarding the status of RCSs and the 5-year reviews. Through that process, the following options have been provided to the applicable member municipalities:

1. Submit the current accepted RCS for continued acceptance;
2. Submit an updated RCS for acceptance that reflects recent changes to the OCP (or related planning initiatives) that would highlight improved alignment between the OCP and the regional growth strategy (e.g. to integrate any OCP updates including projections, completion of housing action or transportation plans as well as advancement of "work towards" statements); or
3. Submit a letter to Metro Vancouver explaining why it is not practical or appropriate to update the RCS right now, and that the municipality anticipates a delay of the 5-year resubmission for a specified rationale (e.g. in the midst of an OCP update).

RCSs must be submitted to the MVRD Board by Council resolution, whether it is for continued acceptance or proposed amendments. The third option above reflects the process undertaken when RCSs were first due post the adoption of *Metro 2040*. At that time, if a member jurisdiction was unable to meet the requirement to submit an RCS within two years of adoption of the regional growth strategy, Council submitted a letter to the MVRD Board expressing the reasons for not meeting the requirement and a proposed timeline for submission. In most cases, the rationale for late submission was that a municipality was in the midst of an OCP review or about to embark on one. This approach was undertaken with the understanding that there is no consequence laid out in the *Local Government Act* for not meeting the deadlines for RCS submission. The MVRD Board received these letters for information.

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

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

SUMMARY / CONCLUSION
The *Local Government Act* requires that each member jurisdiction submit a Regional Context Statement that identifies the relationship between the municipality's Official Community Plan and *Metro 2040*, and how the OCP is, or will be made, consistent with the regional growth strategy over time. Every member jurisdiction must adopt an RCS as part of its OCP and it must also be accepted by the MVRD Board. When the MVRD Board considers acceptance of an RCS, it is expected that it be "generally consistent" with the goals, strategies, actions, and parcel-based regional land use designations in *Metro 2040*.

The *Local Government Act* also requires that a municipality's Board accepted RCS be reviewed at least once every five years, and either be submitted for reacceptance if no changes are proposed, or be submitted for acceptance with proposed changes. The five-year review provides an opportunity for the member jurisdiction to consider if any changes have occurred to its OCP and related planning that would benefit from an amendment to the RCS.

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SERVICES AND SOLUTIONS FOR A LIVABLE REGION

To: Regional Parks Committee

From: Doug Petersen, Division Manager (Acting), East Area, Regional Parks
Janice Jarvis, Natural Resource Management Specialist, East Area, Regional Parks

Date: July 15, 2019 Meeting Date: September 18, 2019

Subject: **Tynehead Regional Park - Ministry of Transportation and Infrastructure Proposal for Forest Restoration**

That the Regional Parks Committee receive for information the report dated July 15, 2019, titled "Tynehead Regional Park - Ministry of Transportation and Infrastructure (MOTI) Proposal for Forest Restoration".

PURPOSE
To advise the Regional Parks Committee of a potential forest ecosystem restoration project within Tynehead Regional Park, as a result of a parking facility being constructed in the City of Surrey.

BACKGROUND
In June 2019, Metro Vancouver met with Ministry of Transportation and Infrastructure staff to review and guide the proposals for habitat compensation work at Tynehead Regional Park, outlined in the Ministry's July 2, 2019 letter (Attachment). This report is being brought forward to alert the Regional Parks Committee to this project.

In 2016, the Ministry of Transportation and Infrastructure approached Metro Vancouver about the potential to compensate for habitat loss associated with parking facility being constructed in the City of Surrey's north area.

The parking facility will be located south of the Fraser River on the north side of Highway 17, east of the Port Mann Bridge. The project will adversely affect up to 5.1 ha of terrestrial habitat, a small portion of which can be off-set within the Ministry of Transportation and Infrastructure right of way on-site. Though discussions, Tynehead Regional Park was identified as a potential compensation site for the remaining 5.0 hectares. The provincial project was delayed until project funding was confirmed in 2019.

OVERVIEW OF THE HABITAT COMPENSATION PROJECT
The Ministry of Transportation and Infrastructure has proposed the restoration of five hectares of forest within Tynehead Regional Park. The conceptual scope of work includes the following:

- Removal of non-native invasive plant species;
- Planting of native plant species to develop into the desired native forest community; and,
- Monitoring and maintenance of the restored area during the establishment period.

The forest restoration sites being considered by Metro Vancouver are all ecologically compromised by past land use. Most areas were large lot rural residences with some agricultural use. The selected areas contain heavy infestations of Himalayan blackberry, English ivy, Japanese hops and other non-native invasive species. The removal of these invasive species and replacement with native forest species, followed by long-term monitoring and maintenance, will improve the ecological health of the regional park.

Metro Vancouver has been conducting ecosystem restoration in Tynehead Regional Park for many years and this project fits well within management goals for the park. Habitat improvements of this scale are limited by current funds.

Next Steps
Staff will continue to work with MOTI to investigate the feasibility of this project. If it is found to be in the interest of both parties, an agreement will be drafted and brought back to the MVRD Board.

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

FINANCIAL IMPLICATIONS
There are no financial implications to Metro Vancouver with respect to exploring the feasibility of this project. Any financial implications that may arise if this project was to proceed will be considered at the time an agreement is considered by the MVRD Board.

SUMMARY / CONCLUSION
The Ministry of Transportation and Infrastructure is interested in funding forest ecosystem restoration within Tynehead Regional Park as habitat compensation for one of their infrastructure projects. The proposed compensation project would improve the ecological condition of five hectares of regional park land. Removal of invasive species and restoration of a vegetation community composed of native species will be of benefit to the park. Metro Vancouver has been restoring ecologically compromised areas at Tynehead Regional Park for many years and this opportunity would advance restoration goals.

If this project is considered feasible, the next step will be to draft an agreement for MVRD Board approval.

Attachment: *(30685144)*
Correspondence re: Habitat Off-setting in Tynehead Regional Park dated July 2, 2019, from the Ministry of Transportation and Infrastructure

23323832

July 2, 2019

To: Janice Jarvis
Natural Resource Management Specialist, Regional Parks, East Area
Metro Vancouver Parks

Re: Habitat Off-setting in Tynehead Regional Park

INTRODUCTION

The British Columbia Ministry of Transportation and Infrastructure (MOTI) is proposing to construct the North Surrey Truck Parking project (the Project) located south of the Fraser River, within the City of Surrey, BC on the north side of Highway (Hwy) 17, east of the Port Mann Bridge. This paved parking facility will accommodate up to 150 trucks and 45 passenger cars with up to a total footprint of 5.3 hectares (ha).

Construction of the Project has the potential to adversely affect up to 5.1 ha of terrestrial habitat (mixture of old field grassland and riparian/upland forest). The MOTI is proposing to offset the loss of these ecological communities and associated wildlife habitat functions by restoring, enhancing, and/or creating habitat of equivalent size and type as close to the Project location as feasible. A small portion of the off-setting can be completed within MOTI ROW (0.1 hectares). The MOTI has proposed to implement this remaining forest restoration (5.0 hectares) offsite and is considering conducting this offsite habitat off-setting at Tynehead Regional Park.

This memo is intended to outline the general terms and conditions of MOTI offsite habitat off-setting at Tynehead Regional Park for review and 'approval in-principle' by the Metro Vancouver Regional Parks. It presents the proposed locations for habitat restoration at Tynehead Regional Park that would fulfill MOTI's needs for offsite habitat offsetting, outlines the scope of the proposed restoration measures, and identifies the responsibilities of the respective parties in terms of design, construction, and monitoring.

PROPOSED LOCATION

Metro Vancouver Regional Parks has provided a map titled, "Tynehead Regional Park Forest Restoration Sites" (attached), which indicates areas of opportunity to implement restoration and provided prioritized areas to receive restoration treatments. Areas A, B, C, on the attached figure total approximately 5.9 ha, which presents ample opportunity to fulfill the up to 5.0 ha of offsite offsetting that MOTI is seeking. The MOTI proposes to complete forest restoration within areas A and B, and approximately one-third of area C, the exact boundaries of which to be determined in collaboration with Metro Vancouver Regional Parks. In total, up to 5.0 ha of upland forest habitat, though invasive plant management and replanting, would be restored within Tynehead Regional Park.

Ministry of Transportation and Infrastructure
Highways
South Coast Region
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Coquitlam, BC V3K 0B8
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PROPOSED SCOPE OF WORK

The conceptual scope of work for restoration of the identified areas consists of removing non-native invasive plant species (e.g. blackberry), planting native plant species to promote the desired native forest community at each site through assisted ecological succession, and maintenance and monitoring of the restored areas during the establishment period (up to 10 years as per conditions stated by Metro Vancouver Regional Parks). On November 23, 2016, representatives from Metro Vancouver Parks, MOTI, and MOTI's consulting ecologists from Stantec Consulting Ltd. (Stantec) visited the site to view the existing condition of identified restoration opportunities and priority areas. A subsequent meeting and site visit occurred on June 25, 2019 to review areas A, B, and C and discuss next steps towards delivering the habitat off-setting. Field surveys confirmed the restoration opportunities at areas A, B, and C are technically feasible and would fulfill the offsetting requirements of MOTI's Project in terms of ecological equivalency, proximity, and habitat functions.

PROPOSED RESPONSIBILITIES OF RESPECTIVE PARTIES

The restoration of up to 5.0 ha of forested habitat within Tynehead Regional Park would be a collaborative undertaking among the MOTI and Metro Vancouver Regional Parks.

MOTI would provide funding, project management, and environmental coordination services. We would also use our 'as and when' consulting services contract with Stantec for the restoration design (includes an invasive plant management plan, and a replanting plan), design-review, tendering, construction monitoring, performance monitoring, and maintenance/management recommendations.

Metro Vancouver Regional Parks would provide permission and access to conduct this restoration on Regional Park land, including maintenance; technical review of proposed designs, tenders, and monitoring and maintenance reports; and act as liaison with park users, the Regional Parks Committee, the Metro Vancouver Board, and local stewardship groups, if necessary.

The delivery of the restoration works has not been finalized, and this aspect of the project is proposed for further discussion with Metro Vancouver. It is understood that the MOTI would be financially responsible for the works and may undertake commissioning the design, design-review, tendering, construction, construction monitoring, performance monitoring, maintenance recommendations, and maintenance measures for an agreed upon period. Alternatively, MOTI could provide funds to Metro Vancouver Regional Parks to manage the long-term maintenance and monitoring period.

A landscape contracting company selected through the tendering process would be responsible for invasive plant removal, installation, and maintenance of the restoration measures and their work would be subject to monitoring for compliance with the design plan, details, and specifications, as well as Metro Vancouver Regional Parks review.

CLOSURE

The conceptual framework presented within this memo is intended to provide sufficient assurance for Metro Vancouver Regional Parks to a) grant MOTI 'agreement in-principle' to utilize 5.0 ha of Tynehead Regional Park for the purposes of offsite habitat restoration associated with the Project, and b) grant permission from the Metro Vancouver Board to enter into negotiations for a Licence Agreement. Please feel free to contact me with any comments, questions, or clarifications by phone at 604-527-2258 or by email at virginia.dragan@gov.bc.ca

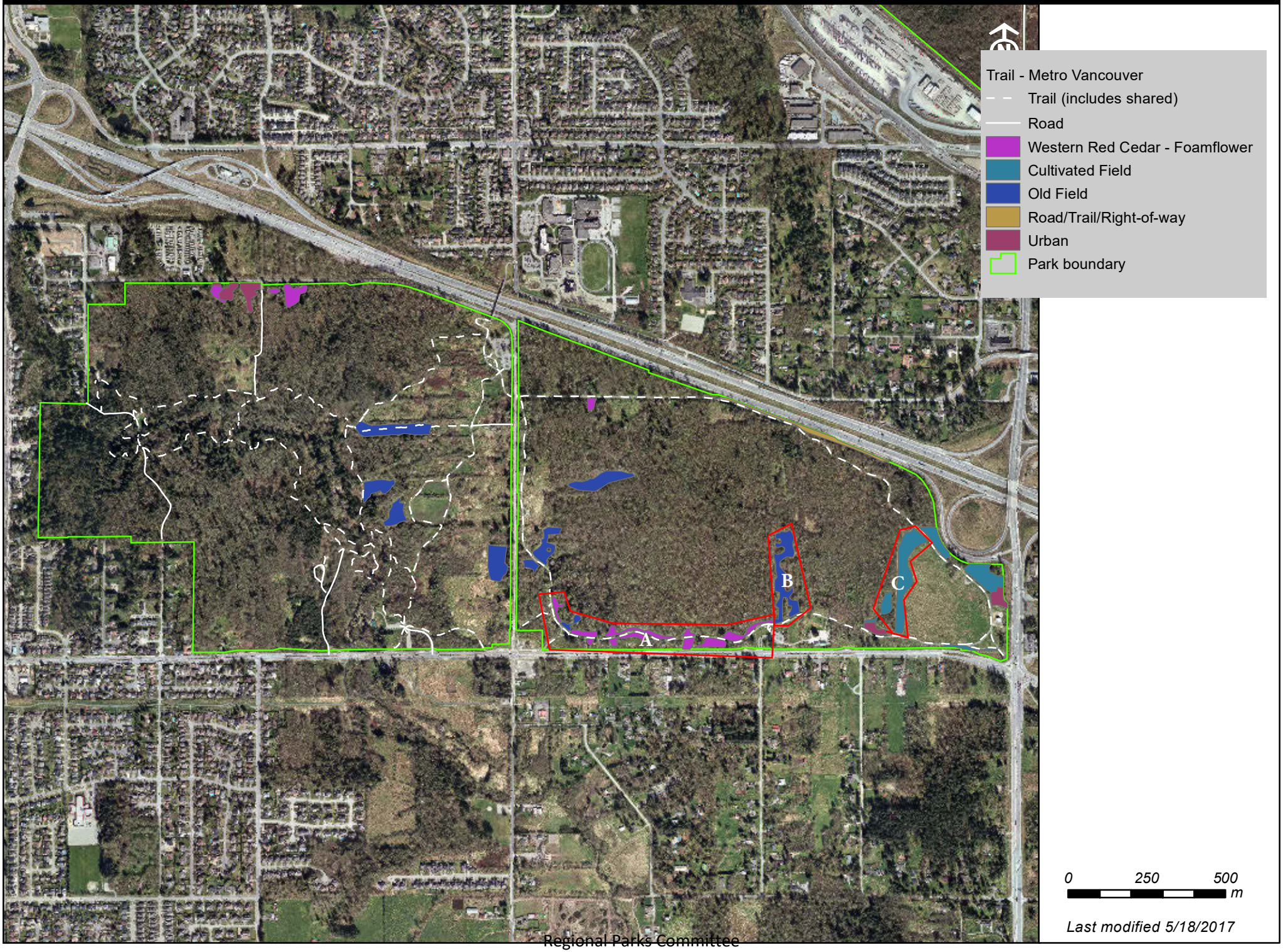
Sincerely,

Virginia Dragan

Environmental Coordinator
Ministry of Transportation and Infrastructure

Attachment: Tynehead Regional Park Forest Restoration Sites
c.c. Matthew Ramsay, Stantec Vegetation/Restoration Ecologist
Derek Drummond, Stantec Project Manager
Kyle Halvorson, Stantec Assistant Project Manager

Tynehead Regional Park Forest Restoration Sites



metrovancouver
SERVICES AND SOLUTIONS FOR A LIVABLE REGION

To: Climate Action Committee

From: David Hocking, Director, Climate Action Committee
Erik Blair, Air Quality Planner, Planning and Environment Department

Date: August 19, 2019 Meeting Date: September 20, 2019

Subject: **Forth's Roadmap 12 Electric Vehicle and Smart Mobility Conference**

RECOMMENDATION
That the Climate Action Committee receive for information the report dated August 19, 2019, titled "Forth's Roadmap 12 Electric Vehicle and Smart Mobility Conference".

PURPOSE
To provide the Climate Action Committee with a report on Forth's Roadmap 12 Electric Vehicle and Smart Mobility Conference, which was attended by one Metro Vancouver Director and one staff member.

BACKGROUND
The Roadmap 12 Electric Vehicle and Smart Mobility Conference (the Conference), now in its twelfth year, is held annually in the Pacific Northwest of the United States. The conference is hosted by Forth, a Portland, Oregon based non-profit focused on promoting electric, smart and shared transportation options. The Conference is an international meeting place for experts from government, utilities and industry. While Metro Vancouver staff have previously attended this conference, this is the first time a Director and staff member have attended.

At its meeting on January 11, 2019, the Climate Action Committee was advised that funds were allocated in the 2019 budget for one elected official to attend the Conference in Portland, Oregon. Director David Hocking represented Metro Vancouver, and was accompanied by Erik Blair, Air Quality Planner.

This report summarizes learnings from attendance at the Conference, to inform the development of goals, targets and actions for the *Climate 2050 Transportation Roadmap* and *Clean Air Plan.*

ROADMAP 12: TEST DRIVE THE FUTURE
The Conference theme this year was "test drive the future", recognizing the rapid growth in electric, smart and shared transportation technologies in the last 10 years. In a very short time, cities and regions across the globe have experienced a wave of new electric transportation options and models, including many new light and heavy duty electric vehicle models, electric bikes and electric scooters. While these cities and regions are paving the path, others are still seeking to learn from the leaders about the opportunities and challenges posed by these new technologies.

The Conference program included more than 120 speakers, discussion panels, dozens of exhibitors, and technical tours of direct relevance to the Climate Action Committee's mandate and work plan.

The event was attended by over 1,100 delegates from government, utilities, industry, academia and non-profit organizations.

The rapid increase in public demand for clean transportation options has created pressure on governments, utilities and other organizations to take immediate action. This was evident at the Conference, as sessions had high attendance across a wide range of topics. Conference speakers from governments, non-profits, academic institutions and utilities spoke to issues concerning vehicle technology, charging infrastructure, awareness campaigning, and equity in access to transportation options.

Important knowledge gained at the conference included the following insights:

- **"Equitable access" to clean transportation must be defined and addressed in planning initiatives, outreach messaging and incentive programs:** Equity emerged as a core theme in the Roadmap 12 Conference. Experts impressed upon participants that electric vehicle (EV) programs should be designed so that a diverse range of communities have access to charging and clean, safe, fair and affordable mobility options. Presenters highlighted health-based incentives for EV charging, electric car-sharing, income-qualified purchase incentives, location-planning for fast charging, and free transit zones as successful solutions already being implemented.

- **Public outreach is critical to EV uptake, and Metro Vancouver is demonstrating best practices:** Potential EV owners still face critical barriers to ownership including knowledge of vehicle models, cost of ownership, and access to charging at home, at work and in public spaces. Emerging best practices from the US in designing and implementing outreach programs are centered around test drive events and showcasing EVs at community events. Metro Vancouver's Emotive and EV Workplace programs use this outreach model and operate at a fraction of the cost of some of the programs described at the conference. Ideas for program updates include increasing language and cultural diversity in messaging, and developing online tools that appeal to different types of potential EV buyers.

- **Electric-assist bikes and scooters are connecting people to public transit in urban and rural communities:** Even advocates for zero emission cars and trucks recognize that the most climate-friendly options are self-propelled modes such as cycling and scootering. However, many people are still too far from bus and rapid transit stations to be convinced to leave their car behind. This is called the "first mile/last mile" problem. In both urban and rural contexts, e-bikes, e-scooters and other electric-assist vehicles are solving the first mile/last mile problem by connecting a more diverse group of people from their homes and workplaces to public transit.

- **Ride hailing services should be zero emissions:** While ride hailing services are new to BC, the United States has extensive experience with Transportation Network Companies (TNCs) such as Uber and Lyft. Presenters shared experiences with TNCs and cautioned that they represent a significant potential to increase transportation options, but may also significantly increase the number of vehicle kilometers travelled in a service area. Without a mix of policies such as

public transit incentives and clear fleet electrification requirements, TNCs may steal would-be transit users and increase greenhouse gas emissions. There are currently no low-carbon targets for fleets in BC's new ride hailing legislation.

- **Smart charging supports better utility planning:** By 2050, there will be millions of EVs charging at homes, workplaces, highway rest-stops, shopping centers and many other locations in North America. It is clear that the future of effective EV charging infrastructure relies on communications and information sharing. Smart and networked charging should be the standard wherever possible. This will allow utilities to use real data to plan for, and manage, infrastructure needs in a cost-effective manner.

- **Medium and heavy duty EV options are already here**: Many solutions already exist for cleaner medium and heavy duty vehicles, and more are coming quickly. Experts shared research and guidance on planning for medium and heavy duty vehicle charging, costs, and future model availability. The transferability of EV technology across multiple heavy duty vehicle categories will fast-track research and design periods, and governments, utilities and other agencies should be prepared for these technologies. Examples of available medium and heavy duty vehicles are transit, tour and school buses, urban delivery vehicles, and tractor-trailers. Electric ferries are also being introduced in Norway and Washington State.

- **Fast charging is critical for EV uptake, but still needs government and utility support in the short term:** Investments in fast charging will need to be made to expand service to many urban and rural EV users. Fast Charging, with approximately a 30-minute charge time, is already paving the way for "ultra-fast" charging, which fully charges the largest EV batteries in 15 minutes. The capital cost and power requirements of these chargers are significant, but provide a broader menu of charging options based on the location and intent of the charger. Utilities and governments in many jurisdictions are investing in critical fast charging infrastructure to improve the business case and encourage further investment from private companies.

The Conference also provided tours for participants to experience e-buses, e-bikes and e-scooters on the streets of Portland. Participants were also invited to explore Forth's Electric Showcase, a public space located in downtown Portland dedicated to educating the public about clean transportation. The Showcase provides EV test drives in a similar way to Metro Vancouver's Emotive program.

The amended *Climate 2050* target will drive action now

In July 2019, the Board amended the greenhouse gas (GHG) reduction target in the *Climate 2050 Strategic Framework* thereby committing to a carbon neutral region by 2050 and a 45% reduction from 2010 levels by 2030. The Board also adopted the *Board Strategic Plan 2019-2022*, which highlights the need to take strong leadership and guide climate action in the region in pursuit of a carbon neutral region by 2050. These are important steps because they align Metro Vancouver with the most recent scientific evidence on targets that can avoid catastrophic climate change and help to drive early zero emissions actions. The learnings from the Conference reinforce the understanding that achieving deep emissions reductions are possible, but that big changes take time. If Metro

Vancouver is going to achieve a carbon neutral region within 30 years, significant action needs to start today.

The ideas and best practices presented at the Roadmap 12 Conference can inform the long-term strategies and the early actions for the transportation sector for the *Climate 2050 Transportation Roadmap* and the *Clean Air Plan.*

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

FINANCIAL IMPLICATIONS
Attendance at events, seminars and technical conferences are important means by which Metro Vancouver's staff and committee representatives share knowledge and build expertise on key issues relating to Metro Vancouver's services. The Remuneration Bylaw authorizes Committees to recommend to the Board Chair the attendance by members at relevant events. Operating budgets include funds for staff attendance, within the Corporate Training and Development Policy. Costs associated with attendance at this event by elected officials and staff were approved as part of the 2019 budget.

SUMMARY / CONCLUSION
The Roadmap 12 Electric Vehicle and Smart Mobility Conference was an opportunity to learn about key challenges, solutions and current and future actions to increase the uptake of electric transportation options in North America. Delegates discussed topics such as electric options for "first mile/last mile" travel, the role of government and utilities in laying the foundation for broader private investment in EV infrastructure, and designing policies and programs for disadvantaged communities. There was broad agreement that solutions for convenient and accessible charging for a range of location types and vehicle modes is critical to electrifying the transportation sector, and that, without clear low-carbon requirements, ride-hailing services may significantly increase transportation emissions. Knowledge gained at the Roadmap conference will help to guide the development of goals, targets and actions for the *Climate 2050 Transportation Roadmap* and *Clean Air Plan*.

Reference
Roadmap 12 Conference Program

31632803

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SERVICES AND SOLUTIONS FOR A LIVABLE REGION

To: Climate Action Committee

From: Josephine Clark, Regional Planner
Planning and Environment Department

Date: August 23, 2019 Meeting Date: September 20, 2019

Subject: **Ecological Health – Tree Canopy Cover and Impervious Surfaces**

RECOMMENDATION
That the Climate Action Committee receive for information the report titled "Ecological Health – Tree Canopy Cover and Impervious Surfaces", dated August 23, 2019.

PURPOSE
To provide the Climate Action Committee with reporting and analysis of the newly developed regional ecological health indicators – tree canopy cover and impervious surfaces.

BACKGROUND
The Climate Action Committee's 2019 Work Plan includes "Ecological Health – tree canopy cover and landscape imperviousness monitoring" in the third quarter.

The Ecological Health Framework was adopted by the MVRD Board in October 2018 and proposes a series of regional ecological health indicators that together, when repeated over time, provide a 'state of the environment' assessment for the Metro Vancouver region. This report provides the results of analysis for two key regional ecological health indicators – tree canopy cover and impervious surfaces.

REGIONAL TREE CANOPY COVER AND IMPERVIOUS SURFACES REPORT
Tree canopy cover refers to the leaves and branches that form a visible layer if one is viewing the region from the air, and the extent to which they cover the ground. Impervious surfaces, such as paved roads and buildings, are surfaces that allow very little or no water to pass through them. In 2019, staff undertook an analysis of tree canopy cover and impervious surfaces in Metro Vancouver. Findings are provided in the attached report *Regional Tree Canopy Cover and Impervious Surfaces*.

Tree canopy cover and impervious surfaces were both measured using the Metro Vancouver high-resolution land cover classification, which was created in 2017. In addition to providing measures for each indicator at multiple scales, the report explores the relationship between the indicators and land use type and residential density, and future projections of tree canopy cover within the Urban Containment Boundary. A number of recommendations are provided relating to maintaining tree canopy cover and reducing imperviousness.

Why Measure Tree Canopy Cover and Impervious Surfaces?
Trees provide a range of important ecosystem services to people including shading, carbon storage, and stormwater management. Measuring tree canopy cover is a relatively simple way to determine the extent of the urban forest and the magnitude of services it provides. Impervious surfaces are associated with many of the negative effects of urbanization such as increased temperatures (the 'Urban Heat Island' effect) and flood risk, along with impacts to stream health through disrupted hydrological cycles and poor water quality. Measuring the level of landscape imperviousness gives an indication of the extents of these negative effects.

Tree canopy cover and imperviousness are ecological health indicators, but because of their connection to factors such as urban temperatures and stormwater management, they are also indicators of how resilient communities may be to climate-related impacts. Looking at whether these indicators are distributed equitably across cities or regions helps us to identify communities or populations more vulnerable to risks and receiving fewer ecosystem service benefits.

Levels and Trends of Tree Canopy Cover and Impervious Surfaces in the Region
In this region, tree canopy cover measures 54% for the entire Metro Vancouver land base, and 32% for the portion of the land within the Urban Containment Boundary. It should be noted that these measurements are averaged, and there is great variation among neighbourhoods and land use types. Impervious surfaces total 20% of Metro Vancouver's land base and 50% of the land base within the Urban Containment Boundary. Again, there is much variation in how impervious surfaces are distributed.

Perhaps surprisingly, high density housing (e.g. condos and towers) has accommodated increasingly more trees in recent decades, with a corresponding decrease in impervious surfaces. These trends seem to have leveled off in recent years, and it is uncertain what will happen in the future. Lower density housing (especially single-family detached housing) appears to have shifted from a housing model that accommodated many trees to one that accommodates increasingly fewer trees and more impervious surface due to expanding home sizes and lot-splitting. These trends are likely to continue into the future.

Projected growth in the region over the next 20-30 years is expected to impact tree canopy cover within the Urban Containment Boundary as lands planned for future urban growth are developed, and single-family detached housing stock is redeveloped. Tree canopy cover in the Urban Containment Boundary is projected to decrease from 32% to 28% from these sources of loss.

The report presents benchmark data analysis, and comparable historic data is not available to allow the estimation of change. However, a review of other data sources (including member jurisdiction tree canopy assessments) suggest tree canopy cover levels are in decline and levels of impervious surfaces are increasing in urbanizing watersheds. In the coming years, measurement of tree canopy cover and impervious surfaces will be repeated with updated land cover data to enable tracking of change over time and identification of trends.

Offsetting Losses through Tree Planting

Municipalities, including several Metro Vancouver member jurisdictions, often use tree planting programs as a way to maintain or expand their canopy, and actions such as these could help to offset anticipated future losses. To offset the projected decline in Urban Containment Boundary tree canopy cover from 32% to 28% would require 1,100 to 3,000 hectares of lands within the Urban Containment Boundary to be dedicated to tree planting.

Analysis indicates that about 30,000 hectares of land within the Urban Containment Boundary is potentially available for tree planting. Site-level analysis would be required to determine what area is actually available, but it does suggest that the 3,000 hectares required to offset projected losses is attainable. Potential planting availability was calculated using the 'Potential Planting Area' dataset which is detailed in Appendix 2 of the attached report and is available to member jurisdictions to assist with urban forest planning.

NEXT STEPS

The attached *Regional Tree Canopy Cover and Impervious Surfaces* report will be shared with member jurisdiction staff and staff advisory committees, such as the Regional Planning Advisory Committee – Environment Sub-Committee. In addition, staff will provide support for users of Metro Vancouver's Potential Planting Area dataset, which can be used to help members develop planting plans and targets. Metro Vancouver, member jurisdictions and other land owners and managers all have a role to play in maintaining tree canopy cover and reducing imperviousness. The report also provides a set of high level recommendations for consideration to support improved tree canopy cover and limiting impervious surfaces.

As noted earlier, because the attached report presents benchmark data analysis, in the coming years, measurement of tree canopy cover and impervious surfaces will be repeated with updated land cover data to enable tracking of change over time and identification of trends. Once complete, updated levels and trends in tree canopy cover and impervious surfaces will be presented to the Climate Action Committee.

In addition, through the 2020 budget process, a project is being proposed to: develop best practices to support urban forest managers, provide tree ratio guidance, recommend tree canopy cover targets, highlight tree bylaw and tree management best practices. Staff will report out to the Climate Action Committee subject to budget approval.

ALTERNATIVES

This is an information report. No alternatives are presented.

FINANCIAL IMPLICATIONS

Work associated with measuring these indicators was completed by staff as part of the Regional Planning annual work program.

SUMMARY / CONCLUSION

Tree canopy cover and landscape imperviousness are measures of the region's ecological health and have been analyzed in the recently completed *Regional Tree Canopy Cover and Impervious Surfaces*.

Tree canopy cover refers to the leaves and branches that form a visible layer if one is viewing the region from the air, and the extent to which they cover the ground. Impervious surfaces, such as paved roads and buildings, are surfaces that allow very little or no water to pass through them.

In the Metro Vancouver region, tree canopy cover measures 54% for the entire Metro Vancouver land base, and 32% for the portion of the land within the Urban Containment Boundary, with great variation among neighbourhoods and land use types. Impervious surfaces total 20% regionally and 50% of the land base within the Urban Containment Boundary.

High density housing development has accommodated increasingly more trees in recent decades, with a corresponding decrease in impervious surfaces. On the other hand, lower density housing appears to have shifted from a housing model that accommodated many trees to one that accommodates increasingly fewer trees and more impervious surface due to expanding home sizes and lot-splitting.

Overall, the report shows that regional tree canopy cover is in decline and impervious surfaces are most likely increasing as parts of the region urbanize. There are opportunities to turn these trends around, and this report includes a number of recommendations to help do so, including continued monitoring to inform actions, adopting and enforcing tree protection bylaws, and implementing green infrastructure approaches.

Attachment
Regional Tree Canopy Cover and Impervious Surfaces *(32352331)*

32360338

ATTACHMENT

August 2019

Regional Tree Canopy Cover and Impervious Surfaces

Analysis of Tree Canopy Cover and Impervious Surfaces in Metro Vancouver

Prepared by:
Leonardo Nicoletti
Josephine Clark

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SERVICES AND SOLUTIONS FOR A LIVABLE REGION

Contents

Executive Summary

Tree canopy cover refers to the leaves and branches that form a visible layer if one is viewing the region from the air, and the extent to which they cover the ground. Impervious surfaces, such as paved roads and buildings, are surfaces that allow very little or no water to pass through them.

Trees provide a range of important ecosystem services to people including shading, carbon storage, and stormwater management. Measuring tree canopy cover is a relatively simple way to determine the extent of the urban forest and the magnitude of services it provides. Impervious surfaces are associated with many of the negative effects of urbanization such as increased temperatures (the 'Urban Heat Island' effect) and flood risk, along with impacts to stream health through disrupted hydrological cycles and poor water quality. Measuring the level of landscape imperviousness gives an indication of the extents of these negative effects. Tree canopy cover and imperviousness are ecological health indicators but because of their connection to factors such as urban temperatures and stormwater management, they are also indicators of how resilient communities may be to climate-related impacts. Looking at whether these indicators are distributed equitably across cities or regions helps us to identify communities or populations more vulnerable to risks and receiving fewer ecosystem service benefits.

In this region, tree canopy cover measures 54% for the entire Metro Vancouver land base, and 32% for the portion of that land within the Urban Containment Boundary (UCB). These measurements are averaged, and there is great variation among neighbourhoods and land use types. Impervious surfaces total 20% of Metro Vancouver's land base and 50% of the UCB. Again, there is much variation in how impervious surfaces are distributed.

Against conventional wisdom, high density housing (e.g. condos and towers) has accommodated increasingly more trees in recent decades, with a corresponding decrease in impervious surfaces. These trends seem to have leveled off in recent years and it is uncertain what will happen in the future. Low density housing (especially single-family detached) appears to have shifted from a housing model that accommodated many trees to one that accommodates increasingly fewer trees and more impervious surface due to expanding home sizes and lot-splitting. These trends are likely to continue into the future.

Projected growth in the region over the next 20-30 years is expected to impact tree canopy cover within the UCB as lands planned for future urban growth are developed, and single-family detached housing stock is redeveloped. Tree canopy cover in the UCB is projected to decrease from 32% to 28% from these sources of loss.

Potential exists to 'offset' losses or increase canopy through tree planting in the UCB. The Metro Vancouver Potential Planting Area dataset summarizes how much area is potentially available for tree planting and can be used by member jurisdictions to assist with planning of the urban forest.

The report includes data and analysis for the entire Metro Vancouver region and was created using 5m resolution land cover data. This is a benchmark data analysis initiative and comparable historic data is not available to allow the estimation of change. However, several member jurisdictions of Metro Vancouver have measured tree canopy locally over time and report losses. In addition, Metro Vancouver's own Sensitive Ecosystem Inventory indicates a loss of about 240 hectares of young and mature forests between 2009 and 2014 in the UCB, and almost 1,000 hectares regionally. Fewer data

sources are available to help identify potential regional trends in impervious surfaces but it is likely increasing in urbanizing watersheds.

Measurement of tree canopy cover and impervious surfaces will be repeated with updated land cover data to enable tracking of change over time and identification of trends.

In conclusion, the regional tree canopy cover is in decline, measurably. Impervious surfaces are most likely increasing as parts of the region urbanize. There are opportunities to turn these trends around, and this report includes a number of recommendations to help do so, including continued monitoring to inform actions, adopting and enforcing tree protection bylaws, and implementing green infrastructure approaches.

Background

Key Terms

High Density Housing Stock: Apartment oriented parcels of type "Low-Rise Apartment" and "Mid/High-Rise Apartment".

Impervious Surfaces: Surfaces that allow very little to no water to pass through them. Paved roads and asphalt are examples of impervious surfaces.

Land Cover: Biophysical features on the earth's surface mapped using multispectral satellite imagery and LiDAR (where available). Classes include coniferous tree, deciduous tree, grass/herb, buildings, paved, and water.

Land Use: The way in which land is used by humans for specific purposes. Examples of land use include residential land use and industrial land use.

Low Density Housing Stock: Ground oriented parcels of type "Single-family detached", "Multi Detached", and "Townhouse".

Metrics: Statistical information summarized categorically (e.g. zoning class) or spatially (e.g. Census blocks).

Potential Planting Area: Land that could theoretically be used to increase Tree Canopy Cover. % Potential Planting Area includes areas currently occupied by non-tree vegetation (grass, shrubs etc.), soil patches, barren surfaces, pavement that does not fall on roads, and that under the right circumstances, could be modified to increase tree canopy cover.

Tree Canopy Cover: The area occupied by all deciduous and coniferous tree crowns (i.e. area occupied by leaves as viewed from the top) in an urban area, as measured from aboveground.

Urban Containment Boundary (UCB): Identified by *Metro 2040* as the area where 98% of future urban growth is to be contained.

Data and Methodology

The 2014 Metro Vancouver Land Cover Classification dataset was used to map and measure tree canopy cover and impervious surface across the Metro Vancouver region. The Land Cover is a 5m resolution GIS mapping dataset and was created using RapidEye satellite imagery and where available, LiDAR data.

The Metro Vancouver Generalized Land Use layer was used in order to assess tree canopy cover and impervious surface in relation to different land use types. The 2016 Generalized Land Use is a non-official 'regional reference map' that depicts land activities existing across Metro Vancouver.

Analysis Area

The Urban Containment Boundary, or UCB, is the area within Metro Vancouver where urban development and future urban growth are focused (see Figure 1). The UCB is used as the primary analysis area in this report because it is where most people in the region live and work. It is therefore an

important area for the provision of ecosystem services by trees, and where most of the negative impacts from impervious surfaces will be experienced. It is also where losses in tree canopy cover and increases in impervious surfaces are most likely to occur through development and redevelopment.

Figure 1: Metro Vancouver's Urban Containment Boundary

In this report, tree canopy cover and imperviousness are reported as a percentage of an area, for example, % Tree Canopy Cover by city block, or % Impervious Surface of the UCB.

Section 1 – Tree Canopy Cover

Why Measure Tree Canopy Cover?

Trees provide a range of 'ecosystem services' – the benefits people obtain from ecosystems – including shading and cooling (which helps to mitigate the Urban Heat Island effect[1]), carbon storage, stormwater management, and wildlife habitat. There is also a growing body of evidence demonstrating that trees and other greenspace have significant human health and well-being benefits through disease prevention and promotion of health[2]. Measuring tree canopy cover is a relatively simple way to determine the extent of the urban forest and the magnitude of services it provides[3]. Healthy forests in both urban and natural areas are an important component of regional livability and resilience to climate change.

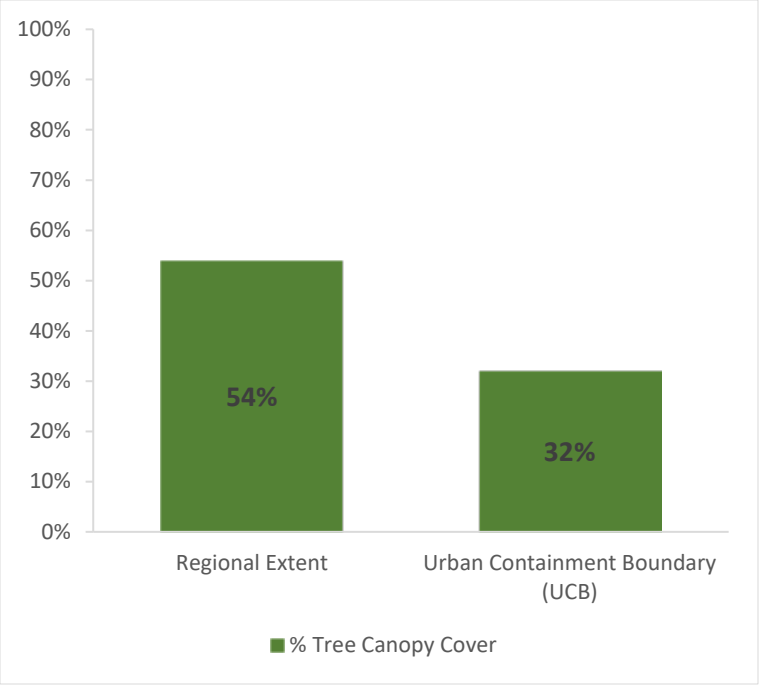

Figure 2: % Tree Canopy Cover for the Metro Vancouver region and within the Urban Containment Boundary.

[1] The term "Urban Heat Island" describes built up areas that are hotter than nearby rural areas

[2] Van den Bosch, M. & Ode Sang, A. (2017). Urban natural environments as nature-based solutions for improved public health - A systematic review of reviews. Environmental Research. 158: 373-384

[3] Leff (2016) The Sustainable Urban Forest – A Step-by-Step Approach

Tree Canopy Cover Levels – General Results

The analysis found that 160,400 ha of Metro Vancouver, and 29,000 ha of lands within the UCB are covered by tree canopy. This represents 54% of Metro Vancouver's land base and 32% of lands within the UCB (Figure 2).

Figure 3 shows % Tree Canopy Cover summarized by city block[4] within the UCB and illustrates the distribution of tree canopy cover within the UCB. Grey indicates very low tree canopy cover (less than 5%) and dark green indicates very high tree canopy cover (more than 60%). Concentrated areas of low tree canopy cover generally correspond to dense urban areas and industrial lands. Areas of high tree canopy cover within the UCB tend to be parks and currently undeveloped areas that are slated to accommodate planned future urban growth.

Maps of the spatial distribution of tree canopy cover (such as Figure 3) can be used by local governments in urban forest planning including determining priority planting locations and identifying underserviced communities.

[4] A dissemination block (DB) is an area "equivalent to a city block" bounded on all sides by roads and/or boundaries of standard geographic areas. The dissemination block is the smallest geographic area for which population and dwelling counts are disseminated. Dissemination blocks cover all the territory of Canada (Statistics Canada. (2018). Dissemination Block. *Dictionary, Census of Population, 2016.*).

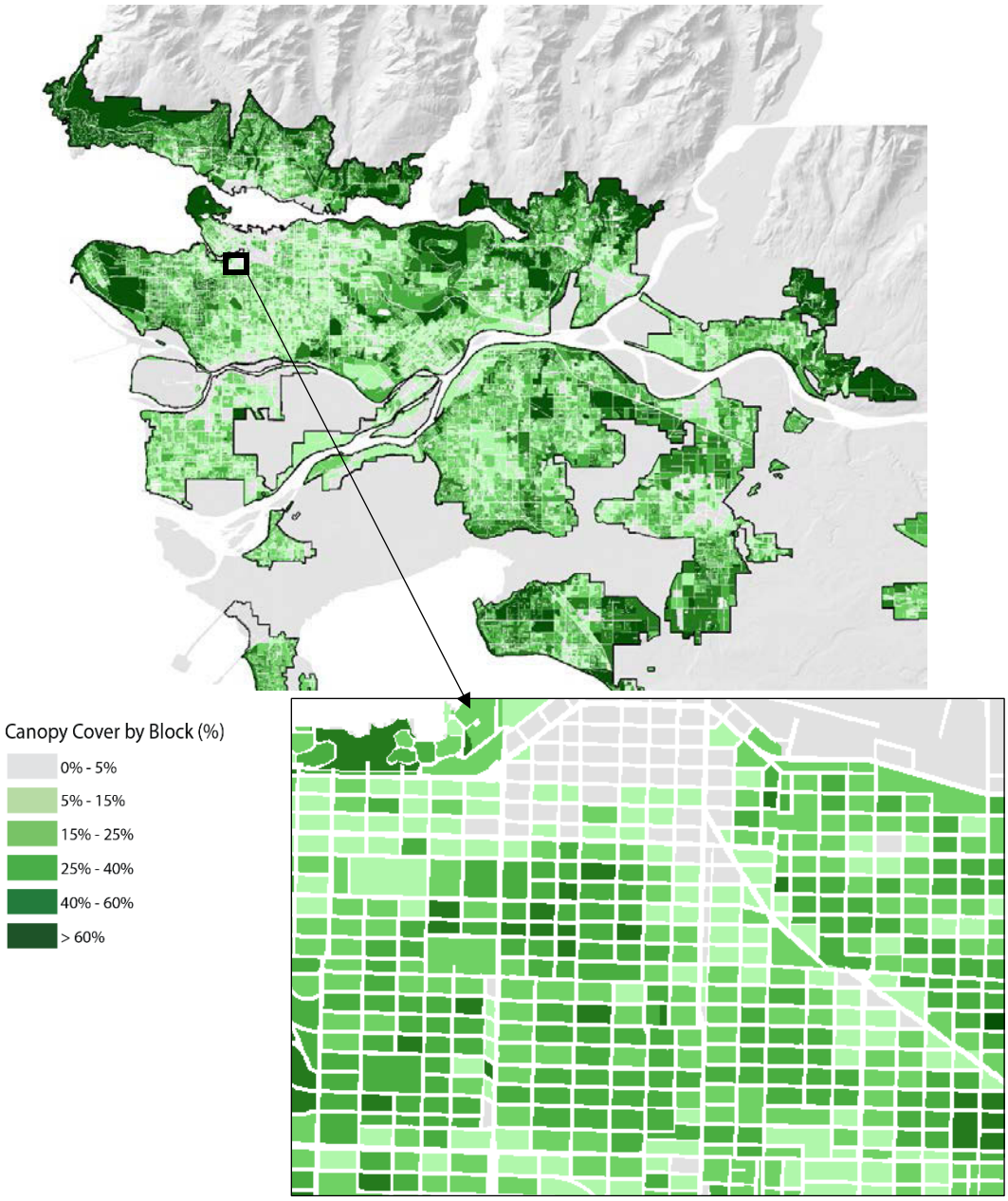

Figure 3: % Tree Canopy Cover summarized by city block within the Urban Containment Boundary.

Trends in % Tree Canopy Cover

It is not yet possible to assess trends in regional tree canopy cover because comparable historical data is unavailable. The regional Land Cover Classification dataset used to measure tree canopy cover will be updated in 2021 and at that point, regional trends will be assessed and reported.

However, other sources of information are available that provide an indication of how the region's tree canopy has changed over time. The Metro Vancouver Sensitive Ecosystem Inventory reported losses of 240 ha of young and mature forests between 2009 and 2014 within the Urban Containment Boundary (UCB) and almost 1,000 ha for the region. In addition, several member jurisdictions have measured their tree canopy cover over time and all have reported losses (Figure 4).

Available data therefore indicates that regional canopy cover is declining but the magnitude of this decline is not clear.

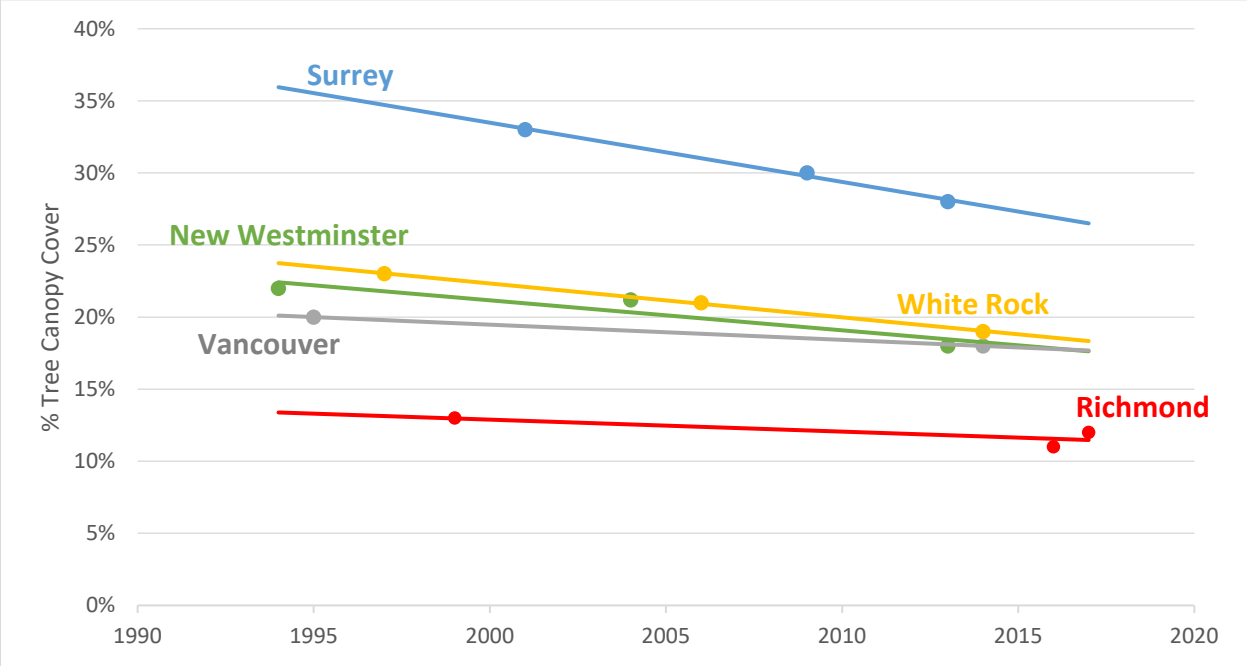

Figure 4: Reported change in % Tree Canopy Cover in Surrey[5], New Westminster[6], Vancouver[7], White Rock[8], and Richmond[9]

[5] City of Surrey Open Data website (visited August 2019)

[6] City of New Westminster Urban Forest Management Strategy

[7] Vancouver Board of Parks and Recreation, Urban Forest Strategy, 2018 Update

[8] City of White Rock Urban Forest Management Plan Workshop, 2015

[9] Email communication with City of Richmond (A. Kurnicki), 2019

% Tree Canopy Cover by Member Jurisdiction

Figure 5 shows % Tree Canopy Cover within the UCB for each member jurisdiction in 2014. Overall, nine member jurisdictions meet or exceed the UCB average of 32% tree canopy cover for lands within their boundaries and inside the UCB.

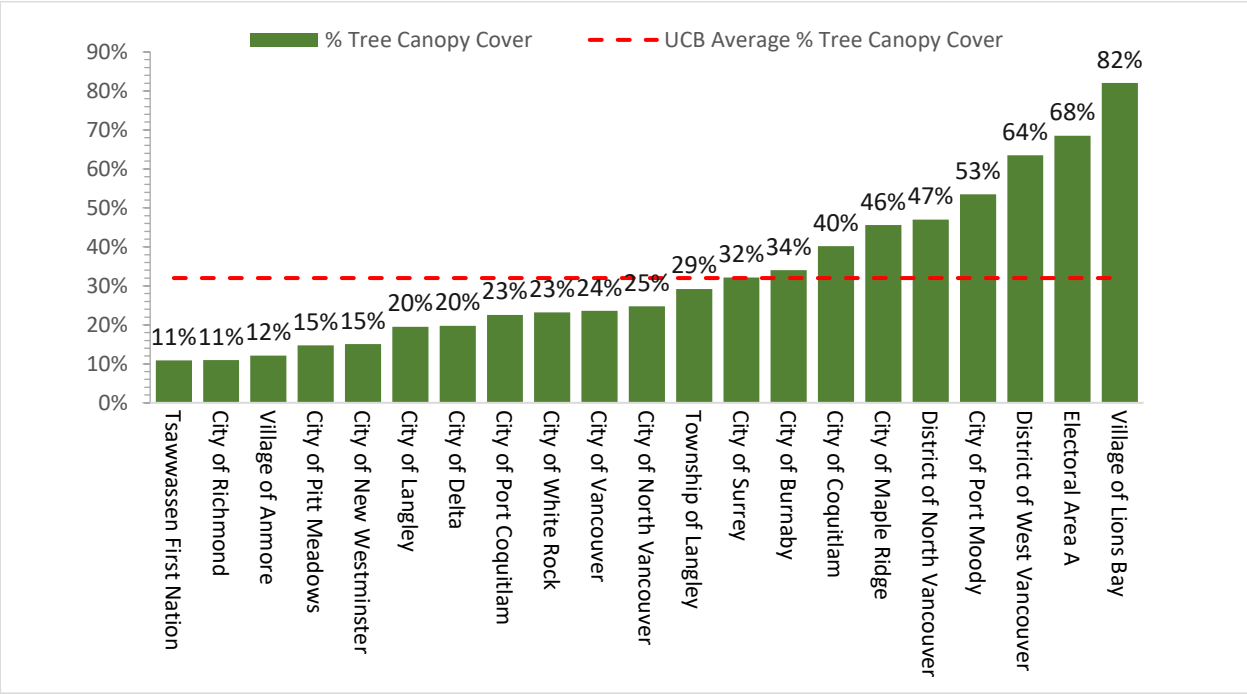

Figure 5: % Tree Canopy Cover within the Urban Containment Boundary by Metro Vancouver member jurisdiction (2014)[10]

Table 1 below provides a summary of each member jurisdiction's total tree canopy cover, and tree canopy cover within the UCB[11].

[10] Please note that Belcarra and Bowen Island are not included on Figure 5 because they fall outside the UCB - these results show % Tree Canopy Cover within the UCB only.

[11] Additional tables with tree canopy cover information are provided in Appendix 1

Member Jurisdiction	% Tree Canopy Cover	
	Within the member jurisdiction's boundary[12]	**Within the UCB**
Bowen Island Municipality	94%	Not in UCB
City of Burnaby	34%	34%
City of Coquitlam	62%	40%
City of Delta	15%	20%
City of Langley	20%	20%
City of Maple Ridge	72%	46%
City of New Westminster	16%	15%
City of North Vancouver	25%	25%
City of Pitt Meadows	19%	15%
City of Port Coquitlam	26%	23%
City of Port Moody	67%	53%
City of Richmond	15%	11%
City of Surrey	28%	32%
City of Vancouver	23%	24%
City of White Rock	23%	23%
District of North Vancouver	81%	47%
District of West Vancouver	78%	64%
Electoral Area A	80%	68%
Township of Langley	35%	29%
Tsawwassen First Nation	7%	11%
Village of Anmore	87%	12%
Village of Belcarra	94%	Not in UCB
Village of Lions Bay	83%	82%

Table 1: % Tree Canopy Cover for Metro Vancouver member jurisdictions (2014)

Differences between Regional and Member Jurisdiction Tree Canopy Cover Estimates

Regional and member jurisdiction tree canopy cover estimates will often differ by a few percentage points due to the different methodologies employed to generate the estimates. Available member jurisdiction estimates are provided alongside estimates generated from regional data in Table 2. Where estimates generated by member jurisdictions are available, they should be relied upon instead of the estimate created using regional data.

[12] Excluding ocean and the Fraser River

Member Jurisdiction	Member Jurisdiction Canopy Estimate (Year)	Regional Canopy Estimate (2014)
New Westminster	18% (2013)	16%
Richmond	12% (2017)	15%
Surrey	28% (2013) (excludes ALR)	28%
Vancouver	18% (2014)	23%
White Rock	19% (2014)	23%

Table 2: Comparison between Regional and Member Jurisdiction % Tree Canopy Cover Estimates

How Much Tree Canopy Cover is Enough?

In response to declines in tree canopy, many cities in Metro Vancouver and across North America have begun monitoring canopy cover and establishing targets. Targets set are highly variable, ranging between 20% and 60%[13]. This reflects the many factors that influence target-setting including climate and geography, the pre-development land cover (e.g. grassland vs forest) along with constraints such as existing development densities and land use patterns.

Tree canopy cover targets set in the Metro Vancouver region and Pacific Northwest include:

- City of Surrey – maintain canopy at 30% (excluding the ALR)[14]
- City of Vancouver – increase canopy from 18% to 22% by 2050[15]
- City of New Westminster – increase canopy to 27% by 2035 and an aspirational long-term goal of 40%[16]
- City of Victoria – increase canopy from 18% to 40%[17]
- Portland, Oregon – increase canopy from 26% to 33%[18]
- Seattle, Washington – increase canopy from 23% to 30% by 2037[19]

The North American average for urban tree canopy is 27%[20] (and declining[21]) so referring to Figure 5, about half of Metro Vancouver member jurisdictions are above this average.

It should be noted that although much of the Metro Vancouver region was historically forested, some areas (such as Richmond and Delta) would have been less treed, with large areas of grassland and

[13] Leff, M (2016) The Sustainable Urban Forest – A Step-by-Step Approach. See p.17 - Tree canopy cover levels and goals for selected cities
[14] City of Surrey Open Data website (visited August 2019)
[15] Vancouver Board of Parks and Recreation, Urban Forest Strategy, 2018 Update
[16] City of New Westminster Urban Forest Management Strategy
[17] City of Victoria Urban Forest Master Plan (2013)
[18] Portland Plan (2012)
[19] City of Seattle Urban Forest Stewardship Plan (2013)
[20] Dwyer, J., Nowak, D.(2000) *A national assessment of the urban forest: an overview.* Proceedings of Society of 1999 American Foresters National Convention, Portland, OR.
[21] Nowak, D.J., and E.J. Greenfield (2012) "Tree and impervious cover change in U.S. cities." Urban Forestry & Urban Greening, Vol. 11, 2012; pp 21-30

wetlands[22]. As a result of this historic context, the communities and urban centres now found in these areas often have lower levels of tree canopy cover.

Urban tree canopy extent is the focus of this report but not the only criteria to consider when assessing the health of the urban forest. A sustainable urban forest contains trees in good condition, with a diversity of ages and species, and considers climate resilience in tree selection. And an equitable distribution of trees across neighborhoods and income levels will ensure all residents receive the benefits provided by the urban forest.

% Tree Canopy Cover Distribution within the Urban Containment Boundary

Figure 6 shows the proportion of regional tree canopy cover by member jurisdiction (within the UCB). This chart reveals each jurisdiction's current contribution to regional canopy cover levels. Around half (54%) of Metro Vancouver's tree canopy cover within the UCB is located within four member jurisdictions; Surrey contributes 24% of all canopy cover within the UCB, followed by Burnaby (11%), West Vancouver (10%), and Vancouver (9%).

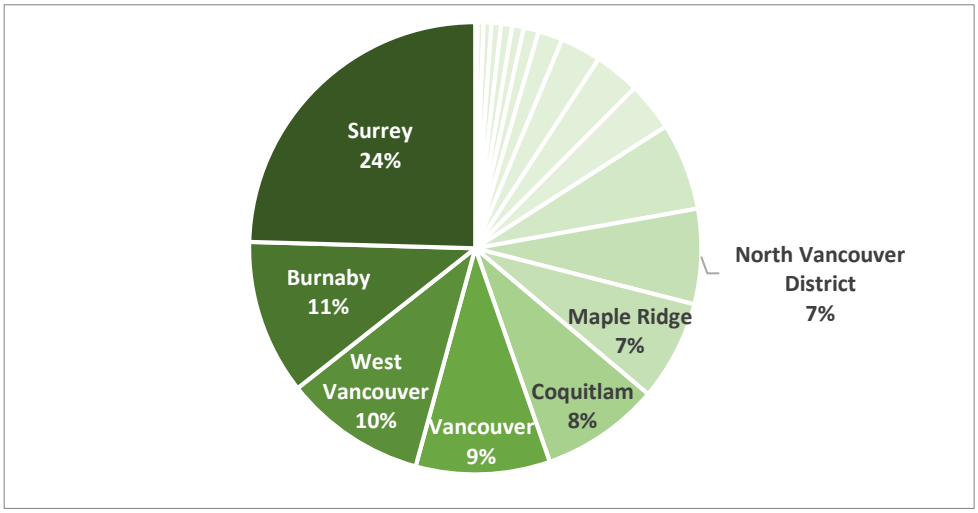

Figure 6: Proportion of tree canopy cover within the Urban Containment Boundary by member jurisdiction.

[22] North M.E.A. & Teversham, J.M. (1983) The vegetation of the floodplains of the Lower Fraser, Serpentine and Nicomekl Rivers, 1859 to 1890. Syesis 17: 47-66 + loose map

% Tree Canopy Cover within the Urban Containment Boundary: Land Use Patterns

To further understand the spatial distribution of tree canopy cover within the UCB, canopy was measured in relation to land use. Using the regional Generalized Land Use (2016) layer, % Tree Canopy Cover was calculated for different types of land use and the results are shown in Figure 7.

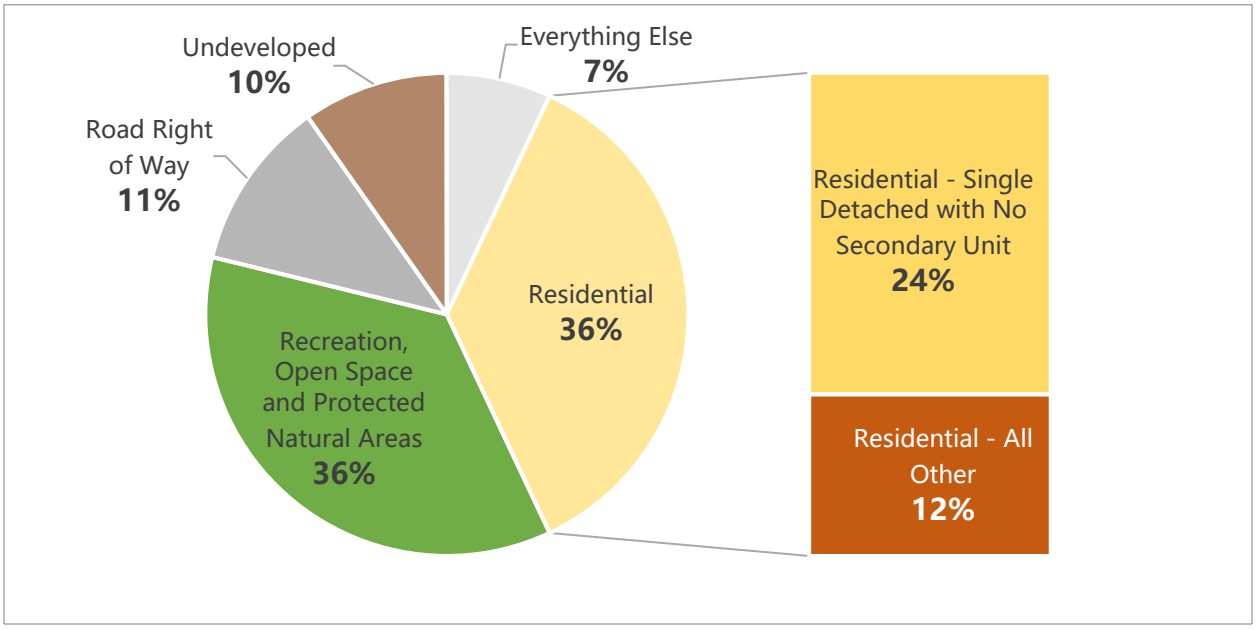

Figure 7: Distribution of tree canopy cover among land use types within the Urban Containment Boundary.

Points to note:

- Most of Metro Vancouver's tree canopy within the UCB is located within recreation and protected natural areas (36%) and residential areas (36%).
- 24% of tree canopy cover within the UCB is found within one particular type of residential area - "Residential – Single-family detached with No Secondary Unit". This residential type covers 30% of land within the UCB, so it is not surprising that most tree canopy is found here.

Some land use types have notably low tree canopy cover. For example, areas designated for 'Parking' have an average of 3% tree canopy cover; 'Retail and Other Commercial' areas have an average of 5% tree canopy cover[23] (see Table 6 in Appendix 1 for a detailed breakdown of tree canopy cover for all land use types).

[23] These land use types are small in overall area so are included within 'Everything Else' in Figure 7

Section 2 – Impervious Surface

Why Measure Levels of Impervious Surface?

The amount of impervious surface is a general measure of urbanization. It is also an ecological health indicator because increasing levels of imperviousness result in disrupted hydrological cycles and increased amounts of polluted runoff entering streams.

Increased imperviousness also results in increased temperatures compared to surrounding rural areas because there is less vegetation, which results in less shade and moisture (from plant evapotranspiration). This is known as the 'Urban Heat Island' effect and identifying areas with high imperviousness is a way of identifying communities at higher risk of potential impacts from heat – an issue of increasing concern as climate change results in increasing temperatures. Areas with high imperviousness may also be at greater risk of localized flooding as water is less able to infiltrate into the ground. This issue will also be exacerbated by climate change which is expected to bring more frequent extreme rain events.

Imperviousness is an indicator of ecological health, vulnerability to climate impacts, and human health and well-being.

Impervious Surface Levels – General Results

The analysis found that 58,000 ha of the Metro Vancouver region, and 45,000 ha of the UCB are covered by impervious surface. This corresponds to 20% of the Metro Vancouver region and 50% of the UCB (Figure 8).

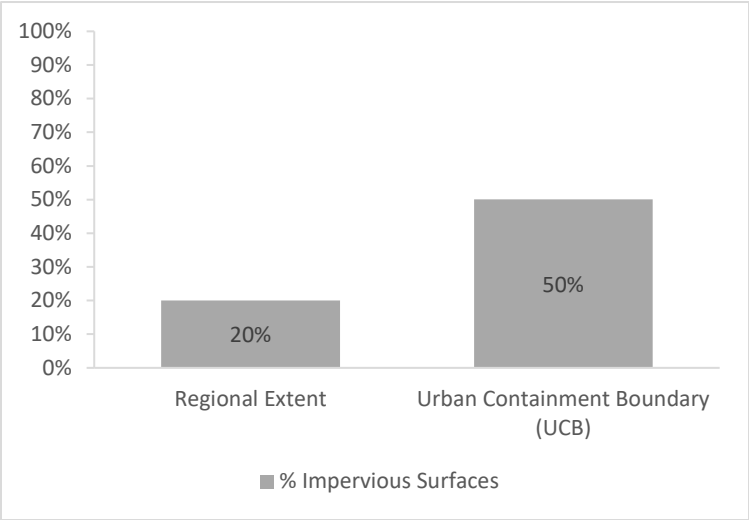

Figure 8: % Impervious Surface for the Metro Vancouver region and the UCB.

Figure 9 is a map of % Impervious Surface summarized by city block[24] within the UCB and illustrates the distribution of impervious surfaces within the UCB. Grey indicates very high levels of impervious surface

[24] A dissemination block (DB) is an area "equivalent to a city block" bounded on all sides by roads and/or boundaries of standard geographic areas. The dissemination block is the smallest geographic area for which population and dwelling counts are disseminated. Dissemination blocks cover all the territory of Canada (Statistics Canada. (2018). Dissemination Block. *Dictionary, Census of Population, 2016.*).

(more than 80%) and turquoise indicates very low levels of impervious surface (less than 20%). Concentrated areas of high imperviousness generally correspond to urban centers. Areas of low imperviousness within the UCB tend to be parks or greenfield sites that are yet to have been developed.

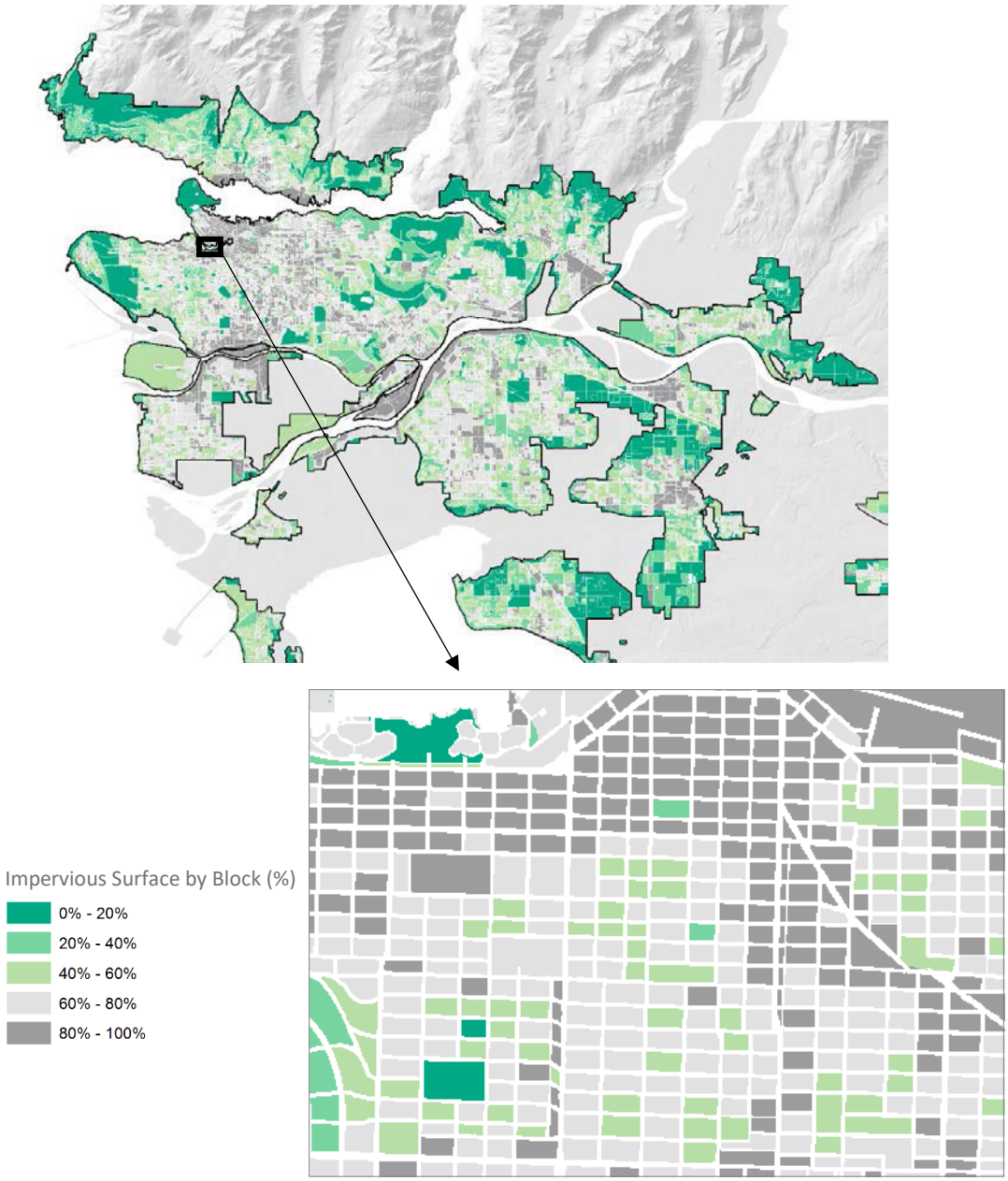

Figure 9: % Impervious Surface summarized by city block within the Urban Containment Boundary

General Trends in % Impervious Surface

It is not yet possible to assess trends in regional impervious surface coverage because comparable historic data is unavailable. However, increasing imperviousness is typically associated with

urbanization and has been recorded by stream health monitoring studies within the region[25]. It is likely therefore that the trend within Metro Vancouver and particularly the UCB is towards increasing imperviousness. The regional Land Cover Classification dataset used to measure imperviousness will be updated in 2021 and at that point, regional trends will be assessed and reported.

% Impervious Surface by Member Jurisdiction

Figure 10 shows % Impervious Surface within the UCB for each member jurisdiction in 2014. Overall, twelve member jurisdictions are below the UCB average of 50% impervious surface for lands within their boundaries and inside the UCB.

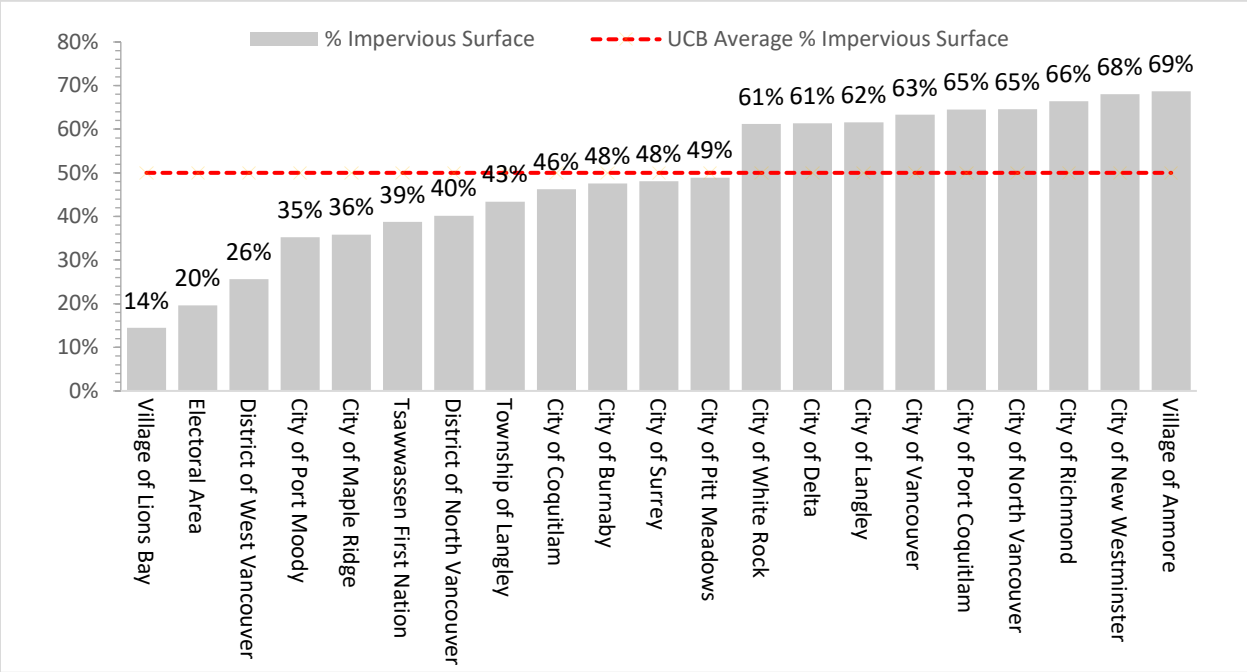

Figure 10: % Impervious Surface within the Urban Containment Boundary by member jurisdiction (2014)[26]

Table 3 below provides a summary of each member jurisdiction's total amount of impervious surface, and amount of impervious surface within the UCB[27].

[25] Raincoast Applied Ecology (2013) Stream health monitoring in Metro Vancouver. Report to Metro Vancouver.
[26] Please note that Belcarra and Bowen Island are not included on Figure 4 because they fall outside the UCB - these results show % Impervious Surface within the UCB only.
[27] Additional tables with impervious surface information are provided in Appendix 1

Member Jurisdiction	% Impervious Surface	
	Within the member jurisdiction's boundary[28]	Within the UCB
Bowen Island Municipality	4%	Not in UCB
City of Burnaby	48%	48%
City of Coquitlam	24%	46%
City of Delta	27%	61%
City of Langley	59%	62%
City of Maple Ridge	9%	36%
City of New Westminster	67%	68%
City of North Vancouver	65%	65%
City of Pitt Meadows	13%	49%
City of Port Coquitlam	49%	65%
City of Port Moody	23%	35%
City of Richmond	47%	66%
City of Surrey	35%	48%
City of Vancouver	61%	63%
City of White Rock	61%	61%
District of North Vancouver	11%	40%
District of West Vancouver	14%	26%
Electoral Area A	6%	20%
Township of Langley	16%	43%
Tsawwassen First Nation	29%	39%
Village of Anmore	3%	69%
Village of Belcarra	5%	Not in UCB
Village of Lions Bay	15%	14%

Table 3: % Impervious Surface for Metro Vancouver member jurisdictions (2014)

How Much Impervious Surface is Too Much?

Research has shown there to be 'an empirical correlation between a watershed's total impervious area and its health, where the health of a watershed decreases as its unmitigated imperviousness increases'[29].

Many thresholds of biological degradation (e.g. invertebrate and fish diversity) and physical degradation (e.g. hydrology and geomorphology) in streams are associated with 10-20% impervious surface within the watershed[30].

[28] Excluding ocean and the Fraser River

[29] Metro Vancouver (2017) Region-wide Baseline for On-site Stormwater Management

[30] Paul, M.J. and Meyer, J.L. (2001) Streams in the Urban Landscape. Annual Review of Ecology and the Systematics. 32:333-65

This report has provided impervious surface measures with respect to administrative boundaries (member jurisdiction boundary, urban containment boundary, etc.) rather than watershed boundaries, so further analysis would be required to determine where in the region has exceeded 10-20% imperviousness. However, given the high levels of impervious surface documented (Figure 10), many watersheds coinciding with the region's urban areas likely exceed thresholds for degradation.

% Impervious Surface Distribution within the Urban Containment Boundary

Figure 11 shows the proportion of regional impervious surface by member jurisdiction (within the UCB). This chart reveals each jurisdiction's current contribution to regional impervious surface levels. Around half (49%) of Metro Vancouver's impervious surface within the UCB is located within three member jurisdictions; Surrey contributes 23% of all impervious surface within the UCB, followed by Vancouver (16%), Richmond (11%), and Burnaby (10%).

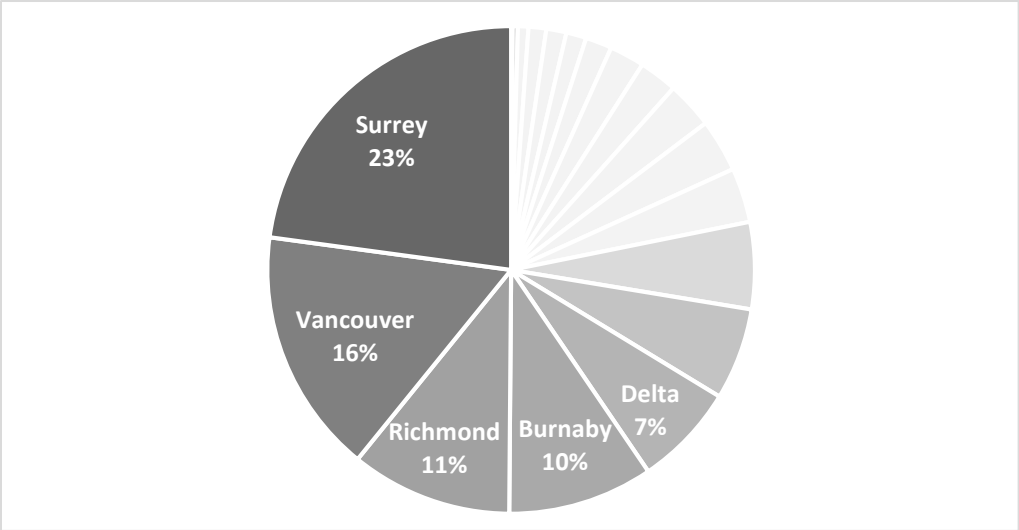

Figure 11: Proportion of impervious surface within the Urban Containment Boundary by member jurisdiction

% Impervious Surface within the Urban Containment Boundary: Land Use Patterns

To further understand the spatial distribution of impervious surface within the UCB, amount of impervious surface was measured in relation to land use. Using the regional Generalized Land Use (2016) layer, % Impervious Surface was calculated for different types of land use and the results are shown in Figure 12.

Points to notes:

- Most of Metro Vancouver's impervious surface is located within residential areas (42%) and road right of ways (25%).
- 30% of impervious surface within the UCB is found within one particular type of residential area - "Residential – Single-family detached with No Secondary Unit". This residential type covers 30% of land within the UCB, so it is not surprising that most tree canopy is found here.

Some land use types have notably high levels of impervious surface. For example, areas designated for 'Parking' have an average of 90% impervious surface; 'Retail and Other Commercial' land use types have an average of 92% impervious surface (see Table 6 in Appendix 1 for a detailed breakdown of impervious surface for all land use types).

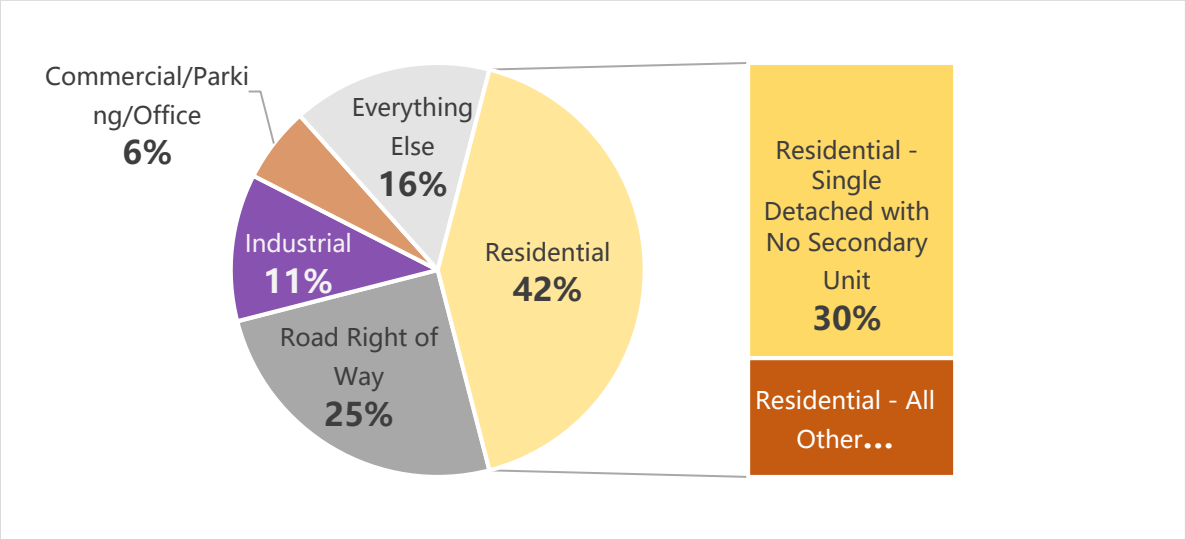

Figure 12: Distribution of impervious surface among land use types within the Urban Containment Boundary

Section 3 - The Relationship between Tree Canopy Cover, Impervious Surfaces, and Residential Density - Temporal Analysis and Future Projections

To explore how tree canopy cover and impervious surface has been influenced by trends in residential building practices, the following analysis looked at the relationship between the year of construction for residential parcels, and the amount of tree canopy cover and impervious surface currently found there.

Tree canopy cover and impervious surface levels are typically related - as the amount of one falls, there is often a corresponding rise in the other. Areas of impervious surface in urban areas include buildings, driveways, paths, and roads. This section explores the relationship between tree canopy cover and impervious surfaces in the Metro Vancouver context.

For this analysis, housing types were split into two categories:

- 'High Density Housing' is defined as apartment oriented parcels with 'Low-Rise Apartment' and 'Mid/High-Rise Apartment'.
- 'Low Density Housing' is defined as ground oriented parcels with 'Single-family detached', 'Multi Detached', and 'Townhouse'.

Average % Tree Canopy Cover by Residential Density: Temporal Trends

Figure 13 illustrates the relationship between amount of tree canopy today on parcels with low density housing and high density housing, and the year in which they were constructed. It demonstrates that for low density housing, there has been a decline in tree canopy cover for parcels constructed in more recent years.

The decline in average % Tree Canopy Cover for low density housing stock parcels has been consistent, from 36% for those built in 1970 to 18% for those built in 2000. This decline indicates that fewer, or smaller, trees are being retained or planted during construction of low density housing over time.

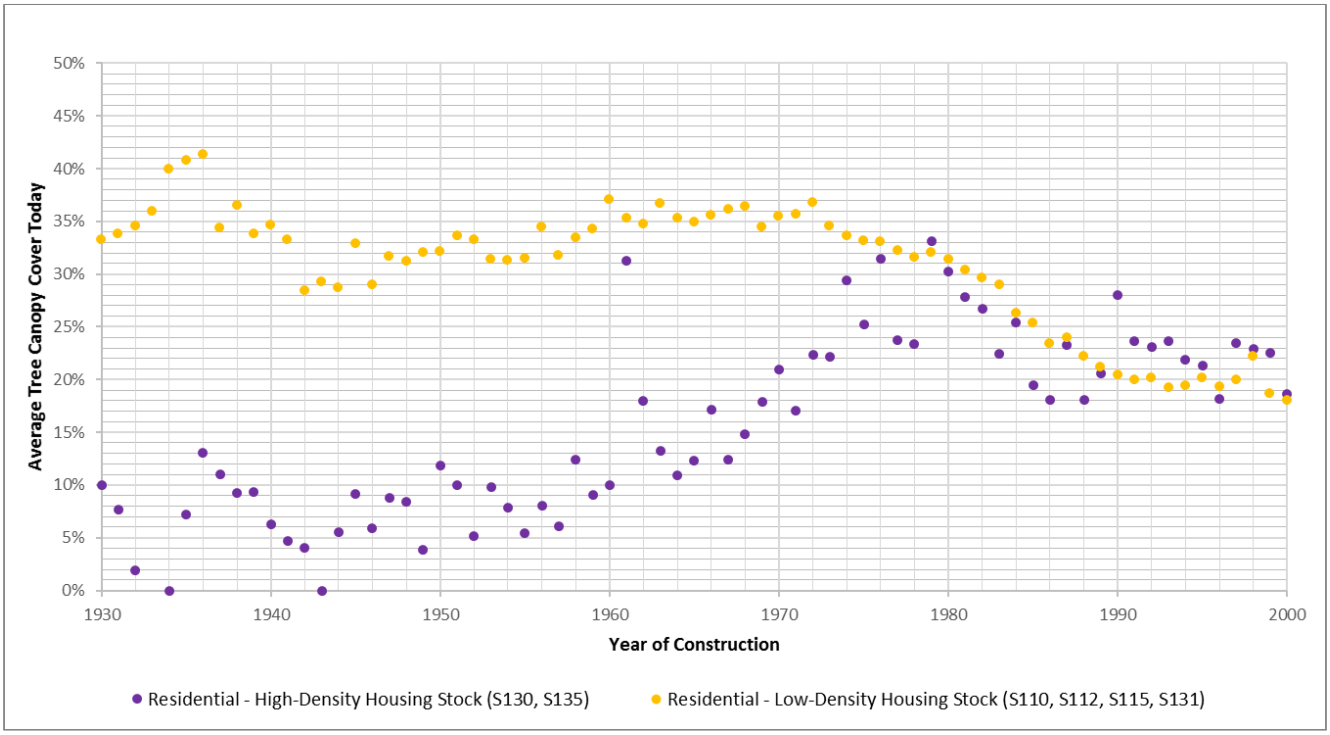

Figure 13: Average % Tree Canopy Cover for low density housing stock and high density housing stock parcels by year of construction.

In contrast, tree canopy is higher for high density housing constructed more recently. Although the relationship is less strongly linear, the data indicates that there has been an overall increase in the number of trees planted or retained for high density housing over time.

Figure 13 only displays results up to the year 2000 because more recently constructed parcels are likely to have a higher proportion of younger, newly planted trees, which have not yet grown a full canopy.

Average % Impervious Surfaces by Residential Density: Temporal Trends

Figure 14 illustrates the relationship between the amount of impervious surface within low density housing and high density housing, and the year in which they were constructed. For almost every year since 1970, the average low density housing parcel has more % Impervious Surface today than the average parcel for the previous year. The analysis shows that there has been a consistent increase in average % Impervious Surface within the low density housing stock, from 49% for parcels built in 1970 to 75% for parcels built in 2012.

In contrast, average % Impervious Surface has been decreasing over time within the high density housing stock. As with % Tree Canopy Cover, the relationship between % Impervious Surface and year of construction for high density housing stock is less linear; but overall there has been a clear trend of decline in levels of impervious surfaces since the 1950's, although this trend has levelled out in recent years.

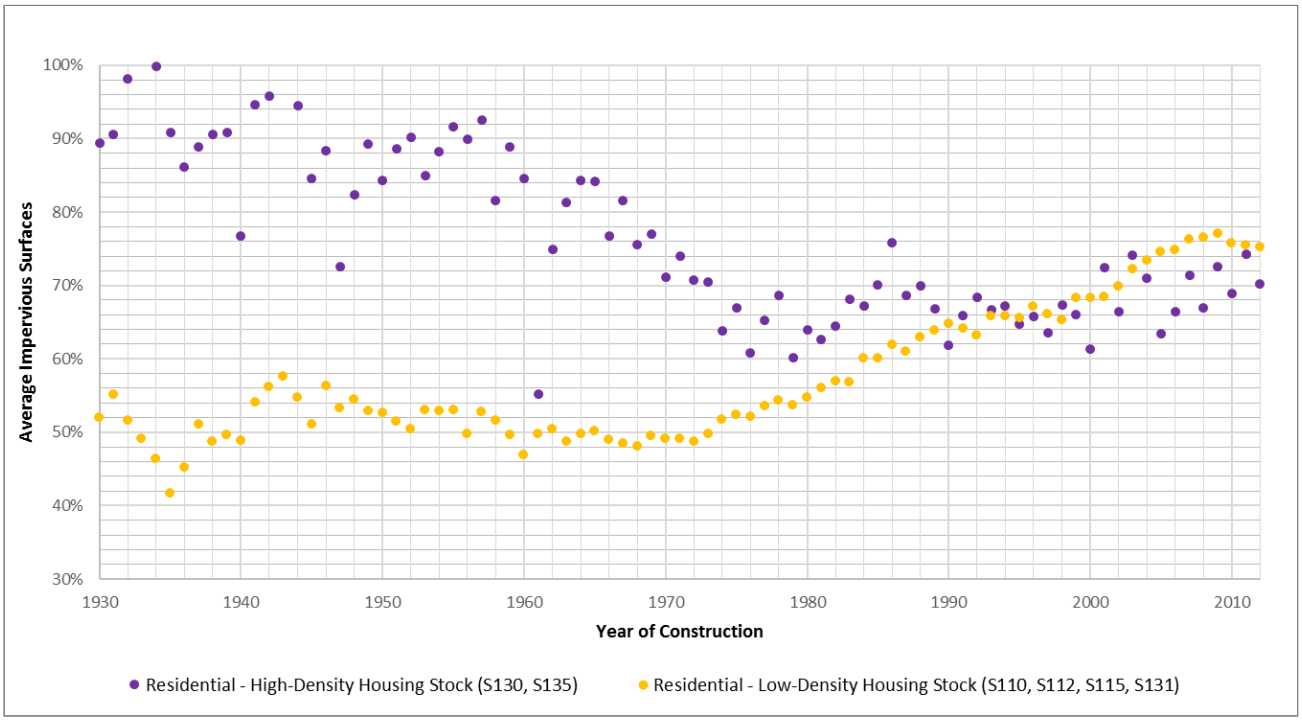

Figure 14: Average % Impervious Surface for low density housing stock and high density housing stock parcels by year of construction.

Observed Relationship Between Tree Canopy Cover and Impervious Surfaces

These results show the amount of tree canopy cover is closely connected to the amount of impervious surface. Comparing Figures 13 and 14 shows that the pattern of change for % Impervious Surface over time mirrors that of % Tree Canopy Cover for both parcels with high density housing and low density housing. As average tree canopy cover has decreased over time within low density housing there has been a corresponding increase in impervious surface. For high density housing this relationship is reversed, and as average tree canopy cover has increased, levels of impervious surface have decreased over time.

Trend Analysis – Historical Context

Low Density Housing: The region experienced rapid urban population growth starting in the 1960's, which resulted in the subdivision of parcels in urban areas to accommodate more housing growth. While lot sizes shrunk, demand for bigger homes increased, resulting in increased lot coverage. This has resulted in less space for trees and an increase in impervious surfaces on low density housing parcels. If these housing trends continue (which seems likely), they may result in ongoing declines in tree canopy and increases in impervious surface.

Figure 10: Examples of low density housing (left) with very low % Tree Canopy Cover (80 people/ha, 0% Tree Canopy Cover), and high density housing (right) with high % Tree Canopy Cover (600 people/ha, 36% Tree Canopy Cover).

High Density Housing - High density housing prior to the 1960's was composed of low-rise apartments which typically had high lot coverage and little greenspace. Economic growth and technological advancement in the region triggered a 'skyscraper' boom in 1960s, 1970s, and 1980s[31], . The new skyscrapers were characterized by tall and slender buildings with low Floor to Area Ratio (FAR), and enough space between them to preserve view corridors[32]. This *Vancouverism* architectural model featured residential buildings that used up little lot coverage and allowed abundant greenspace, street trees and other public space at the bottom[33]. This may explain the observed increase in % Tree Canopy Cover, and decline in % Impervious Surface during the decades leading up to 1980 (Figures 13 and 14). The West End neighborhood in the City of Vancouver is a good example of this phenomenon, where the majority of its residential high rises were constructed between 1960 and 1980[34].

After 1980, % Tree Canopy Cover on high density housing parcels shows a slight decline (Figure 13) but this is not matched with a corresponding increase in % Impervious Surface which have remained relatively steady (Figure 14). This suggests that since 1980, trees have been replaced by other types of vegetation (e.g. grass, shrubs) rather than increased lot coverage by buildings or other impervious surface.

[31] https://www.theguardian.com/cities/2017/sep/27/wipe-out-era-1970s-vanish-vancouver

[32] Walsh, R.M. (2013) The Origins of Vancouverism: A Historical Inquiry into the Architecture and Urban form of Vancouver, British Columbia

[33] Walsh, R.M. (2013) The Origins of Vancouverism: A Historical Inquiry into the Architecture and Urban form of Vancouver, British Columbia; Skyrise Vancouver web article (visited August 2019)

[34] Walsh, R.M. (2013) The Origins of Vancouverism: A Historical Inquiry into the Architecture and Urban form of Vancouver, British Columbia

Section 4 – Future Projections of Tree Canopy Cover within the Urban Containment Boundary

Metro Vancouver's population is projected to increase by about 1 million people over the next 30 years and this growth will be accommodated through both new urban development and intensification of established areas within the UCB[35]. This section considers how projected regional growth trends may impact tree canopy cover by looking at where growth is expected to occur. The following information and assumptions were included:

1. *Development on remaining General Urban land*
    - There are currently about 6,500 hectares of lands with the regional land use designation 'General Urban' within the UCB, that are undeveloped or rural and planned for future urban growth[36] (see Figure 15)
    - The remaining General Urban lands contain 3,900 hectares of tree canopy.
    - It is assumed that the remaining urban lands within the UCB will be largely developed over the next 15-20 years.
    - These areas are expected to be developed as mainly low density housing with some higher density areas but the relative proportions of housing types is unknown.
    - It is assumed that tree canopy cover levels on parcels developed over the next 20-30 years will have comparable tree canopy cover to parcels developed between 1990-2000 (see Figures 13 and 14)[37]. The post 1990's average % Tree Canopy Cover for all housing types (low and high density) is 20%.
    - For the purposes of this analysis, it is assumed that by 2040, the remaining General Urban lands planned for future urban growth will be developed to housing types with an average of 20% tree canopy cover.
    - This would result in a loss of over 3,000 ha of tree canopy.
2. *Redevelopment of single-family detached housing within the General Urban regional land use designation*
    - The amount of single-family detached housing (one unit, one lot) is projected to decrease significantly by 2050, mostly as a result of intensification and redevelopment[38]. For this analysis, a conservative estimate of 25% redevelopment is applied.
    - Redevelopment is projected to focus on multi-unit ground-oriented structures (secondary units, laneway, x-plexes, row houses) and apartments (low rises, mid rises, high rises).
    - Currently, single-family detached housing contains 6,900 hectares of tree canopy within the UCB.

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[35] Projected regional growth trends are documented in 'Metro Vancouver Growth Projections – A Backgrounder' (2018)

[36] For this analysis, 80% of District of West Vancouver's upper lands special study area was not included within the area considered developable, given the District's commitment to transfer much of this area to the Conservation and Recreation designation

[37] This is the most recent timeframe we have tree canopy cover data for residential housing types

[38] Metro Vancouver Growth Projections – A Backgrounder (2018)

- On average, housing built after 1990 has 37% less tree canopy cover than single-family detached housing built before 1990.
- If over the next 30 years, 25% of single-family detached housing is redeveloped to housing types with 37% less tree canopy cover than the current single-family detached housing, the result will be a loss of 650 ha tree canopy cover.

Taking into account only the above two sources of loss, tree canopy cover within the UCB is projected to decrease from 32% to 28% by 2040.

'Offsetting Losses through Tree Planting

Municipalities (including several Metro Vancouver member jurisdictions) often use tree planting programs as a way to maintain or expand their canopy, and actions such as these could help to offset anticipated future losses. To offset the projected decline in UCB tree canopy cover from 32% to 28% would require 1,100 to 3,000 hectares of the UCB to be dedicated to tree planting[39].

Analysis indicates that about 30,000 hectares within the UCB is *potentially* available for tree planting[40]. Site-level analysis would be required to determine what area is *actually* available, but it does suggest that the 3,000 hectares required to offset projected losses is attainable.

Potential planting availability was calculated using the 'Potential Planting Area' dataset which is detailed in Appendix 2 and is available to member jurisdictions to assist with urban forest planning.

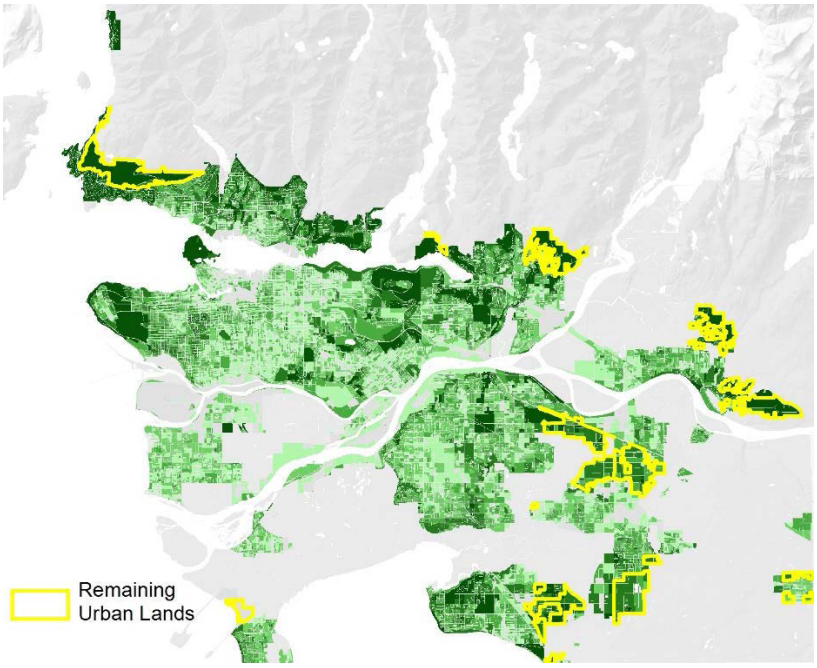

Figure 15: Remaining General Urban areas within the Urban Containment Boundary[41]

[39] The actual area required depends on the ground-to-crown ratio of trees planted so a range is provided.
[40] i.e. areas currently occupied by non-tree vegetation (grass, shrubs etc.), soil patches, barren surfaces, and pavement that does not fall on roads. Assessed using the 'Potential Planting Area' dataset – see Appendix 2
[41] For this analysis, 80% of District of West Vancouver's upper lands special study area was not included within the area considered developable, given the District's commitment to transfer much of this area to the Conservation and Recreation designation

Conclusion

This report provides consistent regional measurements of tree canopy cover and impervious surfaces, which allow for cross-regional comparison and will be repeated with updated land cover data in the future to enable tracking of change over time and identification of trends.

Trees provide a range of important ecosystem services to people including shading, carbon storage, and stormwater management. Measuring tree canopy cover is a relatively simple way to determine the extent of the urban forest and the magnitude of services it provides. Impervious surfaces are associated with many of the negative effects of urbanization such as increased temperatures (the 'Urban Heat Island' effect) and flood risk, along with impacts to stream health through disrupted hydrological cycles and poor water quality. Measuring impervious surfaces gives an indication of the extents of these negative effects. Tree canopy cover and imperviousness are indicators of ecological health but because of their connection to factors such as urban temperatures and stormwater management, they are also indicators of how resilient communities may be to climate-related impacts. Looking at whether these indicators are distributed equitably across cities or regions helps us to identify communities or populations more vulnerable to risks and receiving fewer ecosystem service benefits.

Metro Vancouver's regional tree canopy cover is 54% and for the Urban Containment Boundary (UCB) it is 32%. Canopy is unevenly distributed across the UCB and land use types, with concentrations of canopy within protected natural areas and residential areas. Regional trends will be confirmed when the analysis is repeated with new data but indications from other data sources are that canopy is declining.

For impervious surfaces, 20% of Metro Vancouver and 50% of the UCB is impervious. Most of Metro Vancouver's impervious surface is located within residential areas and road right of ways. Again, regional trends will be confirmed after future updates of the analysis but imperviousness is likely increasing in urbanizing watersheds.

Analysis of the relationship between tree canopy cover, impervious surfaces and residential density showed that over the past few decades, low density housing (especially single-family detached) has shifted from a housing model that accommodated many trees to one that accommodates increasingly fewer trees due to shrinking lot sizes and increasing lot coverage from buildings. This trend is expected to continue. Decreasing tree canopy has been mirrored by increases in amount of impervious surface as higher proportions of lots are covered by buildings, driveways and other paved surfaces. Since the 1960's high density housing has accommodated increasingly more trees with a corresponding decrease in impervious surfaces. This trend seems to have leveled off in recent years, and it is uncertain whether high density housing will continue to accommodate more trees in the future.

Projected growth in the region over the next 20-30 years is expected to impact tree canopy cover within the UCB as lands planned for future urban growth are developed, and single-family detached housing stock is redeveloped. Tree canopy cover in the UCB is projected to decrease from 32% to 28% from these sources of loss.

Potential exists to 'offset' losses or increase canopy through tree planting in the UCB. The Metro Vancouver Potential Planting Area dataset can be used by member jurisdictions to assist with planning of the urban forest.

Recommendations

Metro Vancouver, member jurisdictions and other land owners and managers all have a role to play in maintaining tree canopy cover and reducing imperviousness. The following recommendations are provided for consideration, as appropriate:

1. Monitor the extent, distribution and status of the tree canopy cover and imperviousness to inform planning and management.
2. Establish urban forest management plans that consider how to reduce impacts of future development on tree canopy.
3. Consider focusing tree planting efforts in areas of low canopy cover, particularly when these coincide with areas of high density and vulnerable populations in support of regional and municipal equity.
4. Use Metro Vancouver's Potential Planting Area dataset to develop realistic and achievable planting plans and targets.
5. Adopt and enforce bylaws that protect trees wherever possible, and require trees to be replaced when development results in loss.
6. Prioritize the retention of existing mature trees wherever possible when planning new urban communities as these provide the greatest amount of canopy cover and ecosystem services.
7. Implement on-site stormwater management and green infrastructure approaches throughout urban areas as effective ways of improving water quality and reducing the amount of runoff.
8. Look for opportunities to integrate the objectives of maintaining tree canopy cover and reducing imperviousness into a broad range of departments, plans, and strategies so responsibilities become a shared goal.
9. Given how much tree canopy and impervious surfaces fall within residential areas in the UCB, engage with the public about the importance of tree canopy and its protection, along with the benefits to maintaining permeability. These efforts could be supported with programs to encourage tree planting and maintenance of existing trees on private land.

Appendix 1: Additional tables for % Tree Canopy Cover, % Impervious Surface and % Potential Planting Area

Table 4: % Tree Canopy Cover and % Impervious Surface by member jurisdictions

	% Canopy Cover			% Impervious Surface		
Member Jurisdiction	**as a % of the member jurisdiction**	**as a % of the total regional area**	**as a % of the total area of existing tree canopy (Region)**	**as a % of the member jurisdiction**	**as a % of the total regional area**	**as a % of the total area of existing tree canopy (Region)**
Bowen Island Municipality	94%	2%	3%	4%	0%	0%
City of Burnaby	34%	1%	2%	48%	1%	3%
City of Coquitlam	62%	3%	5%	24%	0%	2%
City of Delta	15%	1%	2%	27%	1%	4%
City of Langley	20%	0%	0%	59%	0%	0%
City of Maple Ridge	72%	7%	13%	9%	0%	2%
City of New Westminster	16%	0%	0%	67%	0%	1%
City of North Vancouver	25%	0%	0%	65%	0%	0%
City of Pitt Meadows	19%	1%	1%	13%	0%	1%
City of Port Coquitlam	26%	0%	0%	49%	0%	1%
City of Port Moody	67%	1%	1%	23%	0%	0%
City of Richmond	15%	1%	1%	47%	1%	5%
City of Surrey	28%	3%	5%	35%	1%	8%
City of Vancouver	23%	1%	2%	61%	1%	3%
City of White Rock	23%	0%	0%	61%	0%	0%
District of North Vancouver	81%	4%	8%	11%	0%	1%
District of West Vancouver	78%	2%	4%	14%	0%	1%
Electoral Area A	80%	23%	43%	6%	2%	8%
Township of Langley	35%	4%	7%	16%	1%	4%
Tsawwassen First Nation	7%	0%	0%	29%	0%	0%
Village of Anmore	87%	1%	2%	3%	0%	0%
Village of Belcarra	94%	0%	0%	5%	0%	0%
Village of Lions Bay	83%	0%	0%	15%	0%	0%

Table 5: % Tree Canopy Cover and % Impervious Surfaces by member jurisdiction within the Urban Containment Boundary

	% Canopy Cover			% Impervious Surface		
Member Jurisdiction	**as a % of the member jurisdiction (within the UCB)**	**as a % of the total UCB area**	**as a % of the total area of existing tree canopy (within the UCB)**	**as a % of the member jurisdiction (within the UCB)**	**as a % of the total UCB area**	**as a % of the total area of existing tree canopy (within the UCB)**
City of Burnaby	34%	3%	11%	48%	2%	3%
City of Coquitlam	40%	3%	8%	46%	1%	2%
City of Delta	20%	1%	3%	61%	1%	3%
City of Langley	20%	0%	1%	62%	0%	0%
City of Maple Ridge	46%	2%	7%	36%	1%	1%
City of New Westminster	15%	0%	1%	68%	0%	1%
City of North Vancouver	25%	0%	1%	65%	0%	1%
City of Pitt Meadows	15%	0%	1%	49%	0%	1%
City of Port Coquitlam	23%	1%	2%	65%	1%	1%
City of Port Moody	53%	1%	3%	35%	0%	1%
City of Richmond	11%	1%	3%	66%	3%	5%
City of Surrey	32%	8%	24%	48%	4%	9%
City of Vancouver	24%	3%	9%	63%	2%	4%
City of White Rock	23%	0%	0%	61%	0%	0%
District of North Vancouver	47%	2%	7%	40%	1%	1%
District of West Vancouver	64%	3%	10%	26%	1%	1%
Electoral Area A	68%	1%	3%	20%	0%	0%
Township of Langley	29%	2%	6%	43%	1%	2%
Tsawwassen First Nation	11%	0%	0%	39%	0%	0%
Village of Anmore	12%	0%	0%	69%	0%	0%
Village of Lions Bay	82%	0%	1%	14%	0%	0%

Table 6: % Tree Canopy Cover and % Impervious Surface metrics by land use type within the Urban Containment Boundary

	% Canopy cover			% Impervious surfaces		
Land Use Type	**as a % of land use type (within the UCB)**	**as a % of the total UCB area**	**as a % of the total area of existing tree canopy (within the UCB)**	**as a % of land use type (within the UCB)**	**as a % of the total UCB area**	**as a % of the total area of existing impervious surfaces (within the UCB)**
Agriculture	21%	0%	0%	14%	0%	0%
Airport/Airstrip and Ferry	0%	0%	0%	43%	1%	1%
Cemetery	23%	0%	0%	11%	0%	0%
Civic and Other Institutional	14%	0%	0%	76%	0%	0%
Exhibition, Religious and Other Assembly	17%	0%	0%	70%	0%	1%
Health and Education	17%	0%	1%	75%	1%	2%
Hotel, Motel and Rooming House	8%	0%	0%	85%	0%	0%
Industrial	11%	1%	2%	82%	6%	11%
Industrial - Extractive	9%	0%	0%	58%	0%	0%
Lakes, Large Rivers and Other Water	16%	0%	0%	4%	0%	0%
Mixed Residential (Low-rise Apartment) Commercial	5%	0%	0%	92%	0%	0%
Mixed Residential (Mid-Rise or High-Rise Apartment) Commercial	7%	0%	0%	89%	0%	0%
Office	12%	0%	0%	82%	1%	1%
Parking	3%	0%	0%	90%	0%	0%
Protected Watershed	94%	0%	0%	3%	0%	0%
Recreation, Open Space and Protected Natural Areas	63%	11%	36%	12%	2%	4%
Residential - Institutional and Non-Market Housing	25%	0%	0%	61%	0%	0%
Residential - Low-rise Apartment	19%	0%	1%	72%	1%	2%
Residential - Mid/High-rise Apartment	22%	0%	0%	67%	0%	1%
Residential - Mobile Homes	18%	0%	0%	73%	0%	0%
Residential - Multi Detached	24%	0%	0%	65%	0%	0%
Residential - Rural	56%	2%	6%	9%	0%	1%
Residential - Single-family detached with No Secondary Unit	28%	8%	24%	55%	15%	30%
Residential – Single-family detached with One Secondary Unit or Duplex	22%	1%	2%	61%	2%	3%

Residential - Townhouse	22%	1%	2%	68%	2%	5%
Retail and Other Commercial	5%	0%	0%	92%	2%	5%
Road Right-of-Way	20%	4%	11%	69%	12%	25%
Transit, Rail and Other Transportation	17%	0%	1%	66%	1%	2%
Undeveloped and Unclassified	59%	3%	10%	15%	1%	2%
Utility, Communication and Work Yards	20%	0%	0%	60%	0%	1%
Vancouver Fraser Port	3%	0%	0%	89%	1%	2%

Table 7: % Potential Planting Area metrics by member jurisdiction within the Urban Containment Boundary

	% Potential tree canopy - Total			% Potential tree canopy - Vegetated			% Potential tree canopy - Impervious		
Member Jurisdiction	**as a % of the member jurisdiction (within the UCB)**	**as a % of the total UCB area**	**as a % of the total existing area of potential tree canopy (within the UCB)**	**as a % of the member jurisdiction (within the UCB)**	**as a % of the total UCB area**	**as a % of the total existing area of potential tree canopy (within the UCB)**	**as a % of the member jurisdiction (within the UCB)**	**as a % of the total UCB area**	**as a % of the total existing area of Potential tree canopy (within the UCB)**
City of Burnaby	33%	3%	10%	16%	2%	10%	17%	2%	9%
City of Coquitlam	32%	2%	6%	13%	1%	5%	19%	1%	7%
City of Delta	43%	2%	7%	17%	1%	6%	26%	1%	8%
City of Langley	41%	0%	1%	18%	0%	1%	23%	0%	1%
City of Maple Ridge	28%	1%	4%	17%	1%	5%	11%	1%	3%
City of New Westminster	43%	1%	2%	15%	0%	2%	28%	0%	3%
City of North Vancouver	28%	0%	1%	9%	0%	1%	19%	0%	1%
City of Pitt Meadows	61%	1%	2%	35%	0%	3%	25%	0%	2%
City of Port Coquitlam	42%	1%	3%	12%	0%	2%	30%	1%	4%
City of Port Moody	23%	0%	1%	9%	0%	1%	14%	0%	1%
City of Richmond	54%	4%	13%	22%	2%	11%	32%	3%	14%
City of Surrey	36%	9%	25%	18%	4%	27%	18%	4%	23%
City of Vancouver	26%	3%	9%	11%	1%	9%	15%	2%	10%
City of White Rock	37%	0%	1%	15%	0%	1%	22%	0%	1%
District of North Vancouver	24%	1%	3%	11%	0%	3%	14%	1%	3%
District of West Vancouver	20%	1%	3%	10%	0%	3%	10%	1%	3%
Electoral Area A	18%	0%	1%	10%	0%	1%	7%	0%	1%
Township of Langley	42%	3%	8%	25%	2%	10%	17%	1%	6%
Tsawwassen First Nation	80%	0%	1%	49%	0%	1%	31%	0%	1%
Village of Anmore	76%	0%	0%	19%	0%	0%	57%	0%	0%
Village of Lions Bay	9%	0%	0%	2%	0%	0%	7%	0%	0%

Table 8: % Potential Planting Area metrics by land use type within the Urban Containment Boundary

Land Use Type	% Potential tree canopy - Total			% Potential tree canopy - Vegetated			% Potential tree canopy - Impervious		
	as a % of land use type (within the UCB)	as a % of the total UCB area	as a % of the total existing area of potential tree canopy (within the UCB)	as a % of land use type (within UCB)	as a % of the total UCB area	as a % of the total existing area of potential tree canopy (within the UCB)	as a % of land use type (within the UCB)	as a % of the total UCB area	as a % of the total existing area of potential tree canopy (within the UCB)
Agriculture	73%	0%	1%	64%	0%	1%	9%	0%	0%
Airport/Airstrip and Ferry	89%	1%	3%	56%	1%	2%	32%	0%	1%
Cemetery	74%	0%	1%	65%	0%	1%	10%	0%	0%
Civic and Other Institutional	55%	0%	0%	10%	0%	0%	45%	0%	0%
Exhibition, Religious and Other Assembly	56%	0%	1%	13%	0%	0%	43%	0%	1%
Health and Education	48%	1%	2%	8%	0%	0%	40%	1%	2%
Hotel, Motel and Rooming House	47%	0%	0%	6%	0%	0%	40%	0%	0%
Industrial	54%	4%	11%	7%	0%	1%	48%	3%	9%
Industrial - Extractive	84%	0%	0%	33%	0%	0%	51%	0%	0%
Lakes, Large Rivers and Other Water	30%	0%	1%	28%	0%	1%	3%	0%	0%
Mixed Residential (Low-rise Apartment) Commercial	32%	0%	0%	2%	0%	0%	29%	0%	0%
Mixed Residential (Mid-Rise or High-Rise Apartment) Commercial	29%	0%	0%	3%	0%	0%	26%	0%	0%
Office	47%	0%	1%	5%	0%	0%	42%	0%	1%
Parking	75%	0%	0%	7%	0%	0%	68%	0%	0%
Protected Watershed	5%	0%	0%	3%	0%	0%	2%	0%	0%
Recreation, Open Space and Protected Natural Areas	34%	6%	17%	24%	4%	12%	9%	2%	5%
Residential - Institutional and Non-Market Housing	38%	0%	0%	12%	0%	0%	26%	0%	0%

Residential - Low-rise Apartment	32%	1%	2%	8%	0%	0%	25%	0%	1%
Residential - Mid/High-rise Apartment	37%	0%	0%	9%	0%	0%	28%	0%	0%
Residential - Mobile Homes	39%	0%	0%	8%	0%	0%	31%	0%	0%
Residential - Multi Detached	25%	0%	0%	9%	0%	0%	16%	0%	0%
Residential - Rural	38%	1%	4%	33%	1%	4%	4%	0%	0%
Residential - Single-family detached with No Secondary Unit	33%	9%	25%	15%	4%	11%	18%	5%	14%
Residential – Single-family detached with One Secondary Unit or Duplex	36%	1%	3%	15%	0%	1%	21%	1%	2%
Residential - Townhouse	35%	1%	3%	8%	0%	1%	26%	1%	3%
Retail and Other Commercial	59%	1%	4%	3%	0%	0%	55%	1%	4%
Road Right-of-Way	14%	3%	7%	10%	2%	5%	4%	1%	2%
Transit, Rail and Other Transportation	66%	1%	3%	16%	0%	1%	50%	1%	2%
Undeveloped and Unclassified	39%	2%	6%	26%	1%	4%	14%	1%	2%
Utility, Communication and Work Yards	64%	0%	1%	18%	0%	0%	45%	0%	1%
Vancouver Fraser Port	78%	1%	2%	6%	0%	0%	71%	1%	2%

Appendix 2: % Potential Planting Area

As part of the analysis on Tree Canopy Cover, possible areas of opportunity for new tree canopy were considered. The additional metric, % Potential Planting Area, is the amount of land that could theoretically be used to increase % Tree Canopy Cover. % Potential Planting Area considers non-tree vegetation (grass, shrubs etc.), soil patches, barren surfaces, and pavement that does not fall on roads, that under the right circumstances, could be modified to increase % Tree Canopy Cover. It is a measure of what is ***physically possible****, given the current land cover.* ***Physically possible*** *planting area does not necessarily translate into* ***feasible*** *planting area. Other factors, such as land use, also determine the feasibility of a site for tree planting. However, this tool is meant to remain general, in consideration that any conversion of land cover/land use types to tree canopy requires site specific assessments by land managers. This tool is intended to support discussions about how much and where land owners, member jurisdictions and Metro Vancouver might be able to increase canopy cover.*

As with % Tree Canopy Cover and % Impervious Surfaces, % Potential Planting Area was mapped and quantified for the Metro Vancouver region, and the UCB. The analysis found that an area of 89,667 Ha (27%) of the Metro Vancouver region qualifies as % Potential Planting Area. More specifically, 19% of the Metro Vancouver region was found to be vegetated potential area and 8% is impervious potential area. In the regional core, 78,621 Ha (47%) qualifies as % Potential Planting Area. 34% of the regional core was found to be vegetated potential area and 13% is impervious potential area. Finally, 31,710 Ha (35%) of the UCB was found to be vegetated potential area and 19% is impervious potential area. For each of the three study areas, Figure 16 shows the proportion of existing % Tree Canopy Cover, % Potential Planting Area – vegetated and % Potential Planting Area – Impervious. The pink area of the chart corresponds to the proportion of land that was found to be generally unsuitable for the establishment of new tree canopy (e.g. buildings, roads, other built features).

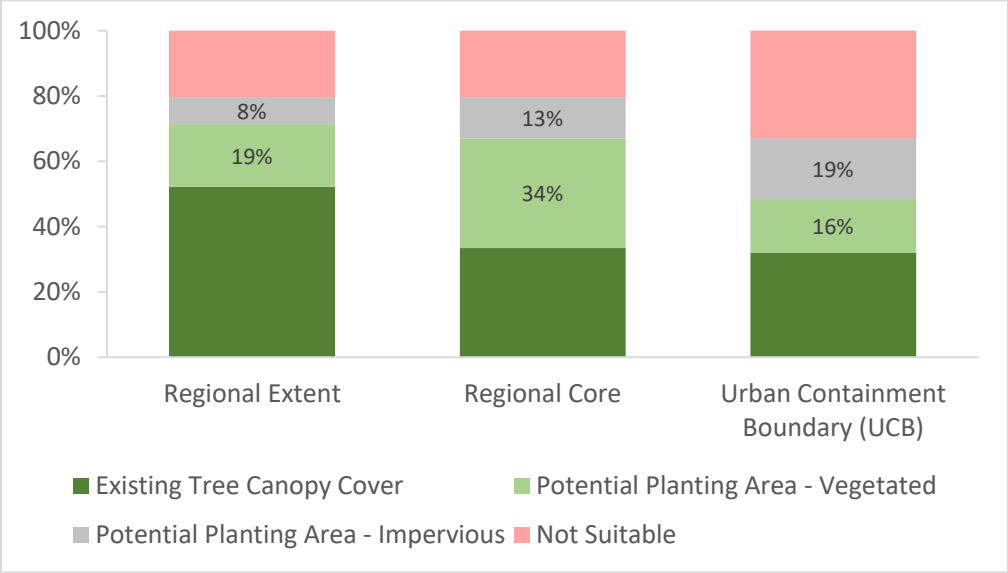

Figure 16: % Potential Planting Area for the Metro Vancouver region and the Urban Containment Boundary.

Figure 17 shows the % Potential Planting Area summarized by census block within the UCB. Beige indicates low % Potential Planting Area (less than 20%) and dark brown indicates high % Potential Planting Area (more than 40%).

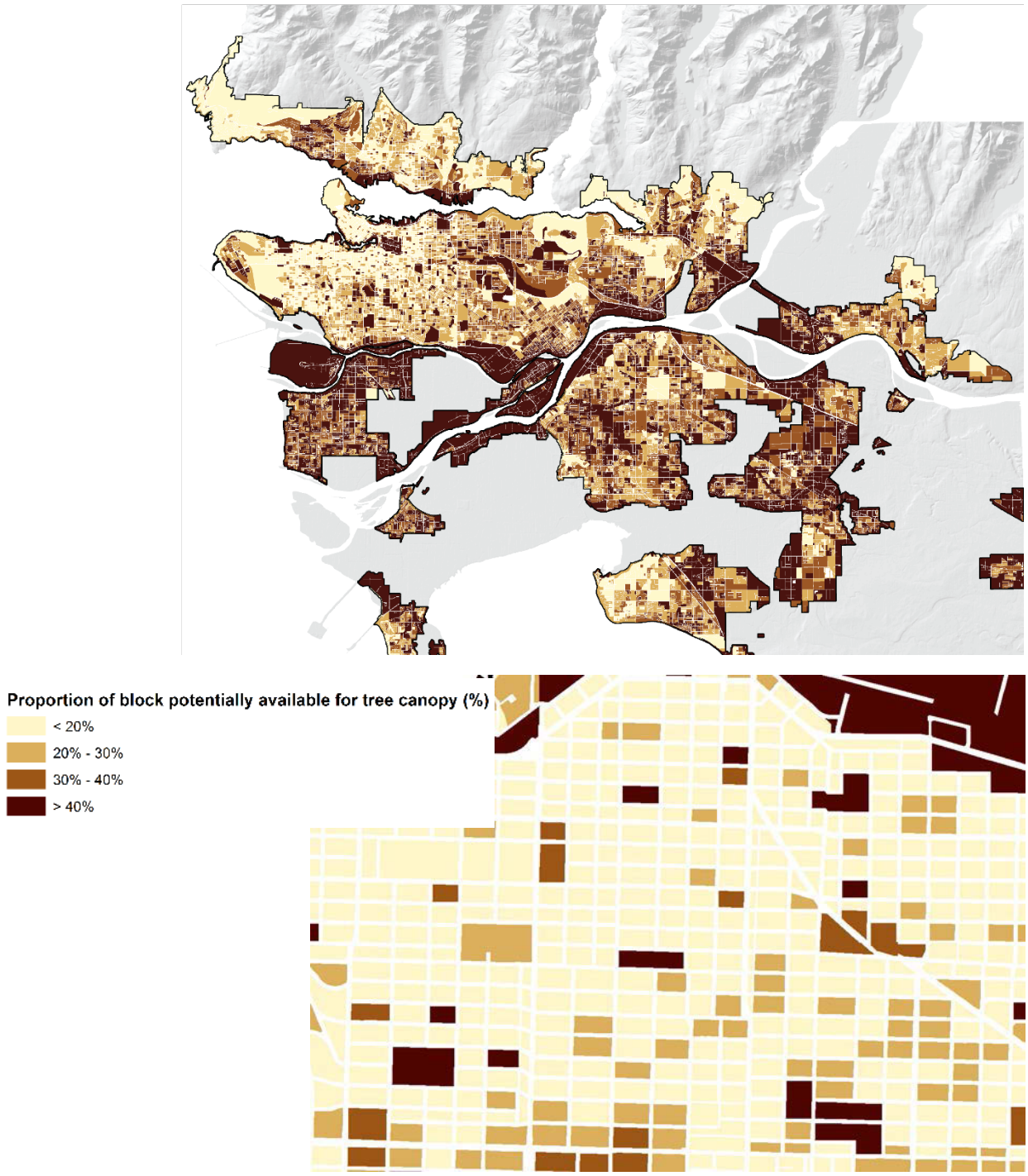

Figure 17: % Potential Planting Area summarized by city block (Urban Containment Boundary)