



REPORT

Report Date: November 26, 2021
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Meeting Date: December 8, 2021
[Submit comments to Council](#)

TO: Standing Committee on City Finance and Services
FROM: General Manager, Planning, Urban Design and Sustainability
SUBJECT: Climate Emergency Action Plan – Big Move 6: Natural Climate Solutions

RECOMMENDATIONS

- A. THAT Council adopt an interim sequestration target within the city boundaries of 21,000 tonnes of CO₂e per year by 2050 and direct staff to move forward with quick-start actions described herein; and
- B. THAT Council direct staff to integrate Natural Climate Solutions within land use policy directions in *Vancouver Plan* and that staff report back with associated longer term actions (2025 onward) and a refined target by 2024; and
- C. THAT Council direct staff to work with regional partners, First Nations and other levels of government to develop a sequestration target outside the city boundary, partner to develop strategies and actions for pilot projects, and to report back to Council with a more detailed work plan in 2024; and
- D. THAT Council direct staff to work with the Vancouver Board of Parks and Recreation to develop a plan to increase the city-wide tree canopy from the current 23% to 30% (target adopted by Park Board in 2020) by 2050 and ground it in the *Vancouver Plan* land use strategy; and
- E. THAT Council receive for information the 5-year forecast of City investment requirements to support the quick start actions as outlined in Appendix C of the Report dated November 26, 2021, entitled “Climate Emergency Action Plan – Big Move 6: Natural Climate Solutions”, to scale up sequestration efforts over the next five years, which will be considered as part of the City’s capital planning processes; and direct staff to pursue senior government and partner funding opportunities as they arise.

REPORT SUMMARY

In November 2020, Council directed staff to report back with nature-based carbon sequestration targets and recommended pilot projects. Nature-based carbon sequestration refers to natural biological processes that capture carbon from the atmosphere into living systems. The following report proposes an interim nature-based carbon sequestration target and associated quick-start actions for natural climate solutions (NCS) inside city boundaries.

To achieve long term success, NCS will be advanced as a policy direction in the *Vancouver Plan*, with additional information to be brought forward in 2022 as part of that plan. This report also recommends to work with partners, including First Nations and other levels of government, to develop a target and action plan for NCS projects located outside the city boundaries.

COUNCIL AUTHORITY/PREVIOUS DECISIONS

- *Vancouver Plan Update and Quick Start Actions (2021)*
- *Climate Emergency Action Plan (2020)*
- *Climate Change Adaptation Strategy (2018)*
- *Coastal Adaptation Plan: Fraser River Foreshore (2019)*
- *Rain City Strategy (2019)*
- *Vancouver Board of Parks and Recreation Master Plan, VanPlay (2019)*
- *Urban Forest Strategy (2014)*
- *Biodiversity Strategy (2016)*
- *City Greenways Plan (updated June 2020)*
- *Metro 2050 – Regional Growth Strategy Update – Draft (June 2021)*
- *City of Vancouver: Regional Context Statement Official Development Plan (2013)*
- *Metro Vancouver 2040: Shaping our Future (2011)*

CITY MANAGER'S/GENERAL MANAGER'S COMMENTS

This report, Big Move 6: Natural Climate Solutions, is in response to Council direction from November 2020 when Council approved the Climate Emergency Action Plan (CEAP). CEAP aims to cut carbon pollution to 50% of 2007 levels by 2030 and achieve carbon neutrality before 2050. The report directed staff (Recommendation U) to report back in fall 2021 with a nature-based carbon sequestration target and recommended pilot projects, potentially working with local First Nations, Metro Vancouver and other local municipalities.

The City Manager recommends approval of the foregoing.

REPORT

Background/Context

The Climate Emergency Action Plan (CEAP) is the city's climate change mitigation plan and includes six big moves to put Vancouver on track to reduce our carbon pollution by 50% by

2030 in alignment with the findings of the UN Intergovernmental Panel on Climate Change (IPCC). This report represents the 6th action in the plan: restored forests and coasts. The IPCC concluded that all future scenarios successful in limiting global warming to 1.5°C must include extensive use of techniques to remove carbon from the atmosphere to reach negative emissions. Carbon sequestration, which broadly refers to capturing carbon from the atmosphere, is an important component to reducing carbon pollution.

Negative emissions can be achieved through nascent technology, such as direct air capture, and/or through natural systems, also known as natural climate solutions (NCS). NCS refers to natural biological processes and systems that sequester carbon from the atmosphere into living systems and are the focus of Big Move Six. There are two main pathways by which NCS can occur: land-based sequestration, and ocean/aquatic sequestration. Land-based sequestration activities include reforestation, improved forest management or forest protection, improved farming practices, composting and soil enhancement techniques. Ocean/aquatic sequestration actions include coastal and freshwater wetland restoration, management or protection, among others.

Staff is not recommending technology-based carbon sequestration at this time because these have not yet been proven at scale, are more expensive than NCS, and provide few co-benefits. Natural climate solutions are proven to sequester carbon, are synergistic with adaptation to climate change, and provide quantifiable co-benefits for communities and ecosystems, such as reducing temperatures in urban heat islands, managing rainwater and supporting biodiversity. Investing in NCS over the long term can help offset the need for costly grey infrastructure while providing co-benefits.

In the fall of 2020, staff began work with a consultant to convene an advisory committee of experts to provide guidance on the initiation of a NCS program. Initial research into potential pathways for the City's sequestration efforts identified five distinct categories, each with a range of potential activities: forests, freshwater wetlands, agriculture and grasslands, marine vegetation, and cross-sectoral approaches. The consultant and advisory committee explored specific project options including green infrastructure, riparian restoration, seaweed-based projects, integration of wetlands in parks and urban forestry.

Strategic Analysis

NCS currently sequesters approximately 16,000 tonnes of CO₂e annually within the municipal boundaries. This is roughly equivalent to the emissions from 3,500 vehicles. The largest contributors to this baseline are street trees and trees growing on private property, representing 85% of the biosequestration baseline. (Figure 1 below).

Trees on parkland and naturally forested areas make up much of the remainder (13%). Bioswales, community gardens, green roofs and other urban solutions represent only a fraction of the current baseline as do wetlands (~2%). The low percentage of urban solutions and wetlands is due to both sequestration potential and the very low number of these in Vancouver.

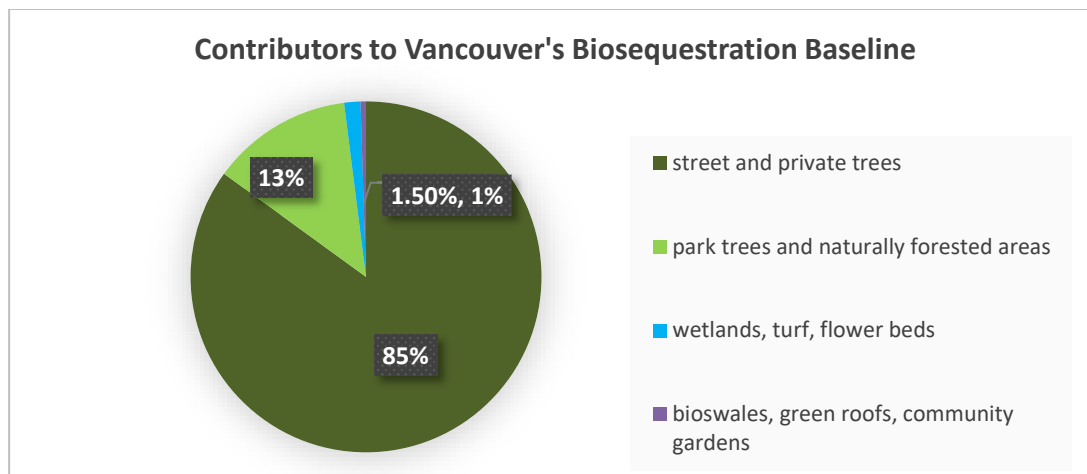


Figure 1: Current percent contributions of natural assets within the city toward the sequestration baseline (16,000tCO₂e)

Vancouver's quantitative contribution to sequestration was derived as follows. The magnitude of negative emissions in the IPCC pathways needed to keep warming to 1.5°C by 2050 were downscaled (reduced to a finer scale) to Vancouver proportionally using our current carbon emissions (roughly 2.4M tonnes annually). Using this proportional reduction¹, Vancouver's sequestration need ranges between 250,000 tonnes CO₂e annually to 300,000 tonnes CO₂e annually.

Increasing Vancouver's current sequestration levels from 16,000 tonnes of CO₂e annually to even the minimum of 250,000 tonnes CO₂e annually represents a 1562% increase. ***It is not feasible to achieve these levels within city boundaries.***

Vancouver faces similar challenges in delivering natural climate solutions as most densely populated urban centres. Potential sequestration solutions are limited by the multiple and often competing demands for land such as the need for housing, employment land, and infrastructure. Higher density housing and job centres in transit supportive locations are critical to reducing carbon emissions from building heating and transportation (Big Moves 1 and 2). For this reason, staff have determined that a number of creative solutions for sequestration both inside and outside the city boundaries will be necessary to achieve meaningful progress towards negative emissions targets.

Staff have worked collaboratively across departments to assess existing plans, projects and program targets (i.e. Rain City Strategy, Van Play, and Urban Forest Strategy) to develop an interim sequestration target inside city boundaries. Development of a sequestration target outside the municipal boundaries with corresponding actions and programs will require additional research and collaboration with all levels of government including First Nations.

¹ Two approaches were used to estimate an approximate range of sequestration, both based on IPCC pathways to 1.5°C: based on land area (a range as low 5000 tCO₂e/year) and based on Vancouver's contribution to global GHG emissions (a range as high as 700,000 tCO₂e/year). The consensus of the Big Move 6 Advisory Committee (national and provincial scientists and partner organizations) was that a target range of approximately 250,000 to 300,000 tCO₂e/year would be reasonable, consistent with the median share of NCS given the City of Vancouver's GHG emissions profile and the most consistent with the IPCC recommendations.

Proposed Target:

Staff is proposing an interim target for sequestration inside Vancouver's municipal boundaries of 21,000 tCO₂e/year gross by 2050. The proposed interim target is based on an additional 5,000 tCO₂e/year being removed by 2050, beyond the current baseline of 16,000 tCO₂e/year. The target was derived by measuring the potential sequestration of a range of projects and targets already planned inside the city. Feasibility of achieving this target will be determined through emerging land use patterns and urban form directions developed through the *Vancouver Plan* process and by meeting objectives to increase tree canopy citywide to 30% from the current level of 23%.

Further work is needed to ensure that the current baseline of NCS can be retained as housing density increases and the impacts of a changing climate worsen. It should be noted that the intent of this target is not to prevent further urbanization. Greater climate benefits will be achieved through land use changes that will allow the creation of more complete and connected neighbourhoods so that more people are able to reduce their dependence on vehicle trips and live in close proximity to their daily needs. Incorporating this work into the *Vancouver Plan* will ensure that natural climate solutions are foundational to the City's future land use plan and the supporting strategies are fully integrated to achieve the highest possible co-benefits.

At this time, staff is not proposing a sequestration target for outside the city boundaries. Instead, staff will continue working with First Nations, in regional forums, and with other levels of government to better understand roles and responsibilities, pilot project opportunities, and potential funding sources and budget implications.

Quick Start Actions

The following quick-start actions are proposed to advance Big Move Six. Quick start actions are no-regret actions that improve Vancouver's liveability regardless of whether the target is revised in the future. These actions are to be implemented over the next four years (to 2025), in parallel with development of a longer-term action plan for NCS. More details, supporting actions and associated pilot projects can be found in Appendices A to C.

6.01: Retaining and Enhancing NCS on Private Lands

The Protection of Trees Bylaw is currently being reviewed for pilot changes in conjunction with the City Manager's Internal Development Application and Permitting Modernization Task Force. Staff propose to integrate learnings from this work with NCS objectives to clarify bylaw provisions, strengthen preservation measures, provide flexibility and alternatives for mitigating tree loss, add options for planting on public lands, and improve monitoring and tracking of canopy loss. The Bylaw will likely see several phases of improvements, starting with initial improvements to provide clarity and transparency during the application process, followed by potential further amendments which would include engagement with experts, stakeholders and the public. Staff will also assess potential revisions to associated bylaws that affect tree placement and below-grade construction. Any amendments need to be made in coordination with other green infrastructure policies for private property including stormwater infiltration and urban agriculture requirements.

Related initiatives underway include efforts to map our urban forest on private property, increasing compliance of replacement tree requirements through inspections, and amending the tree replacement list to ensure resiliency of tree species as the climate changes.

In parallel, the Park Board is also moving forward with improvements to its private tree sales program with a focus on deficit canopy areas and improved stewardship per tree. This program will continue the progress made under the Greenest City Action Plan to encourage planting of new trees on private property. Similarly, the Vancouver Economic Commission will work with its partners to explore how to advance and expand business sector practice on NCS including both on-site natural assets and green infrastructure and off-site investment.

6.02: Enhance NCS efforts on public land

The majority of the City's NCS baseline consists of the urban forest and naturally managed areas (NMAs) which include forests, wetlands, meadows, and streams. These natural assets provide a multitude of benefits, such as supporting biodiversity and providing rainwater management. To capture more of these potential benefits, NMAs require improved management and enhancement, including restoration on civic land and road rights of way as well as specialized operations staff.

Quick start actions include the following:

- Planting trees in neighbourhoods with historical tree deficits to increase tree canopy and reduce urban heat island effects.
- Developing blue-green systems to manage water, contribute to the urban forest and biodiversity, and enhance active transportation routes.
- Pursuing a partnership with the Vancouver School Board to green school property and adjacent areas, with particular attention on schools in areas with relatively high summer temperatures and deficient tree canopy.

Supporting actions will include developing soil conservation and management guidelines and working with Metro Vancouver and others partners to develop and integrate natural assets management practices.

6.03 Enhance sequestration through implementation of NCS pilot projects within the city

There are a number of capital projects in the planning stages that could be advanced with a strong sequestration focus. Many of these projects are priorities in existing plans such as the 2002 Still Creek Rehabilitation and Enhancement Study and the Hastings Park Master Plan. The projects emphasize riparian health, green infrastructure and rainwater integration into parks, and many are located in neighbourhoods historically underserved by natural assets. Several of the projects are part of a recent \$20M application to the federal Natural Infrastructure Fund which, if successful, would provide 60% funding opportunity for NCS projects. Salt marshes and wetlands are known to offer some of the largest potential for NCS. Lost Lagoon restoration is one project that could be supported by Host Nations, and is being considered in the Stanley Park Comprehensive Management Plan. See Appendix B for a complete list of projects.

6.04: Advance sequestration outside the city.

Sequestration projects outside the city boundaries will require funding partners, supporting partners, and close work with First Nations. The City can also play a supporting role in various established federal NCS programs such as the Natural Climate Solutions for Agriculture Fund

and Climate Action Awareness Fund. Staff will continue working with First Nations, in regional forums, and with other levels of government to better understand roles and responsibilities, pilot project opportunities, and potential funding sources and budget implications. As a member municipality in Metro Vancouver, Vancouver will pursue opportunities to collectively advance NCS through the implementation of key regional plans including: the Regional Growth Strategy – Metro 2050, Climate 2050, the Regional Greenways Vision 2050 and the Regional Parks Masterplan.

6.05: Explore funding options to support NCS

There are a number of potential funding sources for NCS, particularly through several federal government programs. Under this quick-start action, staff will ramp up efforts to identify and pursue funding sources for work inside and outside the city.

Integration with Vancouver Plan – Long term actions:

Recommendation B directs staff to integrate Big Move Six into the *Vancouver Plan* land use strategy to ensure a more holistic approach grounded in the retention, restoration and expansion of natural climate solutions while synergistically assessing other land use priorities and objectives. A holistic approach will integrate objectives for biodiversity, climate resilience, greenways, green infrastructure, flood management, Indigenous stewardship, urban forestry and much more. Through this work, ecological networks and natural assets will be identified for conservation, restoration, and potential acquisition. The pilot projects identified in this report are a first step toward a more comprehensive, connected ecological network approach. Longer term NCS actions (beyond 2025) and monitoring indicators will also be developed. The interim sequestration target of 21,000 tCO₂e/year will remain in place until staff report back to Council as part of *Vancouver Plan* and its implementation.

Implementation, Monitoring and Governance:

Progress on implementation milestones will be reported as part of the annual CEAP update as well as through the *Vancouver Plan* implementation program. The amount of sequestration within the city will be reported in 2025.

Staff are not able to report annually on sequestration because monitoring tools are not currently available with the level of data needed. As these tools are being developed, proxy indicators will be used to measure progress on NCS, such as net increase in tree count or increase in canopy cover. Improved monitoring of tree removals and replacements on private parcels is needed. Monitoring information will be brought forward to Council as part of the CEAP Indicators Framework (see Appendix M in 2020 CEAP Council Report).

Implications/Related Issues/Risk

Setting sequestration targets and identifying supporting projects outside the city is a fairly new concept for Vancouver and introduces more complexity and uncertainty than normally encountered when delivering strategies and pilot programs located entirely within the city's jurisdiction. However, NCS programs are currently a focus for all levels of government. The federal Healthy Environment and a Healthy Economy program has earmarked billions of dollars toward tree planting, green infrastructure and NCS. The new Provincial adaptation strategy promotes the use of NCS, and draft policies are being developed as part of the Metro 2050 and

Climate 2050 plans to promote green networks, increased canopy cover, conservation and NCS for climate action.

Although the success of programs and projects located outside city boundaries will be highly dependent on other governmental partners including and First Nations, it is important to move ahead with this work now to capture new opportunities and build a strong foundation of partnerships in this quickly evolving field. City staff have had preliminary conversations on these programs and will continue to actively engage with stakeholders and partners on these fronts.

Financial

A five-year forecast, presented in Appendix C, is intended to serve as a road map of the initial investment requirements for Big Move 6. While many of the projects mentioned in this report are identified in existing strategies, already underway or in the planning stages; the ~\$100 million of investments to advance quick-start actions over the next five years will require doubling the current level of investment of ~\$10 million per year to make progress towards the proposed interim target. The initial investment requirements and shortfall for Big Move 6 are incremental to those previously presented for the Climate Emergency Action Plan, which did not include Big Move 6. Funding requests will be brought forward for consideration as part of the capital planning processes, subject to prioritization and funding capacity constraints facing the City given the impact of the pandemic, the City's infrastructure deficit, and other CEAP and Council priorities.

Staff anticipate the investment strategy for Big Move 6 will evolve over time as federal and provincial funding programs become available. Staff will bring forward revised estimates as new financial information becomes available, as part of the overall CEAP financial strategy.

Environmental

As noted throughout the report, the environmental benefits of natural climate solutions are numerous. NCS can restore and enhance biodiversity, and aquatic and terrestrial habitat. NCS can improve water quality and reduce the amount of combined sewer overflows. Healthy, resilient ecosystems are best able to thrive under the pressures of climate change and climate related disasters.

Equity, Reconciliation and Engagement

Equity is central to Big Move 6 and staff are grateful for the work of the Climate and Equity Working Group (CEWG) and their thoughtful contributions to the content and recommendations in this report.

The CEWG highlighted many opportunities to advance reconciliation and equity. Some of the key learnings and feedback from the group included providing equitable access to natural assets across the city, employing the wisdom and leadership of the host Nations to guide implementation, focusing the strategy on stewardship and people, and placing an enhanced natural asset lens on land development. Staff will return to the CEWG for guidance on emerging policies and proposed pilots and programs throughout this work.

Staff also reached out to the three local First Nations seeking to collaborate on sequestration work. As one example of this work, the Tsleil-Waututh Nation provided valuable input to the process through a meeting and report comments. These included the important reminder that upland NCS interventions improve downstream water quality in Burrard Inlet. In turn, this leads to improved opportunities for ocean-based sequestration and an overall increase in the health of the inlet. Capacity funding for the Nations is imperative to continue building these relationships and exploring potential NCS projects and is included in the budget.

Additionally, the Vancouver Park Board Master Plan, Van Play, presented equity initiative zones, a priority setting tool to identify historically under-served areas (see Figure 4, Appendix D). Public health studies ([e.g. BC CDC Grand Rounds Presentation, Nov 2, 2021](#)) and recent news articles have examined the disparate impacts of urban heat island effect on marginalized and vulnerable people (see Figure 3, Appendix D). These inequities will be addressed in the provision of NCS quick start actions and longer term strategies of the *Vancouver Plan*.

CONCLUSION

The Big Move 6 natural climate solutions recommendations contained in this report support the Climate Emergency Action Plan and are an important step towards achieving the City's goals of reaching net zero GHG emissions before 2050 and moving toward negative emissions to limit global warming to 1.5°C. Additionally, carbon pollution reductions provide significant co-benefits related to water management, human health, biodiversity, reconciliation and overall resilience of the City of Vancouver.

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List of Quick Start Actions and Sub-Actions

6.01: Retain and enhance NCS on private land

Roughly 38% of Vancouver's current tree canopy cover is on private land. The majority of this area is on residentially zoned land containing either one- or two-family homes with relatively low building/lot coverage. Typical redevelopment of these lots today is simply replacing older single family homes with new, larger single family homes. This low density residential land use pattern impacts carbon sinks, such as trees, while providing none of the climate action benefits of denser, complete communities.

Alternatively, increasing density in older low density residential neighbourhoods is an important opportunity to further the climate goals of complete communities. However, tree retention and mitigation strategies must be strengthened to maximize the co-benefits of this important strategy.

Staff are currently reviewing best practices for tree bylaws and monitoring the recent changes to consider a comprehensive update of the Protection of Trees Bylaw. Staff will also explore other regulatory tools that support healthy trees, such as setbacks, reducing excavation for shallower basements or increasing subsurface setbacks for parkades and improving post-development replacement tree inspections.

6.02: Enhance NCS efforts on public land

NCS quick start actions include:

- Supporting a Park Board update to the Urban Forest Strategy with a plan to increase the canopy cover from current 23% to 30% by 2050;
- Continue and expand the Park Board Naturally Managed Areas Program with specialized operations staff;
- Support Park Board in an equity-driven tree planting program;
- Begin implementation of blue green systems and school hot blocks projects;
- Develop guidance for City and Park Board projects on how to maximize sequestration and achieve other co-benefits;
- Develop soil conservation and management guidelines for private development and City operations (Engineering and Park Board);
- Develop a framework for natural assets across the City and Park Board and complete a coordinated inventory ; and
- Employ a City environmental coordinator to integrate departmental work on natural assets and urban ecosystems in development.

The information below elaborates on a few of these recommended actions –

As illustrated in Figure 1 in the main body of this report, sixty two percent of the urban forests are on public land contributing a large portion of sequestration benefits. The majority are located on streets and in public parks. The Urban Forest Strategy is being updated with a new target of 30% canopy cover by 2050 (adopted in 2020 by the Park Board). Meeting the target will require a range of actions including increased space and capital for tree planting on public rights of way and City-owned land, improved watering programs, climate-resilient tree species, and expanding staff resources.

Given the complexity of the urban environment and the competition for street space both above and below grade, urban forestry will require increased coordination with the engineering department to find creative solutions to minimize infrastructure conflicts.

An equity-driven planting strategy coincides with two projects: equitable blue green systems and school hot blocks. The first include networks of natural corridors that manage water, contribute to the urban forest and enhance active transportation routes. Historically underserved areas will be prioritized and the projects will address a large suite of climate impacts and equity concerns.

The second provides an opportunity to partner with Vancouver School Board to “green” school yards. Staff have identified schools located in hot spots around the city where urban heat island effect and deficient tree canopy are pronounced. These schools have large hardscaped yards and building footprints with few shaded and green areas

Naturally Managed Areas (NMAs) are forests, wetlands, meadows, and streams that provide wildlife habitat, cooling, and water filtration. Vancouver’s NMAs range from Musqueam Creek to Grandview Cut, providing robust sequestration of carbon. These natural areas are intentionally managed with minimal practices, such as invasive species removal, fire hazard control, and waste removal. To maximize the potential benefits of these important resources, existing NMAs will require improved management.

A fundamental component of a successful NCS strategy is adequate land resources for implementation and expansion. A mapping exercise is underway through *Vancouver Plan* to identify existing and potential high value sequestration areas, including those that support biodiversity and blue/green ecological systems. Leveraging land use tools and acquisition to acquire and conserve these sites for NCS will be necessary.

6.03 Enhance sequestration through implementation of NCS pilot projects within the city

See appendix B for a full list of projects.

6.04: Advance sequestration pilot projects in partnership with other levels of government, First Nations and other partners outside the city.

Sequestration projects outside the city boundaries will require funding partners, supporting partners such as the Forest Carbon Initiative and Seaforestation, and close work with First Nations. The City can also play a supporting role in various established federal NCS programs such as the Natural Climate Solutions for Agriculture Fund and Climate Action Awareness Fund.

Buying carbon credits related to fully developed sequestration projects is another alternative option to explore to meet our targets. Currently, there are a surplus of carbon offset credits on the B.C. market.

- Work with host Nations to explore pilot projects outside the City of Vancouver
- Continue to work with Metro Vancouver, the Port, UBC, the Province and others on enhancing regional sequestration
- Explore the purchase of carbon offset credits on the B.C. market

6.05: Explore funding options to support NCS programs and projects both inside and outside city boundaries.

Vancouver has received an invitation to apply for up to \$20M through the Federal Natural Infrastructure Fund. Projects need to be substantially completed by 2024 and require a 40% share in costs by the City. Land can be purchased and the funding can apply to a range of projects. Staff were encouraged to apply again in the next round of the Federal expression of interest for the 2 Billion trees initiative to support city tree planting. Staff also supported a Seaforestation application for the Climate Action and Awareness Fund on sequestration. Staff will continue working with all levels of government and through partnership to explore funding opportunities.

Pilot Project Descriptions

***Still Creek Enhancement Plan:**

Still Creek is one of Vancouver's few surviving creeks and is connected to the Fraser River via Burnaby Lake and the Brunette River. Still Creek was historically salmon bearing and after several decades of community/regional effort on restoration, spawning salmon began to return to East Vancouver in 2012/2013. The Still Creek watershed has very low tree canopy cover and the creek riparian forest corridor is very constrained by pavement. The surrounding area is also an underserved area for parks.

Approved in 2002, the Still Creek Enhancement Plan includes 10 and 50 year actions for creek enhancement including acquisition of land. Implementing actions will maintain the natural drainage asset, reduce flood risk, and increase biodiversity, aquatic habitat health and sequestration. Associated projects have been identified for implementation.

- Still Creek Enhancement Projects Review: Study to update enhancement concepts and cost estimates prepared and approved in 2002
- Still Creek at Cornett Restoration: Design and capital work to enhance the riparian corridor and treat stormwater runoff entering the creek.

***St. George Rainway:**

A rainwater management project that will deliver core utility services of rainwater management in the neighbourhood using green rainwater infrastructure. It will reduce flooding, bodies, reduce combined sewer overflows and improve water quality to local waterways, enhance climate resiliency, increase biodiversity and sequester carbon.

***Woodland and 2nd Avenue:**

Project includes a ½ block street closure with traffic calming measures, active transportation and a green infrastructure project.

Hastings Park One Water Plan:

The Hastings Park Master Plan (2011) is approved and includes re-establishing a historic stream (Renfrew Creek) that will reduce combined sewer overflows, increase biodiversity and provide sequestration opportunities through riparian tree planting. The project will double the amount of habitat through riparian expansion along the creek. A creek channel and adjacent riparian corridor connecting the Sanctuary ponds to Burrard Inlet will act as the backbone for stormwater management for the park and the adjacent area (all future projects should contribute rainwater to the pond), and will reduce the volume of rainwater discharged to the regional combined system. The quick start action for implementation now is the Hydraulic Study to support future creek corridor construction.

Lost Lagoon Restoration

Burrard Inlet water flowed into and out of the lagoon before it was land locked by the construction of the Stanley Park Causeway between 1913 and 1926. Historically the mud flats in the lagoon were a food source for Squamish peoples that had houses on the shoreline. As an isolated fresh/brackish water body, Lost Lagoon is a declining habitat threatened by future sea level rise. The Park Board has been working on options to restore this water body, including the feasibility of reconnection to Burrard Inlet and / or Second Beach.

Rainwater Park integration

These projects include adding wetlands, completing restoration and daylighting creeks in parks.

Columbia/Alberta Park: Park enhancement and water management. Requires feasibility and technical studies with construction in 2025 onward.

*[Tatlow/Volunteer](#): restore the historical stream in these two parks and restore the English Bay shoreline. The project is consistent with the Park Board's Biodiversity Strategy and is a focus project in the Rainwater Management Plan. Currently undergoing Archaeological Impact Assessment. Delays may incur further funding requests.

**Beaconsfield Park:* Beaconsfield is a larger park within the Still Creek watershed that includes a natural depression. Localized flooding of the nearby street and field could be managed with a carefully designed and funded ephemeral wetland that would also provide habitat and a naturally managed area to the neighbourhood, and connect to a nearby existing drainage area.

** Many of these projects are part of an application to the federal Natural Infrastructure Fund (NIF) through a non-competitive invitation. Projects receive part federal funding with a completion date of 2024.*

5-YEAR FORECAST OF REQUIRED CITY INVESTMENTS

Proposed Action	Estimated Current Annual Capital Spend (approx.)	2023-2026 Capital Plan Requirement					Operating Impact of Capital
		2022	2023	2024	2025	2026	
6.01 Retain and enhance NCS on private property	\$0.4M	\$0.15M	\$0.25M	\$0.25M	\$0	\$0	\$0.75M (inspections)
6.02 Enhance NCS Effort on Public Lands	\$0	\$0	\$0.15M	\$0.2M	\$0	\$0	\$150K/yr.
6.02.1 Equity-Driven Tree Planting	\$3M/yr.	\$6.0M	\$7.0M	\$7M	\$9M	\$9M	\$300K/yr.
6.02.2 Equity-Driven GI Projects	\$0	\$2.6M	\$2.85M	\$2.85M	\$3.1M	\$3.1M	\$100K/yr.
6.03 Pilot Sequestration Projects	\$7M/yr.	\$4.3M (applic. submitted for \$3.6M NIF)	\$11.8M (applic. submitted for \$9.25M NIF)	\$20.1M* (applic. submitted for \$1.75M NIF)	\$5.3M	\$5M	\$300K/yr.
6.04: Explore Options for Partnership Projects Outside the City	\$0	\$0.1M	\$0.1M	\$0.1M	\$0.1M	\$0.1M	\$0
6.05 Explore funding options	\$0	\$0	\$0.15M	\$0	\$0	\$0	\$0
Total	\$10.4M/yr.	\$13.15M	\$22.05M	\$30.25M	\$17.5M	\$17.2M	

*Lost Lagoon Restoration (estimated capital cost \$20M)

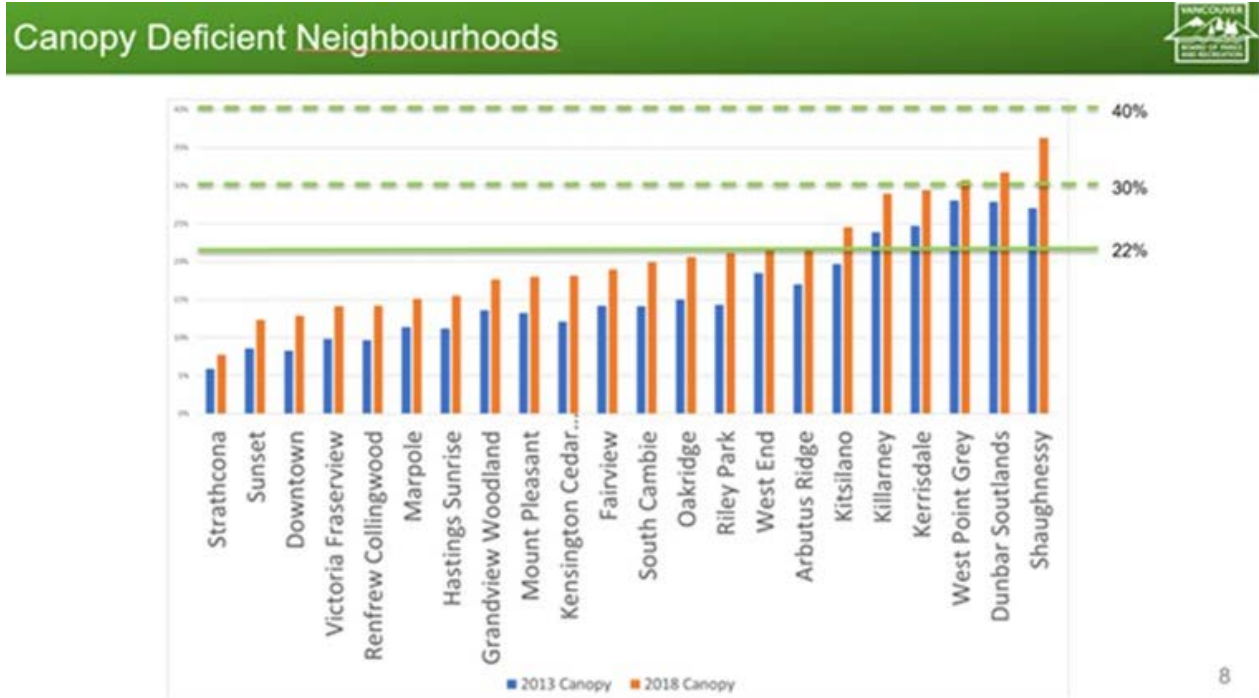


Figure 2. Percent canopy cover by neighbourhood

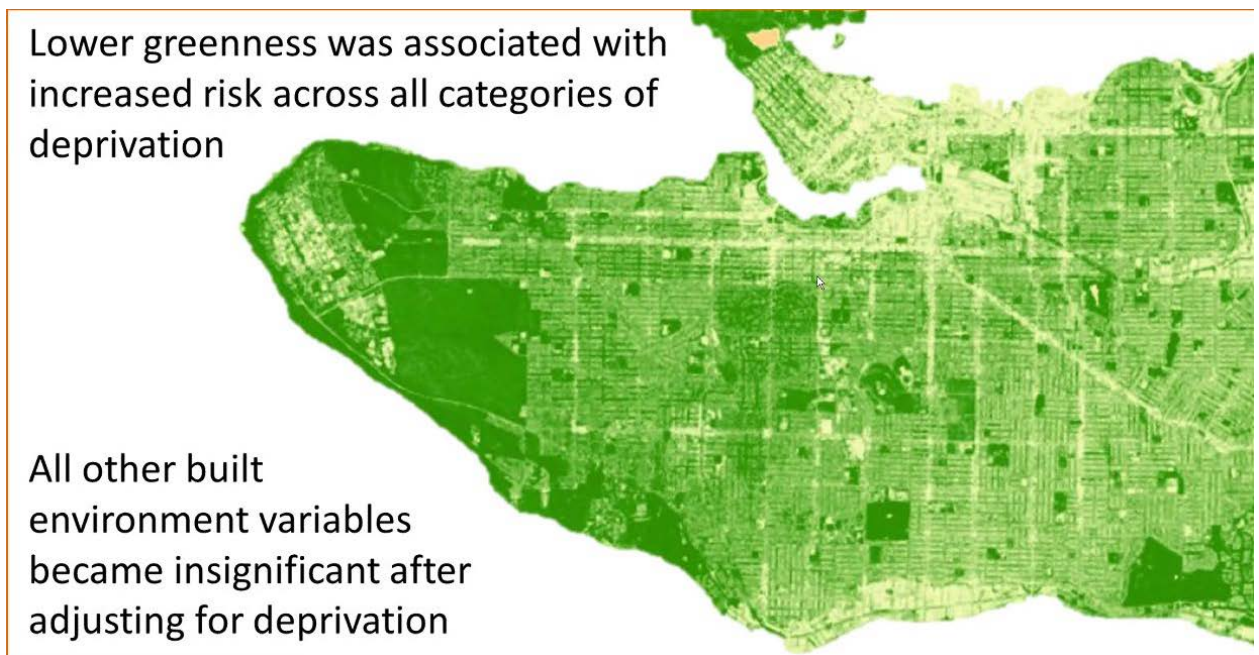


Figure 3. Excerpt From BC Centre for Disease Control Grand Rounds November 2nd, 2021, S. Henderson presentation. Refers to studies of mortality during the summer 2021 Heat Dome event.

APPROACH

INITIATIVE ZONES MAPPING

The three indicators that form the Initiative Zones are:

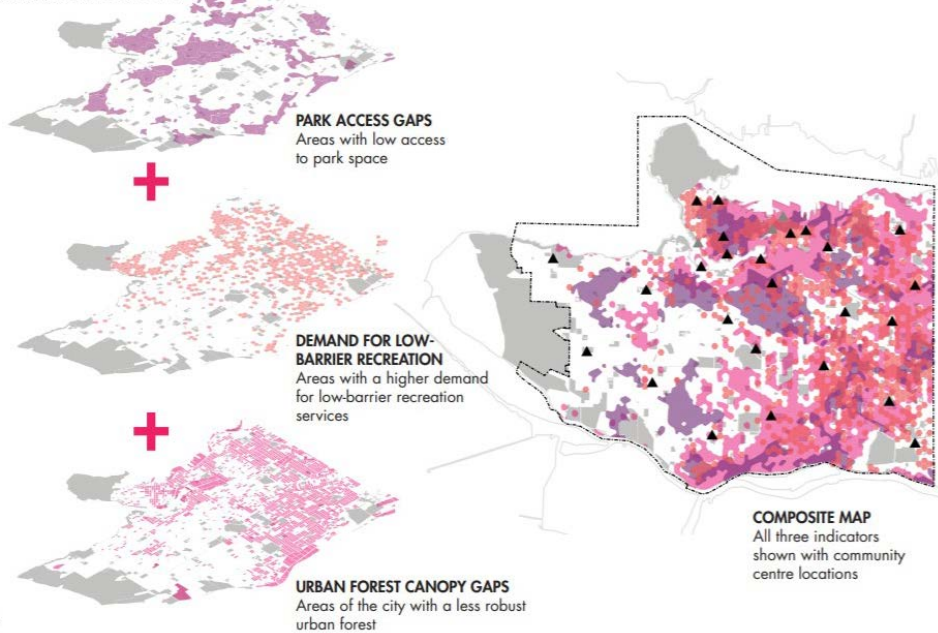


Figure 4. Van Play Equity Initiative Zones (Vancouver Board of Parks and Recreation)

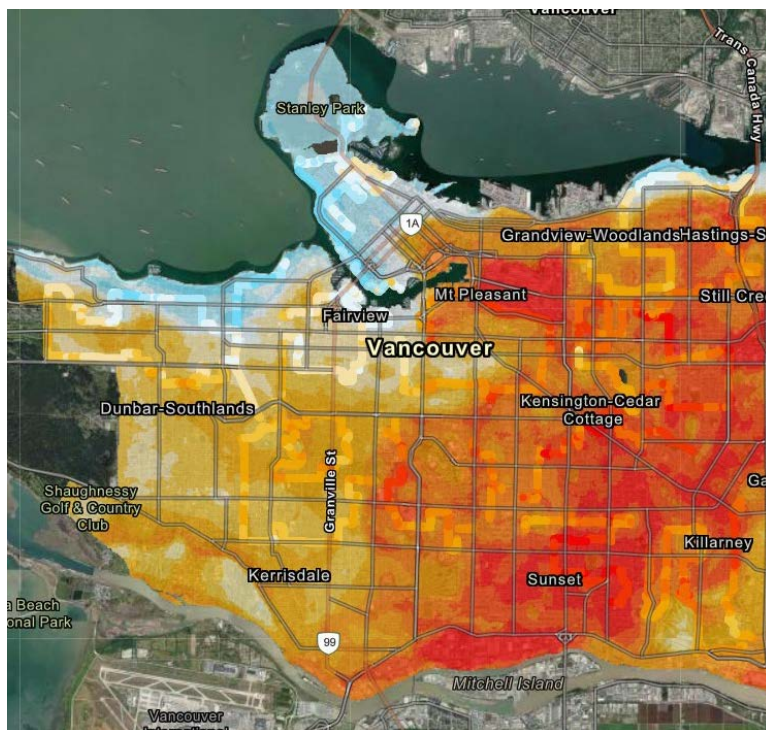


Figure 4. Afternoon air temperature model (citizen science bike campaign with CAPA Heat Watch, August 2020)