



POLICY REPORT

Report Date: October 7, 2019
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TO: Vancouver City Council

FROM: Acting General Manager of Engineering Services in consultation with the General Managers of Planning, Urban Design and Sustainability; Development, Buildings and Licensing; Vancouver Board of Parks and Recreation; Finance, Risk and Supply Chain Management/CFO; and Real Estate and Facilities Management

SUBJECT: Rain City Strategy

RECOMMENDATION

- A. THAT Council adopt the Rain City Strategy and related Streets & Public Spaces and Buildings & Sites Action Plans, implementation targets and rainwater management design standard, as described in Appendix A, and direct staff to begin implementation as part of the 2019-2022 Capital Plan and report back on key metrics through the Greenest City Action Plan annual reporting;

FURTHER THAT Council direct staff to report back on the implementation options, business case, and financial strategies as part of the Rain City Strategies' major initiatives to inform the next 10-year Capital Strategy Outlook and Capital Plan.

- B. THAT Council endorse the Parks and Beaches Action Plan developed with Park Board staff and refer the Rain City Strategy and Parks and Beaches Action Plan, as described in Chapter 7 of Appendix A, to the Vancouver Board of Parks and Recreation for consideration.
- C. THAT Council direct staff to amend the City of Vancouver's Provincially-mandated Integrated Rainwater Management Plan to align with the Rain City Strategy, Action Plans, implementation targets and rainwater management design standard.

- D. THAT Council direct staff to incorporate the goals and objectives of the Rain City Strategy and to systematically review options for green rainwater infrastructure integration in (1) the Climate Emergency Response Plan, (2) the City-wide Plan process, (3) policy and planning related to land use, development, streets and transportation, and water, sewer and drainage systems, and (4) City capital (growth and renewal) and operating programs.
- E. THAT Council direct Staff to explore how the City's equity framework (currently under development) applies in the context of holistic water resource planning and how equity and intersectionality could be reflected through integrated water policy, planning, programs, infrastructure delivery and ongoing lifecycle asset management.
- F. THAT Staff report back on comprehensive progress towards Rain City Strategy implementation every three years.

REPORT SUMMARY

The Rain City Strategy is a cross-departmental initiative that reimagines how we manage rainwater in the city now and over the coming three decades to 2050. The strategy calls for a paradigm shift in how we value and manage our water resources. With urgent imperatives around climate change, water quality and vulnerable ecosystems, regulations, utility servicing costs and affordability, equity and reconciliation with Indigenous Peoples, the need to chart a new course in holistic water management is clear.

At its core, the Rain City Strategy advocates for a transition towards a water sensitive city that strives for holistic and intergenerational water thinking and integrates land use planning, development, urban design and water management services to help communities and ecosystems thrive. These directions are embodied in Vancouver's 'One Water' approach to integrated water management.

A key element of the strategy is the use of green rainwater infrastructure (GRI), which uses a combination of engineered and ecosystem-service approaches to capture (return to ground, return to atmosphere or reuse) and treat rainwater run-off, effectively diverting it from the pipe network, which helps to reduce urban flooding, combined sewer overflows (CSO) and pollution discharge to our local waters. While the City and Vancouver Board of Parks and Recreation (Park Board) have demonstrated leadership and action around GRI installations over the past 20 years, many of the projects were delivered as pilots or one-off demonstrations. Our intent now is to move beyond pilots to make GRI practices a standardized part of how we deliver rainwater management services.

GRI is widely recognized, globally, as a cost-effective approach to rainwater management that yields many co-benefits for biodiversity, place-making, green jobs, and community and ecosystem health while providing resourceful and resilient water and natural infrastructure for communities. Many cities have found that integrating GRI with cost-effective grey infrastructure approaches leads to lower overall system life-cycle costs and improves system functions, resilience and performance. Numerous cities have

found that integrated grey-green systems are more cost-effective than grey infrastructure-only approaches.

The Rain City Strategy is comprised of nine Transformative Directions and three practical Action Plans that articulate 46 programs related to (1) Streets & Public Spaces, (2) Buildings & Sites, and (3) Parks & Beaches. The Strategy:

- Reaffirms the previously adopted performance target to manage 90% of Vancouver’s average annual rainfall;
- Accelerates our impact by increasing the required design standard for the volume of rainwater to be managed by sites and GRI assets from 24 mm to 48 mm per day in both public and private spaces; and
- Establishes an ambitious implementation target to manage rainwater volume and water quality for 40% of Vancouver’s impervious areas by 2050 through new development, capital and renewal projects and strategic retrofits.

Initial start-up funding for several programs within the action plans has been identified within the existing 2019-2022 Capital Plan and annual operating budgets. Funding will support resources to scope, evaluate and develop programs in the short term and begin implementing. Beyond 2022, program funding and business cases will be assessed, as needed, for specific programs and evaluated through the City’s capital delivery and financial planning processes.

The City, however, cannot achieve this ambitious new vision for holistic water management alone. Implementation will include both regulation, advocacy and enabling actions. Targeted incentives and building partnerships, supporting leadership, collaboration and action across sectors, with communities, industry, other agencies and levels of government will be critical to success. The Rain City Strategy is presented in Appendix A.

COUNCIL AUTHORITY/PREVIOUS DECISIONS

The Rain City Strategy builds on and reinforces many City and Park Board, strategies and priorities, including:

- VanPlay: Parks and Recreation Services Master Plan (2019)
- Motion – Accelerate combined sewer overflow mitigation (2019)
- Resilient Vancouver Strategy (2019)
- Climate Emergency Response (2019)
- Motion – Watershed Revival (2019)
- Motion – 1995 Greenways Refresh (2019)
- Motion – False Creek to the Fraser River Blueway (2019)
- Climate Change Adaptation Strategy (updated in 2018)
- VanPlay: 10 goals to shape the next 25 years (2018)
- Cambie Corridor Utility Servicing Plan (2018)
- Rain City Strategy Update (2017)
- Complete Streets Policy Framework (2017)

- Green Building Policy for Rezonings (2016)
- Biodiversity Strategy (2016)
- Citywide Integrated Rainwater Management Plan (IRMP) (2016)
- Healthy City Strategy (2014)
- Urban Forest Strategy (2014)
- Transportation 2040 (2012)
- Greenest City 2020 Action Plan (GCAP) (2011)

CITY MANAGER'S/GENERAL MANAGER'S COMMENTS

The Rain City Strategy has embraced recent Council and Park Board directions to be ambitious, take leadership beyond current regulations, and develop a roadmap for climate emergency and resilience, integrated thinking, combined sewer overflow mitigation, healthy ecosystems, equity, intersectionality and reconciliation with Indigenous Peoples, as it relates to water. This ambitious plan has been developed broadly with departments across the organization, in partnership with staff at the Park Board, and with community to support a deep transformation in how we do business.

This strategy will transform our practices across departments to fully embed GRI as part of our planning, design and operations and the organizational transformation has already begun. A new integrated utility planning division has been created and we are investing in new strategic initiatives around clean waters and watershed planning. We have shifted our investments to accelerate data collection and analysis, monitoring and modelling, and delivery of GRI and integrated water systems. Furthermore, to support these efforts, we have developed decision-making and cross-departmental and cross-sectoral collaborations as essential parts of water management in the city. The City Manager strongly supports adoption of the Rain City Strategy.

REPORT

Background/Context

The Rain City Strategy is a multi-year effort that builds upon existing strategies and plans, provincial regulatory obligations, and nearly two decades of GRI leadership as well as pilot and demonstration projects undertaken by the City, the Park Board, community, industry and academia in Vancouver. The Rain City Strategy purposefully takes into account the emerging directions that have arisen in late 2018 and 2019, through a number of Council imperatives around resilience, climate adaptation, the climate emergency, watershed revival, blue-green systems and accelerating combined sewer overflow mitigation. As well, it also takes into account the Park Board commissioners resolutions to accelerate efforts to address combined sewer overflows and protect water quality in False Creek and other waters surrounding Vancouver.

In addition, through its VanPlay Parks and Recreation Services Master Plan (VanPlay) initiative, the Park Board has continued to emphasize the criticality of natural systems and biodiversity as a foundation for thriving cities and ecosystems. Collectively, these initiatives from Council and Park Board have shaped the imperatives for a paradigm shift

around water management in Vancouver and have influenced the ambitions and directions in the Rain City Strategy.

Vancouver's regulatory obligations

In 2011, the Province endorsed the regional Integrated Liquid Waste Resource Management Plan (ILWRMP) which sets regulatory obligations for Vancouver around (1) Eliminating combined sewer overflows by 2050, (2) having and implementing an Integrated Rainwater Management Plan (IRMP), and (3) monitoring and mitigating water quality impacts from urban rainwater pollution. All municipalities in Metro Vancouver must have IRMPs and must report to the Province, through Metro Vancouver biannually, on their progress and compliance.

In 2016, the City of Vancouver's IRMP was adopted by Council, with a focus on water quality and addressing the impacts of our sewer and drainage system on local receiving waters and aquatic ecosystems. The IRMP established a target to capture and clean 90% of Vancouver average annual rainfall with a strong emphasis on GRI approaches that utilize a combination of engineered and eco-system services methods to manage rainwater volume and water quality.

GRI comes in many forms and uses soils, plants, trees and built structures such as green roofs, swales, permeable pavements, infiltration trenches, rainwater tree trenches and rain gardens to capture, store and clean rainwater before being absorbed in the ground or returning it to our waterways and atmosphere. GRI can also include the harvest and reuse of rainwater that helps reduce pressures on drinking water supply and provide greater water security. A summary of GRI tools is given in Appendix B.

Through broad engagement across the organization about the needs and opportunities related to GRI implementation, it became apparent that to fully realize the value and benefits of GRI and to align rainwater management with a range of other city policy and program objectives, the vision and goals of the initiative needed to expand beyond a singular focus on water quality. In November 2017, Council amended the vision and goals of the IRMP to include resilience and livability through healthy urban ecosystems, as detailed in the Strategic Analysis section of this report.

Since then, the City has made good progress on implementing the IRMP. The Rain City Strategy will expand and accelerate our efforts to meet our regulatory obligations and respond to Council priorities related to the climate emergency, climate adaptation, watershed revival and CSO mitigation.

In addition, on September 11, 2019, the Provincial Minister of Environment and Climate Change Strategy mandated jurisdictions within the purview of the regional ILWRMP comply with a number of new actions to enhance transparency and public reporting related to CSOs, environmental monitoring and water quality in receiving water bodies by October 30, 2020. These actions will be taken into account as part of the Rain City Strategy implementation.

Imperatives for a paradigm shift around rainwater management

In addition to our regulatory obligations and Council directions, four key drivers have influenced the creation of the Rain City Strategy and Action Plans:

(1) Climate Emergency and Resilience

Vancouver City Council has declared a climate emergency and is at a pivotal point in terms of the need to both mitigate and adapt to the effects of climate change. Most people will experience climate change as either too much or too little water or high heat, all of which contribute to community, infrastructure and ecosystem vulnerability. More extreme weather events, increasing precipitation in winter, declining snowpack in our drinking watersheds, reduced precipitation in summer, and rising sea levels will increase flooding, drought, heat stress, and drinking water supply pressures in Vancouver. The Rain City Strategy has assessed how GRI can be a critical tool to help to mitigate the impacts of climate change and enhance resilience.

(2) Sewer and drainage system impacts on water quality and aquatic ecosystems

The water quality issues related to our sewer and drainage system are two-fold. The first is that Vancouver, as with many cities developed pre-20th century, including Seattle, Edmonton, Toronto and Montreal, has a combined sewer system. That means that rainwater run-off from rooftops and roadways are combined into the same pipes that convey sewage to the wastewater treatment plant.

During rain events, the combined volume of rainwater and sewage often overwhelms parts of the pipe system, leading to discharges known as combined sewer overflows (CSOs), in to False Creek, the Fraser River or Burrard Inlet. In 2018, in the Vancouver Sewerage Area, there were over 33 billion litres of CSO discharge recorded. Vancouver has been working to address this issue for many decades through its long-standing sewer separation program and other initiatives to improve system connections and reduce inflow and infiltration in to our combined pipe system. The Rain City Strategy brings leading practice and guidance to inform Vancouver's existing plans and will help formulate future plans for CSO mitigation.

Beyond CSOs, Vancouver is also contending with pollutants picked-up in rainwater run-off, mostly from roads, rooftops and other high pollutant surfaces. Heavy metals, tire debris, hydrocarbons and other pollutants are known toxins to fish and other aquatic species. Our current system of outfalls in combined and separated areas currently provides no treatment of rainwater pollutants prior to discharge. Allowing water to be cleaned and absorbed back in to the ground or reused through GRI will divert water from the pipe system, reduce CSOs and pollutant discharge in to our waters.

(3) Growth, utility cost pressures and value-for-money investments

Water-related infrastructure makes up one of the most costly building blocks of modern cities. With the pressures to upgrade our systems to serve growth, improve receiving water quality through increased treatment, adapt to changing rainfall patterns due to climate change and address the infrastructure renewal gap, the expected cost of water infrastructure serving Vancouver is in the billions of dollars. Water infrastructure will become an increasingly important affordability issue in Vancouver and the need to explore more cost-effective and higher value-for money approaches to water services delivery is significant.

(4) Livability, equity and reconciliation with Indigenous communities

Water is a vital resource and life force for communities and ecosystems. For millennia the Musqueam, Squamish, and Tsleil-Waututh First Nations have

developed their communities around their relationships with water in this region. Post-contact, in the past hundred years or so in Vancouver, through land development, de-forestation, the burying of streams and development of modern sewer and drainage infrastructure, our relationships with water, the land and natural systems have been disrupted.

The Rain City Strategy provides an opportunity to explore how environmental protection through new approaches to rainwater management could help Vancouver's commitment as a City of Reconciliation. In addition, GRI can support equity, contribute to neighbourhood resiliency, urban cooling, green jobs, access to nature and green public spaces, and mental health and well-being so that our communities and ecosystems thrive.

Progress towards green rainwater infrastructure implementation

While planning for the Rain City Strategy has been underway, staff have been actively implementing GRI projects in support of our IRMP obligations. A report card on progress toward the IRMP implementation is detailed in Appendix C.

Since mid-2017 the City has designed and constructed 38 new GRI assets in our streets, bringing our total number of assets to 238, which manage 15.7 hectares of impervious area. These assets include infiltration trenches, bio-swales, bio-retention bulges, rainwater tree trenches, permeable pavements and a wetland that manages street rainwater run-off from the adjacent community.

In 2017 and 2018, the City introduced new rainwater management policy for private developments, which has resulted in 170 sites developing rainwater management plans and implementing GRI through private development. In 2018, the City also introduced new rainwater harvesting requirements to improve public health and technical implementation. In addition, staff have developed watershed characterization maps for all 19 of Vancouver's urban watersheds to support current and future planning at a watershed scale. The watershed planning and characterization maps are detailed in Appendix D.

There are significant synergies between Park Board-led initiatives and the Rain City Strategy. Park Board staff have been instrumental in collaborating with City staff to explore how rainwater management and the goals and objectives of the Rain City Strategy could complement VanPlay, the Biodiversity Strategy and the Urban Forest Strategy. The Rain City Strategy has also embraced VanPlay's Strategic Bold Move 3: Connectivity, which can be applied through blue-green systems in the public realm, beyond parks.

Our work in both the public and private realms has led to dozens of collaborations and partnerships to support technical research, education, training, capacity building, learning about equity, Indigenous reconciliation and citizen science. Initiatives have included Musqueam, Squamish and Tsleil-Waututh Nations and organizations such as Earth Watch, HSBC, CityLab, the Fraser Basin Council, the University of British Columbia, BC Institute of Technology, Simon Fraser University, Langara and Kwantlen Universities, Museum of Vancouver, the Municipal Natural Assets Initiative and peer cities locally and internationally.

In addition, City and Park Board staff are developing Integrated Water Management Plans along the Cambie Corridor and the Broadway Corridor that are aligned with the 'One Water' approach and Rain City Strategy findings, directions and watershed characterizations. These plans are expected to deliver optimized water servicing solutions that will scale up our implementation of green rainwater infrastructure and inform the City's long-term water planning methods.

Combined Sewer Overflow Mitigation and Clean Waters Plan Development

In July 2019, Council directed staff to report back on next steps for development of a CSO mitigation plan. To address this, a dedicated Clean Waters Planning team has been created, which will deliver a plan to accelerate action on mitigating combined sewer overflows and pollution from rainwater runoff. This will require an integrated and holistic approach to management of various water resources and water infrastructure typologies.

It is expected that CSO volumes will need to be addressed through a combination of green infrastructure, grey infrastructure, operational, sewage reduction and/or expanded treatment strategies. The optimal complement of green and grey infrastructure and system operations improvements to ultimately address CSOs and meet our regulatory obligations will be determined through the Clean Waters Plan.

A project scope and work plan are currently being developed and will include:

- A current state analysis, including initiating the roll-out of real-time monitoring and reporting for all combined sewer overflow outfalls;
- An international jurisdictional scan to identify leading examples of infrastructure and policy solutions, to be included in the opportunities assessment for Vancouver;
- Engagement with First Nations and other levels of government such as Metro Vancouver and the BC Ministry of Environment;

An update of this plan will be presented to Council in Q2 2020, with an overview of progress, stakeholder input and key performance outcomes to be achieved in the Clean Waters Plan.

Strategic Analysis

The Strategy has been developed through research, community, industry and expert panel engagement, analysis of best management practices and by taking a learning-by-doing approach. The key elements of the strategy are summarized in the Strategy Snapshot figure below. The external engagement is detailed in Appendix E.

The Rain City Strategy is comprised of nine Transformative Directions that are focussed on the foundations and strategic initiatives for achieving a water paradigm shift. It also includes three practical Action Plans that articulate 46 programs related to (1) Streets and Public Spaces, (2) Buildings and Sites, and (3) Parks and Beaches. See Appendix F for detailed Action Plans.

The action plans are more tactical in nature and are intended to help transform our policies, programs, planning and design approaches to make green rainwater infrastructure mainstream in Vancouver, deliver tangible initiatives to help revive our watershed and waterfronts, and help restore the natural water cycle. The action plans will make GRI a standard practice in our climate emergency response and in policy, planning and infrastructure delivery related to land use, development, and street, transportation, water, sewer and drainage systems.

Strategy snapshot

Vision

Vancouver's rainwater is embraced as a valued resource for our communities and natural ecosystems

Goals

1. Improve and protect Vancouver's water quality;
2. Increase Vancouver's resilience through sustainable water management; and
3. Enhance Vancouver's livability by improving natural and urban ecosystems.

Objectives

- Remove pollutants from water and air;
- Increase managed impermeable area;
- Reduce volume of rainwater entering the pipe system;
- Harvest and reuse water;
- Mitigate urban heat island effect; and
- Increase total green area.

Targets

- Capture (infiltrate, evapotranspire, and/or reuse) and clean (treat) a minimum of 90% of Vancouver's average annual rainfall volume (long term); and
- Manage urban rainwater runoff from 40% of impervious areas in the city by 2050.

Rainwater management design standard for public property as of November 2019

Capture and clean 48 mm in:

- Streets and public spaces;
- Civic facilities; and
- Parks.

Rainwater management design standard for private property by 2022

- Capture and clean 48 mm.

Guiding principles to become a water sensitive city

- Design our city as a water supply catchment;
- Design our city and infrastructure to deliver ecosystem services;
- Design our city for water resilience, adaptability and flexibility;
- Design our city to encourage collaborative action and enable water wise behaviours; and
- Design our city to support an equitable water future.

Transformative directions

1. Strive to become a water sensitive city;
2. Respond with urgency to climate change;
3. Accelerate action to protect the health and vitality of surrounding waterbodies;
4. Revitalize watersheds and waterfronts to enable communities and natural systems to thrive;
5. Shape systems to integrate and value all forms of water;
6. Explore intersectionality, equity and reconciliation with Indigenous peoples through urban water management;
7. Drive innovation and system effectiveness through data and analytics;
8. Enable a culture of collaboration; and
9. Invest in education, capacity-building and partnerships to mobilize action.

Action plans

- Streets and public spaces: 11 implementation and 5 enabling programs;
- Buildings and sites: 7 implementation, 5 enabling programs and 2 linked (complementary) programs; and
- Parks and beaches: 12 implementation and 4 enabling programs.

Updated rainwater management design standards

The 2016 IRMP established site and GRI asset performance standards for impervious areas to capture (return to ground, return to atmosphere or reuse) 24 mm of rainfall per day and clean 48 mm of rainfall per day. Given the continued pressures on the sewer and drainage systems, capacity constraints and significant issues around combined sewer overflows, increased precipitation due to climate change, and the cost of servicing through conventional piped infrastructure, a more ambitious performance standard is needed to help divert more water from the pipe system.

As such, the Rain City Strategy updates and consolidates the rainwater management design standard in to a single performance standard to capture and treat 48 mm of rainfall per day. The intent is that this be applied to the greatest extent practicable, though it is expected there will be instances where it is not technically feasible and the performance standard would need to be amended to respond to local site conditions.

This new standard will be adopted immediately for streets and public spaces, parks and civic facilities where rainwater management is part of the project scope. Adoption of the new design standard is expected to provide a number of immediate benefits and will help catalyze further industry and private realm actions.

For buildings and sites in the private realm, the aim is for this target to be adopted by 2022. For some types of development in the private realm, particularly with higher infiltration potential, meeting the 48 mm of rainfall per day design standard should not be onerous. On larger sites with development and/or parkades encompassing the entire lot, more complex forms of green rainwater infrastructure, such as blue-green roofs and water harvest and re-use, will be needed and more time will be required for implementation. Staff will work with industry to identify needs, opportunities, and barriers and will develop guidance materials and other tools to advance industry and city capacity and readiness.

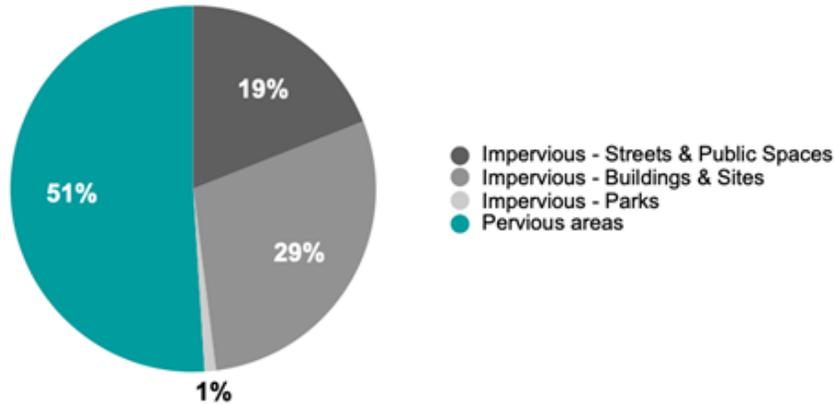
Timeline for Design Standard Adoption



The Rain City Strategy reaffirms the performance target adopted in the 2016 IRMP to capture and treat 90% of Vancouver's annual rainfall through the implementation of green rainwater infrastructure. Achieving this means that all impervious areas of the City will have to manage rainwater volume and water quality to the 48 mm of rainfall per day design standard.

The City currently has approximately 5,718 hectares of impervious area, which represents 49% of the city land cover as a whole. Currently, only a small portion of public and private projects are integrating rainwater management objectives.

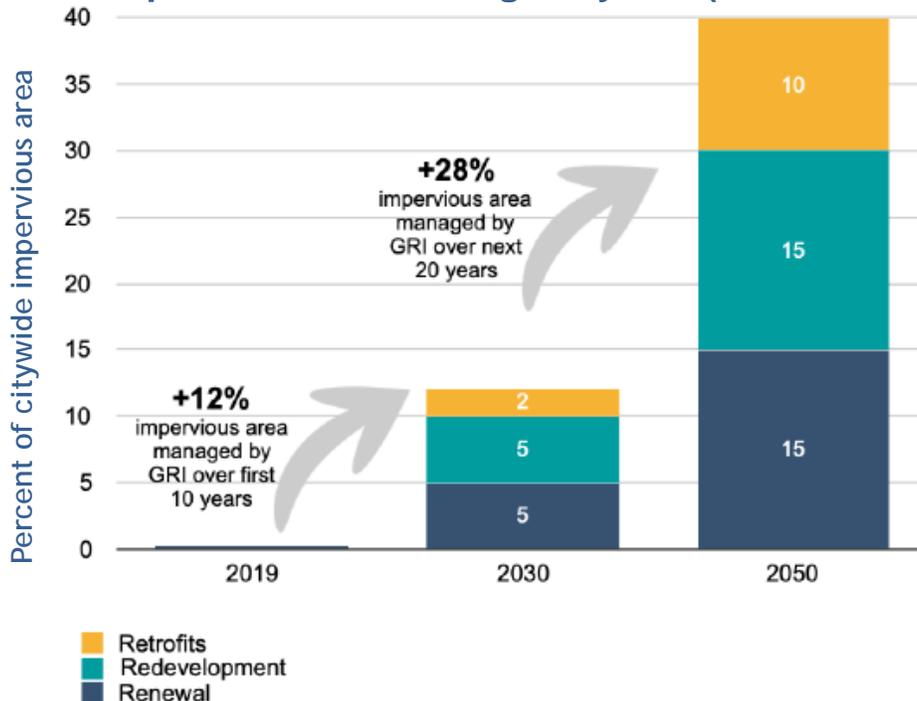
Pervious and Impervious Areas in Vancouver by Land Area



As the 2016 IRMP did not specify a timeline by which all impervious areas in the city should apply the rainwater management design standard, the Rain City Strategy, after assessing multiple scenarios, establishes an ambitious implementation target to apply the rainwater management design standard to 40% of the city's impervious areas by 2050. This means making rainwater management business-as-usual in all new development and renewal projects as well as pursuing strategic retrofits in both the public and private realm. The City will need to grow its planning, design and development review capacity to support this scale of implementation. Specific resourcing needs will be developed as programs and associated resourcing plans are scoped.

Today, 0.5 % of streets and public spaces currently manage rainwater from impervious areas and a few hundred private developments citywide. Consequently, achieving the 40% target for citywide impervious areas is an ambitious endeavor as shown in the figure below.

Total Impervious Area Managed by GRI (2019 – 2050)



Expected outcomes associated with target to manage 40% of impervious areas by 2050

Based on managing rainwater volume and water quality for 40% of Vancouver's impervious areas on public and private property by 2050, our analysis projects that green rainwater infrastructure installations will clean and divert an estimated 28 billion litres of rainwater per year from the pipe system, which will contribute to preserving capacity in the existing pipe system for growth and additional precipitation due to climate change. It could have potential to help reduce overall CSO volumes by around one third, or approximately thirteen billion litres per year. Validation of specific outcomes and the most desirable combination of green and grey infrastructure interventions to fully address CSOs will be determined through more in-depth CSO mitigation planning through the Rain City Strategy Transformative Direction 3, which involves developing a Clean Waters Plan to accelerate CSO mitigation.

GRI Implementation approach

The importance and value of integrating land use and water resource planning is a key finding of the Rain City Strategy. Accordingly, the Rain City Strategy directions will help inform the City-wide Plan process as it relates to water. Once the engagement is complete, then the outcomes of the City-wide Plan will shape the implementation and future evolution of the Rain City Strategy.

The strategy implementation will rely on municipal tools including regulation, advocacy and investment. More holistic and cost-effective rainwater management calls for all lands in Vancouver to do their part to help manage rainwater close to where it lands. As part of the strategy, public, park and private properties and infrastructure will need to share responsibility in managing more water and help reduce discharge to the pipe system.

The City will continue its advocacy, to build partnerships and collaborations and to catalyze actions by others in support of the goals of the Rain City Strategy. In order to lead by example, the City will increase its investment in its own infrastructure and programs to make managing rainwater volume and quality a standard practice in our new capital and renewal projects and through retrofits.

Measuring progress and adaptive management

A key metric to track our progress in implementing the Rain City Strategy will be the amount of impervious areas applying the rainwater management design standard on both public and private property. This will be tracked and reported through the Greenest City Action Plan annual reporting. We expect that as programs are developed additional metrics and indicators will be developed to assess both progress and outcomes related to the initiative.

Given that GRI is an emerging field of practice and widespread implementation is new for Vancouver, it is expected that we will need to be open to learning what is working well, what is proving problematic and then iterating and adapting our approach. This report recommends a full report back to Council within three years on overall progress.

Public/Civic Agency Input

The development of the Rain City Strategy employed a strategic engagement and application process, moving through cyclical phases of Ask, Try and Do. To gain far reaching and sustained support, the Ask phase included engagement opportunities and events for City staff, industry professionals, expert panelists and the public to define the scope of this initiative and unpack the values and assumptions around urban water management and rainwater management in particular. In all, there were over 10,000 contacts with the community and industry through an open house, workshops, events, surveys and more than thirty sessions across five departments involving hundreds of City staff at all levels of the organization. The external engagement process is detailed in Appendix E.

Implications/Related Issues/Risk

Financial

The City faces increasing cost pressures associated with maintaining, renewing and expanding our sewer and drainage system. Future water infrastructure investments necessitated by population growth, asset renewal and climate change are expected to be in the billions of dollars over the coming decades. There is a significant financial, social and environmental imperative to strategically examine how to deliver our services efficiently and optimize our investments in a financially sustainable way.

Integrating GRI into traditional sewer and drainage systems provides better value over the systems' life cycle. Other cities that have deployed an integrated grey-green approach show that water services can be delivered more cost-effectively than grey-only approaches, and often with co-benefits (social, environmental and economic) to the community.

Currently, the sewer and drainage infrastructure is managed by the City while larger regional infrastructure is managed by Metro Vancouver. Adopting the proposed design standards and targeting managing 40% of impervious areas by 2050 require policy intervention and investments in both public and private realm. To achieve future rainwater management, climate adaptation, and water quality objectives, it is vital for the City to deploy a combination of policies, regulations and partnerships with regional government and private property owners in managing water and sharing the responsibilities while helping to mitigate overall citywide risks related to rainwater management.

Recognizing the urgency around the climate emergency and developing cost-effective water infrastructure servicing approaches, \$70 million of capital and operating funding has been contemplated in the current 2019-2022 Capital Plan and Operating Budget to support actions through 2022. The proposed budget for Rain City Strategy implementation would remain within the overall 2019-2022 capital plan envelope. To achieve the aggressive mid to long-term goals, more comprehensive analyses surrounding costs, benefits, risk mitigation, asset optimization, and compliance will be undertaken.

As further planning and program development work is completed through the Rain City Strategy Action Plans as well as lessons learnt from major programs

currently underway (e.g. Integrated Water Management Plans along the Cambie Corridor and the Broadway Corridor), staff will report back and provide updates on delivery and financial strategies to inform the next 10-Year Capital Strategic Outlook and 4-year Capital Plan.

Human Resources/Labour Relations

Staff resources have been allocated from within existing staff teams and budget allocations to support implementation needs to 2022. As the programs expand to include rainwater management as part of all related capital and renewal projects beyond 2022, staff needs to support implementation will be assessed and resourced as part of the Capital Planning and annual budgeting cycles. Resourcing plans will be developed as programs are scoped and considered for implementation.

Environmental

Implementation of GRI will help mimic and restore the natural water cycle in Vancouver and help prevent pollution of rainwater run-off and pollutant discharges to our waterways, including False Creek, Burrard Inlet and the Fraser River. The water quality challenges associated with our sewer and drainage system are chronic and there is an urgent need to address both combined sewer overflows and rainwater run-off pollutants in our receiving waters. The application of GRI has been demonstrated to be effective in filtering pollutants and supporting fish health. The strategic use of GRI will also be used to divert water from the pipe system to reduce combined sewer overflow events, reduce environmental risks and support regulatory compliance.

GRI offers many additional environmental benefits. Natural spaces and ecosystems can be enhanced and promoted through implementation of green rainwater infrastructure that allows water to return to plants, trees, aquifers and streams. Intensified GRI installations along corridors connecting parks, natural areas and waterfronts can also enhance habitat, urban cooling, health, help protect existing natural areas and connect fragmented habitats. Ecosystem structures and function are enhanced with access to water, making them more resilient to the impacts of climate change. Finally, by increasing urban habitats size and canopy cover, there are positive benefits for biodiversity.

Legal

Vancouver has regulatory obligations it must meet around the elimination of combined sewer overflows, implementing its IRMP and reducing the water quality impacts of our sewer and drainage system on local receiving waters. The City's efforts to meet its obligation to have no combined sewer overflows by 2050 require an accelerated and diversified approach, and green rainwater infrastructure investments have a strategic role to play to meet this obligation and reducing risks associated with non-compliance and environmental impacts.

Equity, Intersectionality and Reconciliation with Indigenous Peoples

Exploring how an intersectional lens can be applied to planning and implementing GRI projects will require considering the legacy of inequitable distribution of investment and water system benefits and impacts within communities in the city. GRI sits in a unique position as it can be found at the intersection of a variety of equity related topics.

GRI offers opportunities to respond to environmental injustices and provides an opportunity to address action areas associated with reconciliation and greater and more meaningful collaboration with Musqueam, Squamish, Tsleil-Waututh Nations, and urban Indigenous communities. Concepts such as accessibility to water resources and infrastructure, public health, environmental justice, public participation, and place making can all be found within the sphere of influence of a GRI project.

CONCLUSION

A holistic and ‘One Water’ integrated water management approach can do more than serve the rainwater and wastewater needs of a community. It can improve water quality, increase climate resilience, contribute to improved livability and equity and work to restore and enhance the health of urban watersheds, waterfronts and ecosystems.

The Rain City Strategy encompasses two years of engagement, research and action while planning. The strategy and action plans will move the city beyond ad hoc GRI implementation and will have a profound impact on the way we deliver water services in the city. GRI approaches align water management with a multitude of other community benefits including water security, enhanced public spaces, increased habitat and biodiversity, urban heat mitigation, health and well-being and green jobs all while reducing future risks and costs of climate change and infrastructure service delivery. If adopted, the Rain City Strategy will become the first step in making more holistic, integrated and cost-effective water management mainstream in Vancouver as we strive to become a water sensitive city.

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