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# WATER

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# EAU



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# CONTENTS | SOMMAIRE

PLAN CANADA Summer • Été 2024 Vol. 64 No. 2

WATER   EAU	
<p><b>7</b></p> <p><b>Housing, the Water Infrastructure that Serves It, and the Changing Social Contract</b></p> <p>By Nicola Crawhall</p>	<p><b>28</b></p> <p><b>Waste Not, Want Not: Planning for Sustainable and Adaptable Wastewater Surveillance Infrastructure</b></p> <p>By Alex Ho Shing Chik</p>
<p><b>11</b></p> <p><b>Design Standards Modernization: A Collaborative Approach to Optimize Infrastructure Design</b></p> <p>By Susan Ancel and Heather Zarski</p>	<p><b>32</b></p> <p><b>Making Waves in Utility Planning through the Development of Vancouver's First Healthy Waters Plan</b></p> <p>By Lauren Foote and Zoe Greenberg</p>
<p><b>14</b></p> <p><b>Reversing the Tide: Flood Protecting the Toronto Port Lands</b></p> <p>By Corey Bialek</p>	<p><b>38</b></p> <p><b>Prairie Spotlight: Natural Infrastructure for Water</b></p> <p>By Rebecca Row, Josée Méthot, and Ashley Rawluk</p>
<p><b>21</b></p> <p><b>Eau Secours</b></p> <p>De Gabrielle Roy-Grégoire et Antoine Camion</p>	<p><b>42</b></p> <p><b>Water is All: Integrated Water Management in the Regional District of Nanaimo</b></p> <p>By Kim Fowler</p>
<p><b>25</b></p> <p><b>A Global Initiative Dedicated to Water Emerges in Georgian Bay</b></p> <p>By Dan Travers</p>	

## COLUMNS | CHRONIQUES

<p><b>4</b></p> <p><b>Editors' Note</b> <i>Mot de la rédaction</i></p> <p>By Sandra Cooke and Sarah Ezzio</p>
<p><b>46</b></p> <p><b>Fellows Corner</b> <i>De côté des Fellows</i></p> <p>By Hugh Kellas</p>
<p><b>50</b></p> <p><b>Planner's Bookshelf</b> <i>L'étagère du planificateur</i></p>
<p><b>51</b></p> <p><b>Book Review</b></p> <p>By Emilie K. Adin</p>
<p><b>52</b></p> <p><b>Planning Research Digest</b> <i>Condensé des recherches en urbanisme</i></p>





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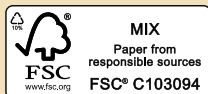
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## EDITORS' NOTE IS CANADA WATER-WISE?

**T**he myth of abundant water continues to challenge our collective thinking about how, and even if, we plan to manage it. We also take water for granted in our cities and communities, and assume it will come out of our taps when we need it, flush our toilets, or be whisked away to the appropriate places when it rains. With a lingering drought currently affecting the Canadian Prairies, communities are experiencing firsthand what limited water feels like. Given our changing climate, I can't help but optimistically wonder if this drought event is shifting our thinking toward more water-wise practices. However, are we shifting fast enough? This issue of *Plan Canada*

## LE CANADA EST-IL ÉCONOME EN EAU? MOT DE LA RÉDACTION

**L**e mythe de l'abondance de l'eau continue de défier notre réflexion collective sur la nécessité et la manière dont nous envisageons de la gérer. Dans nos villes et nos communautés, nous tenons l'eau pour acquise et présumons qu'elle sortira de nos robinets lorsque nous en aurons besoin, qu'elle alimentera nos toilettes ou qu'elle sera acheminée vers les endroits appropriés lorsqu'il pleuvra. Avec la sécheresse persistante qui touche actuellement les Prairies canadiennes, les communautés font l'expérience directe du manque d'eau. Compte tenu de l'évolution du climat, je ne peux m'empêcher de me demander avec optimisme si cette sécheresse nous incite à adopter des pratiques plus respectueuses de l'eau. Cependant, cette évolution est-elle assez rapide? Ce numéro de *Plan Canada*





“ **We take water for granted in our cities and communities and assume it will come out of our taps when we need it, flush our toilets, or be whisked away to the appropriate places when it rains.** ”

highlights some great work and effort to plan for and manage our water resources wisely to support our communities, but will it be enough?

When planning for and managing water resources, we hear about how we must *integrate*. What does integrate mean? In this issue, we learn that the Regional District of Nanaimo integrates three core services with climate action – drinking water, source water protection, and regional growth. We also learn that the City of Vancouver is using a OneWater vision for managing their grey and green infrastructure, and EPCOR in Edmonton is using a OneWater approach to bring together their water, wastewater, and

stormwater systems planning. Finally, if we are to manage the health of our residents in our communities, integrating public health management and urban wastewater management may help to inform future pandemics. At the heart of integration is collaboration.

Collaboration is an easy term to use, but a difficult process to implement. Collaboration is highlighted as a key process of working towards building equitable, resilient, and sustainable water services and housing in our cities, which we learn more about in the article, ‘*Housing, the Water Infrastructure That Services It, and the Changing Social Contract*.’ The City of Vancouver also demonstrates the wide

breadth through which its collaborative Healthy Waters plan was established, bringing together multiple jurisdictions and multi-stakeholders, including the Musqueam, Squamish, and Tsleil-Waututh First Nations. Bringing multiple stakeholders together also illuminates the importance of applying an equity lens when we bring community members together in support of more integrated water management. In this issue, we learn more about water equity in an article which shares insights from Quebec, and recognizes that drinking water is a fundamental human right. However, it also shares ongoing issues of water inequity in some of our communities, particularly through the situation of people

met en lumière des travaux et des efforts remarquables pour planifier et gérer nos ressources en eau de manière judicieuse afin de soutenir nos communautés, mais cela suffira-t-il?

Lors de la planification et de la gestion des ressources en eau, nous entendons parler d'*intégration*. Qu'est-ce que cela signifie? Dans ce numéro, nous apprenons que le district régional de Nanaimo intègre trois services essentiels : l'eau potable, la protection des sources d'eau, la croissance régionale et l'action climatique. Nous apprenons également que la ville de Vancouver utilise une vision OneWater pour gérer ses infrastructures grises et vertes et qu'EPCOR à Edmonton utilise une approche OneWater pour rassembler la planification de ses systèmes d'eau, y compris les eaux usées et les eaux pluviales. Enfin, si nous

voulons gérer la santé de nos résidents dans nos communautés, l'intégration de la gestion de la santé publique et de la gestion des eaux usées urbaines peut contribuer à nous préparer pour les futures pandémies. La collaboration est au cœur de l'intégration.

La collaboration est un terme facile à utiliser mais un processus difficile à mettre en œuvre. La collaboration est soulignée comme un processus clé pour travailler à la construction de services d'eau et de logements équitables, résilients et durables dans nos villes, ce que nous découvrons plus en détail dans l'article sur les *Habitations, les infrastructures d'eau qui les desservent et l'évolution du contrat social*. La ville de Vancouver démontre également l'ampleur de la collaboration qui a présidé à l'élaboration de son plan « Eaux saines », réunissant

de multiples juridictions et parties prenantes, dont les Premières Nations Musqueam, Squamish et Tsleil-Waututh. Le fait de réunir plusieurs parties prenantes met également en lumière l'importance d'appliquer une optique d'équité lorsque nous rassemblons les membres de la communauté en faveur d'une gestion plus intégrée de l'eau. Dans ce numéro, nous en apprenons davantage sur l'équité en matière d'eau grâce à un article révélateur qui nous parvient du Québec et qui reconnaît que l'eau potable est un droit humain fondamental. Cependant, il fait également état de problèmes persistants d'inégalité en matière d'eau dans certaines de nos communautés, notamment en ce qui concerne la situation des sans-abri. La nécessité pour les urbanistes et les gestionnaires de l'eau de se réunir pour

## EDITORS' NOTE

### MOT DE LA RÉDACTION

experiencing homelessness. The need for urban planners and water managers to come together to deal with urgent issues like the housing, climate, and affordability crises demonstrates the need for building resilience in our built and natural systems.

Finally, this issue also teaches us that coupling natural systems within our built environment may, in fact, build resilience. The re-naturalization of the mouth of the Don River in Toronto showcases nature's

ability to mitigate floods. On the prairies, we learn that natural infrastructure is a cost-effective and environmentally beneficial alternative to traditional grey infrastructure, and provides multiple services like stormwater management, wastewater treatment, water supply, flood protection, and drought resilience.

Water is integrated into our daily lives, although it is brilliantly invisible and is taken for granted far too often. Illuminating

the urban water cycle in our everyday lives may lead to more resilient communities, but to do this, we need to bring urban, environmental, and water management planners together, which requires collaboration. Collaboration is a slow and hard process when there are a multitude of priorities. Sometimes, by going slow together though, you can go farther. Let's collaborate in support of water-wise cities in Canada! ■

traiter des questions urgentes telles que les crises du logement, du climat et de l'accessibilité financière démontre le besoin de renforcer la résilience de nos systèmes bâtis et naturels.

Enfin, ce numéro nous apprend également que l'association de systèmes naturels à notre environnement bâti peut, en fait, renforcer la résilience. La renaturalisation de l'embouchure de la rivière Don à Toronto illustre la capacité de la nature à atténuer les inondations. Dans les Prairies, nous apprenons que

les infrastructures naturelles sont une alternative rentable et bénéfique pour l'environnement aux infrastructures grises traditionnelles et qu'elles fournissent de multiples services tels que la gestion des eaux pluviales, le traitement des eaux usées, l'approvisionnement en eau, la protection contre les inondations et la résilience face à la sécheresse.

L'eau fait partie intégrante de notre vie quotidienne, bien qu'elle soit étonnamment invisible et qu'elle soit bien trop souvent considérée comme acquise. Mettre en

lumière le cycle urbain de l'eau dans notre vie quotidienne peut mener à des communautés plus résilientes, mais pour ce faire, nous devons rassembler les planificateurs urbains, environnementaux et de gestion de l'eau, ce qui nécessite une collaboration. La collaboration est un processus lent et difficile lorsqu'il existe une multitude de priorités. Mais parfois, c'est en allant lentement ensemble que l'on peut aller plus loin. Collaborons pour soutenir les villes canadiennes respectueuses de l'eau! ■




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# HOUSING,

## the Water Infrastructure that Serves It, and the Changing Social Contract

By Nicola Crawhall

### SUMMARY

The current national debate about meeting housing targets needs to recognize that the infrastructure to service this housing must be designed to address not only housing availability, but also climate change, equity, and affordability. Re-evaluating the level of service to support residents and businesses in the face of changing social and climatic conditions will require cross-sectoral and public engagement to arrive at a new consensus, or social contract.

### SOMMAIRE

Le débat national actuel sur la réalisation des objectifs en matière de logement doit reconnaître que les infrastructures destinées à desservir ces logements doivent être conçues de manière à tenir compte non seulement de la disponibilité des logements, mais aussi du changement climatique, de l'équité et de l'accessibilité financière. La réévaluation du niveau de service pour soutenir les résidents et les entreprises face à l'évolution des conditions sociales et climatiques nécessitera un engagement intersectoriel et public pour parvenir à un nouveau consensus ou contrat social.



## INFRASTRUCTURE AS A SOCIAL CONTRACT

It is estimated that Canada needs to build nearly six million new homes by 2030.<sup>1</sup> But there is much less talk about how this accelerated housing will be serviced by infrastructure built to withstand tomorrow's extreme climate impacts while remaining equitable and affordable. Canadian infrastructure expert at MIT, Deb Chachra describes infrastructure systems as "*the physical manifestation of our social contract.*" The problem is that the conditions that currently define this social contract – the tacit agreement between service provider and receiver on the level of service provided by these systems – are changing under our feet. This is due to a convergence of the climate crisis, the housing crisis, and an affordability crisis. In response, Chachra argues for a renegotiated infrastructure social contract, focused on equity, resiliency and sustainability.<sup>2</sup>

Re-evaluating the accepted level of service from our infrastructure systems, the protection they will deliver to residents and businesses, and at what cost, is critical to the way forward, to build and service the six million homes needed by 2030.

## ONLY TWO CHOICES: GET IT WRONG OR GET IT RIGHT

A prerequisite for building six million new homes is significant new capacity and investments in water, wastewater, and stormwater infrastructure. In Canada's largest metropolitan centres, particularly those with very old infrastructure stock, this involves not only building new capacity, but upgrading and maintaining old infrastructure in a state of good repair. If not addressed, the lack of investment in this foundational infrastructure will be a significant impediment to building new housing.

Alternatively, if we pay attention to the shifting conditions, expectations, and values around us, and the implications for infrastructure systems design, this era of housing development could result in a new social contract underlying servicing. This will prepare us for climate change, building servicing at lower cost, and aiming for low-carbon construction. In doing so, it could transform a spiralling housing and affordability crisis into an era of urban renewal in Canada, creating more livable, affordable, climate-resilient cities.

## WHAT'S CHANGED?

Many dynamic forces, including the market, technology, demographics, and social values dictate urban form. However, the single constant urban planners could once take for granted in Canada is reliable sources of drinking water and relatively predictable stormwater management needs. The great exception to this rule is the lack of access to safe clean drinking water in Indigenous communities (see more below). This constant has become a casualty of the climate crisis.

As we plan to service the six million housing units, the infrastructure we build upon, expand upon, and renew will be locked in for the next 50 years. What "*physical manifestation of our social contract*" will our children need in 2074? Although the precise timing and location of climate change impacts cannot be known, we do know with *great* certainty that it will get hotter, there will be more intense storms, there will be areas of extreme drought, and there will be sea level rise. It is incumbent upon us to prepare our communities for all of these eventualities. That must be our new social contract.

Changing conditions are not only climate-induced. There is also an affordability and equity crisis. The decisions we make about infrastructure can significantly impact the overall cost of housing. Since the COVID-19 pandemic and the affordability crisis, more attention is being paid to water rates and who in the community may find them unaffordable. Customer assistance programs have been put in place across Canada as a result. Going forward, we need to think about how to reduce servicing costs. The most efficient way of doing that is to build more dense neighbourhoods, which reduces the per-household cost of infrastructure.

We also need to consider equity with regard to infrastructure. While most Canadians probably do not see inequity in public water services, many First Nations, Metis and Inuit communities have experienced this inequity firsthand while living under disgraceful drinking water boil advisories for years.<sup>3</sup> A 2022 study that integrated a 100-year Canada flood map with a 2016 national census-based socioeconomic survey found that vulnerable groups – including females, lone-parent households and Indigenous

peoples – are at a greater risk of flooding in neighbourhoods across Canada.<sup>4</sup>

Applying an equity and a climate lens is becoming more common when prioritizing climate-proofing projects. For example, the City of Saskatoon applied its Triple Bottom Line Policy and Framework,<sup>5</sup> which included equity considerations, when developing its long-term infrastructure plan. By applying an equity lens and a climate lens, projects in neighbourhoods with equity-seeking groups, particularly those in areas more prone to flooding, are prioritized.

## EVIDENCE OF A NEW EMERGING SOCIAL CONTRACT

There are market drivers, particularly in the financial sector, that are changing the level of climate protection afforded to households and businesses. Mark Carney, former chairman of the Bank of Canada and the Bank of England, has called for financial institutions to factor in climate-related financial risk, stating that "Better [risk] disclosure and a heightened sense of urgency are leading to a transformation of climate risk management."<sup>6</sup> Several insurance companies have suspended coverage for household loss or damage due to overland flooding. Earlier this year, home insurance company Desjardins announced it would stop issuing mortgages to those living in flood zones in some regions of the country.<sup>7</sup> According to the Insurance Bureau of Canada, up to 1.5 million Canadian households located in flood zones could be affected if other mortgage lenders follow suit.<sup>8</sup> While painful in the shorter term, these financial drivers will ultimately send strong signals regarding where to build, and the cost of protecting our homes.

Municipalities are also re-evaluating the level of service they can provide their residents and businesses due to climate impacts. In the City of Calgary, water restrictions were in place this past summer due to low water levels in the Bow and Elbow rivers that feed the city's drinking water supply.<sup>9</sup> In Guelph, one of Canada's largest cities that is entirely dependent on groundwater, aggressive conservation measures have reduced per capita water use to 166 litres per day. This is almost 30% lower than the Canadian average. The City of Richmond, located within the Fraser River's floodplain and only one metre above



**Nicola Crawhall** is CEO of the Canadian Water Network. She previously served as Deputy Director of the Great Lakes and St. Lawrence Cities Initiative, and was a senior policy advisor in the Ontario Government in the development of the Clean Water Act, groundbreaking legislation to protect sources of public drinking water.

sea level, faces the risk of sea level rise and coastal surges. It has invested heavily in its Flood Protection Management Strategy.<sup>10</sup>

Notwithstanding these initiatives, Canadian cities are far behind some cities in Europe and Australia, like Copenhagen and Melbourne, in fully embracing climate adaptation in water management and water servicing.<sup>11</sup>

### PLENTY OF SOLUTIONS, SO WHAT'S STOPPING US?

The technical and engineering solutions we need already exist and are in practice worldwide. And yet, the adoption of these solutions is slow in Canada. Why? My own assessment, having worked in the water sector for over 20 years, is that water utilities are being asked to address the convergence of the climate, housing, and affordability crises without the financial resources or the authority to bring about the necessary changes. It is a challenge to bring about the transformation at the speed required in a highly regulated, compliance-focused, engineering solutions-driven environment that is also dealing with skyrocketing costs, supply chain interruptions, and a labour force in transition.

### THE NEED FOR COLLABORATION

The first step in addressing the triple crisis we face is not to identify new technologies and innovations, nor is it to map out each community's climate vulnerabilities or equity-seeking groups. It is to forge a social consensus about the nature of the new social contract to address the triple crisis before us, and to engage multiple parties across sectors and disciplines in a

collaborative effort to build communities and their servicing accordingly.

This process has been kickstarted by the Taskforce on Climate and Housing, co-chaired by the Honourable Lisa Raitt, former federal cabinet minister, and Don Iveson, former mayor of Edmonton. It has produced a *Blueprint for More and Better Housing*,<sup>12</sup> which provides a path forward to build six million units of affordable, low-carbon, resilient housing. This needs to be replicated on the water infrastructure and servicing side of the housing equation.

For this urban infrastructure transformation to occur, a complex cast of decision-makers needs to reach a consensus on how we will work together to build equitable, resilient and sustainable servicing and housing in the short term and through to 2074. We need decision-makers involved in and with housing development, city building, land use planning, infrastructure planning, energy planning, infrastructure funding programs, building codes, new technologies, financing mechanisms, water allocation, Indigenous and equity-seeking groups, residents, and businesses. This type of collaborative process is critical for building a common understanding and building trust around the table, clarifying shared roles and defining responsibilities.

Let's seize this opportunity of a lifetime to rewrite the social contract so that we can start creating the cities we will need 50 years from now. Using a well-used hockey analogy: Canada, we need to tie up our skates, get the right team on the ice, and skate like heck to where the puck is going.

### ENDNOTES

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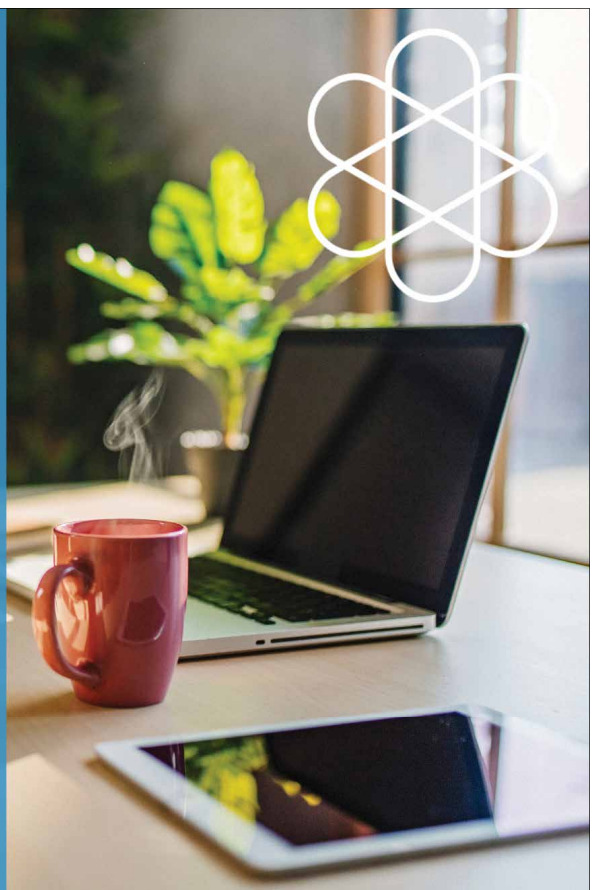
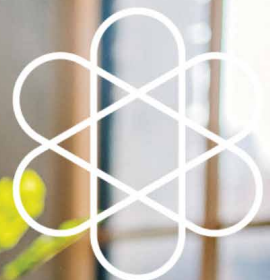
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# DESIGN STANDARDS MODERNIZATION:

## A Collaborative Approach to Optimize Infrastructure Design

By Susan Ancel and Heather Zarski

### SUMMARY

In 2024, the City of Edmonton's new zoning bylaw came into effect. The bylaw is the primary regulatory tool required to implement ambitious redevelopment targets and other policy goals. The new zoning bylaw necessitated changes to the water cycle infrastructure design standards. These standards were primarily written for greenfield development versus redevelopment, and did not account for the more flexible zones and broader land uses introduced. Using a one water approach, EPCOR worked collectively with industry partners to update the standards to reflect modern infrastructure needs and introduced a flexible and collaborative process for developments with innovative water management goals.

### SOMMAIRE

En 2024, le nouveau règlement de zonage de la ville d'Edmonton est entré en vigueur. Ce règlement est le principal outil réglementaire nécessaire à la mise en œuvre d'objectifs ambitieux en matière de réaménagement et d'autres objectifs politiques. Le nouveau règlement de zonage a nécessité des modifications des normes de conception des infrastructures du cycle de l'eau. Ces normes ont été rédigées principalement pour le développement de sites vierges par rapport au redéveloppement et ne tenaient pas compte des zones plus flexibles et des utilisations plus larges des terres introduites. Dans le cadre d'une approche unique de l'eau, EPCOR a travaillé collectivement avec des partenaires de l'industrie pour mettre à jour les normes afin de refléter les besoins modernes en matière d'infrastructures et a introduit un processus flexible et collaboratif pour les développements ayant des objectifs novateurs en matière de gestion de l'eau.

**O**n January 1, 2024, the City of Edmonton's new zoning bylaw came into effect, representing its first comprehensive zoning overhaul since 1961, when Edmonton's population was 276,000.

Today, Edmonton has grown to a population of more than one million, and is on pace to reach 1.25 million by 2030. The zoning bylaw overhaul was required to modernize regulations that were repeatedly amended over the past two decades, align with city goals including population growth

within existing city boundaries, and to minimize development hurdles and red tape for developers and builders. Hitting the reset button on the current zoning bylaw was key to building a more affordable, sustainable and equitable Edmonton.



The zoning bylaw is the primary regulatory tool required to implement The City Plan: Edmonton's long-term vision for growth and development. The City Plan envisions that 600,000 additional residents will be welcomed through redevelopment as Edmonton grows to a city of 2 million people. To meet ambitious infill targets as well as other policy goals, the City of Edmonton took the bold approach of streamlining and simplifying its new zoning bylaw with more flexible zones and broader land uses, which will help reduce barriers to future development. This includes new standard residential zones which were applied through city-wide rezoning, introducing a wide range of housing options, including row housing and multi-unit housing forms in all neighbourhoods.

The new zoning bylaw positions Edmonton as a national leader when it comes to creating opportunities for housing diversity, and advancing equity by accommodating housing needs throughout the city. However, such a flexible and permissive approach creates a unique challenge when it comes to infrastructure

planning. Given the importance of utility infrastructure on housing affordability and speed-to-market, the City, EPCOR and the development community worked closely to make the implementation of the bylaw as seamless as possible.

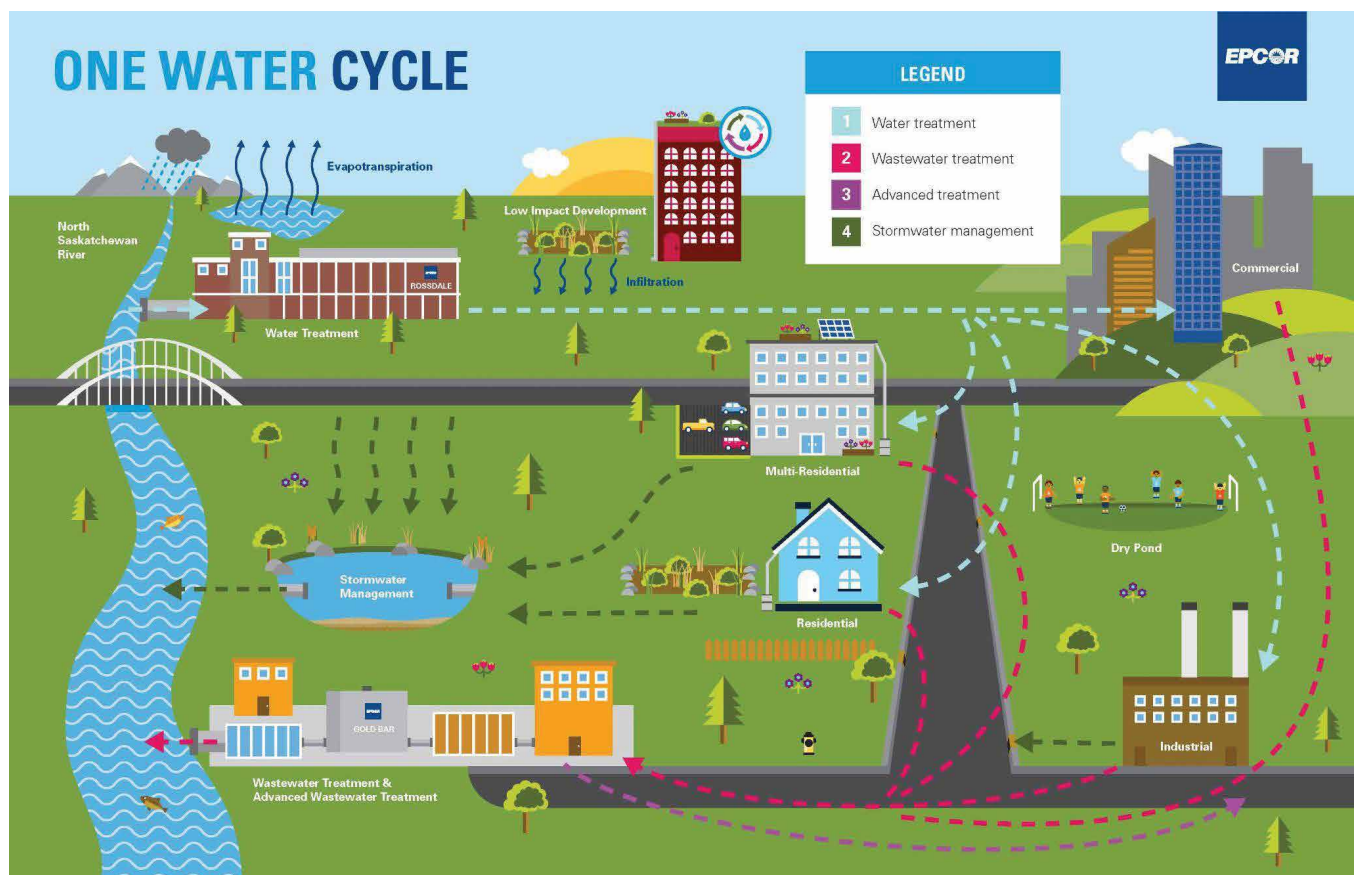
EPCOR Water Services is responsible for the safe distribution, collection, and treatment of municipal water cycle utilities vital to Edmonton's continued growth and development. EPCOR is a City of Edmonton-owned corporation, governed by an independent board of directors.

As the City of Edmonton began engaging with industry partners and stakeholders for their perspectives on changes to the zoning bylaw, it was clear that EPCOR's current water, wastewater and stormwater design and construction standards could be adjusted to more efficiently meet the needs of the more flexible zones, and broader land uses being introduced. Water cycle design and construction standards are the 'rule book' to ensure that consistent and quality public infrastructure is built.

Many standards surrounding fire flow requirements, water consumption,

wastewater generation, and surface water run-off was informing the design of municipal water, wastewater, and stormwater infrastructure, and was based on zones that would no longer exist in the future. Simply adjusting the standards to the broader (i.e., higher maximum) use of the zone, would lead to infrastructure overdesign or costly infrastructure upgrades. This was confusing, and sent a mixed message because many infill developments had pre-existing infrastructure: a selling feature for the development of the parcel. Further, EPCOR's design and construction standards were largely developed for greenfield construction, and the nuances for large-scale redevelopment were not reflected in the current standards. Lastly, the standards did not provide any sort of incentive for developers to install green infrastructure.

EPCOR's Stormwater Integrated Resource Plan (SIRP) encourages alternative water management approaches like green infrastructure to slow the entry of stormwater into the drainage network. This reduces flood risk and encourages climate resilience.



However, there was no option for developers to downsize their required traditional stormwater infrastructure investment, therefore green infrastructure was seen as a duplicate and unnecessary system.

### ONE WATER: A NEW WAY OF PLANNING

In 2020, the areas responsible for the strategic planning of EPCOR's water, wastewater, and stormwater systems came together to form a single planning group that focuses on sustainable water management using One Water processes and solutions. One Water is defined by the Water Research Foundation (WRF) as an integrated planning and implementation approach to manage finite water resources for long-term resilience and reliability, meeting both community and ecosystem needs.<sup>1</sup> One Water planning recognizes the circularity and interconnectedness of the water cycle.

Traditionally, the wastewater engineers would plan the wastewater system, while the water engineers would plan the water system. This siloed planning did not encourage collaboration or data sharing, and sometimes resulted in fragmented solutions not considering the entire water cycle. Pillars of One Water planning include the mindset that all water has value (there is no 'waste' water, only wasted water), exploring projects with multiple system benefits, relying on partnerships and stakeholder inclusion, and adaptive, non-traditional, and right-sized solutions, such as green infrastructure, to maximize the use of existing infrastructure. This One Water mindset was key to delivering an innovative solution to the issues presented by the new zoning bylaw.

### PARTNERSHIPS TO ADVANCE CHANGE

EPCOR approached the development industry in late 2022, acknowledging the current and foreseeable infrastructure issues that would be introduced with the new zoning bylaw. While the development community was initially skeptical of meaningful changes, there also was a sense of relief – one participant mentioned “it was about time” to partner to make the necessary design standards and process changes.

Over the next year, EPCOR held multiple workshops with the development and

consulting sectors to understand the issues and determine the optimal solution. Four technical working groups (Greenfield Fire Flows, Infill Fire Flows, Water Consumption and Sanitary Generation, and Runoff Coefficients) were also established and met multiple times over the year. In the end, over 45 people ranging from developers, consultants, industry associations, the City of Edmonton, Fire Rescue Services, and EPCOR were members of the technical working group effort that partnered to guide the updated standards and new processes.

### THINKING DIFFERENTLY

The four technical working groups used a data-driven and collaborative approach to modernize the design standards. Data was gathered and assessed from multiple sources: geospatial data, such as old and new zoning and titled lots, metered water consumption data, land imperviousness, and required fire flows by building type. The update to the standards reflects the new zones, changes in water efficiency practices, building materials, fire protection methods (i.e., sprinkler systems) and on-site stormwater management approaches that have evolved over the decades. For example, Edmonton residents use less than 170 litres of water per person per day due to advances in water efficiency for fixtures and appliances (primarily low-flow toilets and washing machines), compared to historical use of 300 litres per person per day. Fire flow requirements for structures have changed due to sprinkler systems and building practices. There also was an intersection of opportunity as increased redevelopment can lead to more hard surfaces and runoff, along with the desire within communities to increase trees and green infrastructure to address the impact of increased stormwater, but also to decrease the impacts of the urban heat island.

Through the consultation efforts with the development industry, it was clear that a one-size-fits-all approach was not the best option. Redevelopment projects are highly nuanced and certainly different from greenfield development. To meet the development industry's diverse needs, a two-pronged approach (traditional and collaborative) was identified.

The traditional approach involves using updated design standards to design water cycle infrastructure, and is often the preferred approach for developers who want to move quickly through the approval process.

The collaborative approach provides an off-ramp to developers, who have a better understanding of the development's built form, innovative water management goals, and the time to engage early with EPCOR on their design assumptions. The recently formed One Water planning team was perfectly suited to lead the new collaborative and customized effort.

The outcomes of the design standards modernization work are a new flexible process to design infrastructure requirements, and improved information on customer water use, available fire flows, and stormwater run-off coefficients. These processes and understanding help all partners to maximize the use of existing infrastructure to achieve City of Edmonton density targets, and encourage innovative water management techniques like the use of green infrastructure to store and slowly release stormwater and also build climate resilience.

“The design standards modernization work that EPCOR has collaboratively undertaken optimizes infrastructure design and helps to remove barriers for innovative development,” says Kalen Anderson, Chief Executive Officer with the Urban Development Institute – Edmonton Metro, a not-for-profit organization representing real estate developers in Edmonton. “As Canada faces a housing affordability crisis, increasing supply is key to helping address diverse needs. Ensuring infrastructure is fit-for-purpose and not over-built, is crucial to both housing affordability and environmental sustainability.”

**Susan Ancel** P. Eng., FCSSE, is the director of EPCOR One Water Planning in Edmonton, Alberta. **Heather Zarski** P. Eng., is the senior manager of EPCOR Integrated Resource Planning in Edmonton, Alberta.

### ENDNOTES

- <sup>1</sup> Paulson, C., Broley, W. and Stephens, L. “Blueprint for One Water.” *Project #4660*. Water Research Foundation, 2017. ■





# REVERSING THE TIDE:

## Flood-Protecting the Toronto Port Lands

By Corey Bialek

### SUMMARY

The Port Lands Flood Protection Project in Toronto exemplifies the pivotal role of coordinated planning in safeguarding against flooding and bolstering resilience. Initiated by Waterfront Toronto in 2017, the project integrates flood protection measures seamlessly into the city's fabric, marking a significant milestone in waterfront revitalization. The project has also delivered a new waterfront community: Villiers Island. Through meticulous planning and collaboration, including a 30-year advocacy effort, the project addresses ecological and urban design challenges while fostering a climate-resilient community. Embracing green infrastructure and biomimicry principles, the project sets a global precedent for climate-resilient urban development. Waterfront Toronto's holistic approach underscores the imperative of environmental stewardship and community engagement in creating sustainable, resilient cities for future generations.

### SOMMAIRE

Le projet de protection contre les inondations de Port Lands à Toronto illustre le rôle central d'une planification coordonnée dans la protection contre les inondations et le renforcement de la résilience. Lancé par Waterfront Toronto en 2017, le projet intègre des mesures de protection contre les inondations de manière transparente dans le tissu de la ville, marquant une étape importante dans la revitalisation du bord de l'eau. Le projet a également donné naissance à une nouvelle communauté du bord de l'eau : Villiers Island. Grâce à une collaboration et de l'urbanisme méticuleux, y compris un effort de sensibilisation de 30 ans, le projet relève des défis écologiques et de conception urbaine tout en favorisant une communauté résiliente au climat. Adoptant les principes de l'infrastructure verte et du biomimétisme, le projet crée un précédent mondial en matière de développement urbain résistant au climat. L'approche holistique de Waterfront Toronto souligne l'importance de la gestion de l'environnement et de l'engagement communautaire dans la création de villes durables et résilientes pour les générations futures.

### INTRODUCTION TO WATERFRONT TORONTO

In November 2001 the Toronto Waterfront Revitalization Corporation ('Waterfront Toronto') was established by the Government of Canada, the Province of Ontario, and the City of Toronto to oversee

planning and revitalization of Toronto's central waterfront.

Waterfront Toronto was formed at a time when a lack of shared vision left Toronto's downtown waterfront a patchwork of isolated development (Figure 1). Today, Waterfront

Toronto's mandate demands the delivery of design excellence, the advancement of innovation and sustainability, and a commitment to accessibility and inclusivity. One of Waterfront Toronto's most ambitious projects to date, the Port Lands Flood Protection Project, is a showcase of this mandate.





Figure 1: Waterfront Area Map. Source: Waterfront Toronto.



Figure 2: Flood plain prior the naturalization of the Don River. Source: [waterfronttoronto.ca](http://waterfronttoronto.ca).

### THE PORT LANDS

The Port Lands, located southeast of Toronto's downtown core, includes over 356 hectares (880 acres) of land along the Lake Ontario waterfront. The Port Lands were created in the late 1800s by infilling the

original mouth of the Don River, transforming an estuary teeming with wildlife into an impermeable industrial hardscape. This conversion altered the floodplain of downtown Toronto, subjecting 290 hectares of land to flood risk (see Figure 2).

Attenuating this flood risk is crucial to enabling future mixed-use development in the Port Lands. Waterfront Toronto, alongside its City, Provincial, and Federal government partners, initiated a project to renaturalize the mouth of the Don River:



the Port Lands Flood Protection Project (PLFP). Construction formally commenced in 2017, realizing the culmination of over 30 years of planning, analysis, and advocacy.

#### PORT LANDS AND FLOOD PROTECTION: THE PLANNING HISTORY

The Metro Toronto and Region Conservation Authority (MTRCA) identified the need to remove flood risk in the Port Lands and South Riverdale areas in the 1980s. The MTRCA's 1980 *Watershed Plan* listed this area as having the greatest risk related to flooding in its jurisdiction.

Nearly a decade later, on March 30, 1988, the federal government appointed former Toronto mayor and sitting Member of Parliament David Crombie to head a Royal Commission to make recommendations regarding the future of the Toronto waterfront. The *Royal Commission Report on the Future of the Toronto Waterfront* established two course-altering directives: first, the revitalization of the waterfront required a holistic approach that considered the rivers flowing into it, and second, success hinged on citizen-led initiatives.

This direction precipitated the establishment of a Council-appointed citizen advisory group called the Task Force to *Bring Back the Don*. One of their first projects, a book published in 1991 by the

City of Toronto called *Bringing Back the Don*, set forward a call to action to recreate a natural mouth for the Don River.

In 2005, Waterfront Toronto responded to this call: the corporation initiated the process of establishing a Terms of Reference for the Don Mouth Naturalization and Port Lands Flood Protection Environmental Assessment (DMNP EA). The purpose of the DMNP EA was to make an ecologically

functional river mouth, remove flood risk, and provide opportunities to revitalize the Port Lands area of Toronto's waterfront. These are referred to as the three drivers of the DMNP EA. In September 2006, the Ontario Ministry of Environment and Climate Change approved the Terms of Reference for the DMNP EA and the study formally began.

As a corollary, Waterfront Toronto launched an international design competition in 2007

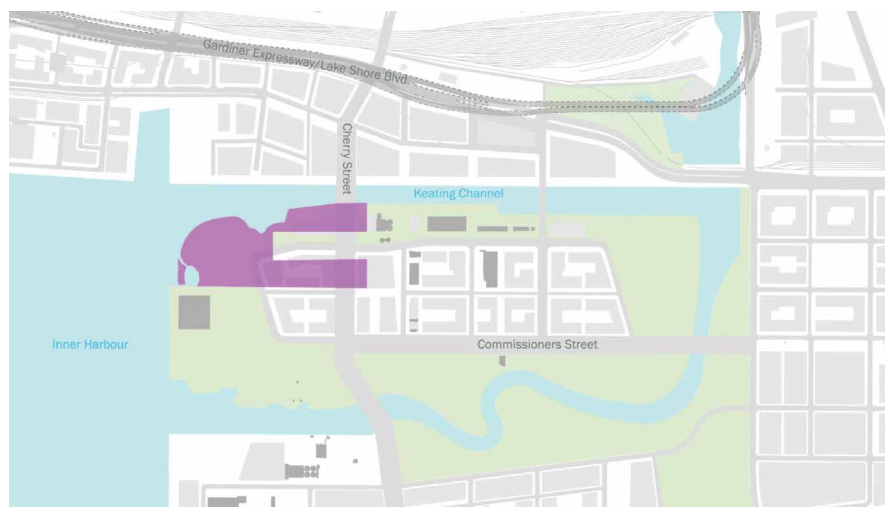


Figure 3: The Cherry Street Lakefilling project, highlighted in purple, allowed for the realignment of Cherry Street and the construction of a new, higher bridge over the Keating Channel. Realigning Cherry Street and rebuilding the Cherry Street Bridge will help stormwater flow more easily through the Keating Channel. Source: [portlandsto.ca/wp-content/uploads/MVVA-Base-CSLF-02-1024x888.jpg](http://portlandsto.ca/wp-content/uploads/MVVA-Base-CSLF-02-1024x888.jpg).



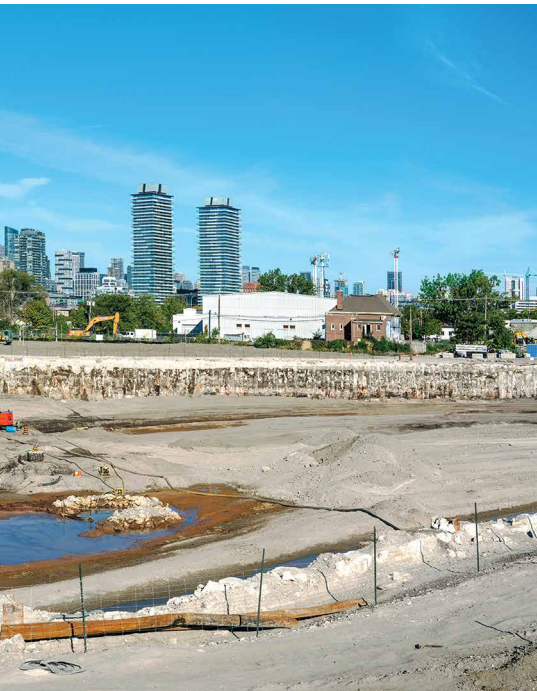
Figure 4: The future river valley following soil removal (September 2020). Source: [portlandsto.ca/wp-content/uploads/Resized-Panorama84B\\_Sept21-2020.png](http://portlandsto.ca/wp-content/uploads/Resized-Panorama84B_Sept21-2020.png).



to create a concept design that included habitat creation and flood protection, and a comprehensive plan for addressing urban design, transportation, naturalization, sustainability and other ecological issues.

In 2003, Toronto City Council approved the *Central Waterfront Secondary Plan* (CWSP), which codified a framework for improving waterfront access, delivering new parks and open spaces, creating new communities, and promoting a clean and green environment. The CWSP identified numerous strategies to achieve these principles, including renaturalizing the mouth of the Don River.

In 2011, catalyzed by Council's direction to expedite implementation of the DMNP EA, Toronto City Council adopted what would later be called the Port Lands Acceleration Initiative (PLAI). The purpose of the PLAI was to integrate core principles from the DMNP EA, such as flood protection and naturalization, evaluate options for phased development, and integrate higher-value interim and permanent uses during phasing. In support of this outcome, Waterfront Toronto and the City developed supplemental plans for land use, transportation, and servicing, including the *Port Lands Planning Framework* (PLPF) and the *Villiers Island Precinct Plan* (VIPP) (see side panel for more information).



## PORT LANDS PLANNING FRAMEWORK

The Port Lands Planning Framework provides a comprehensive 50-plus year vision for the area. It sets a context for positive change while establishing new and enhanced policy direction for the Port Lands.

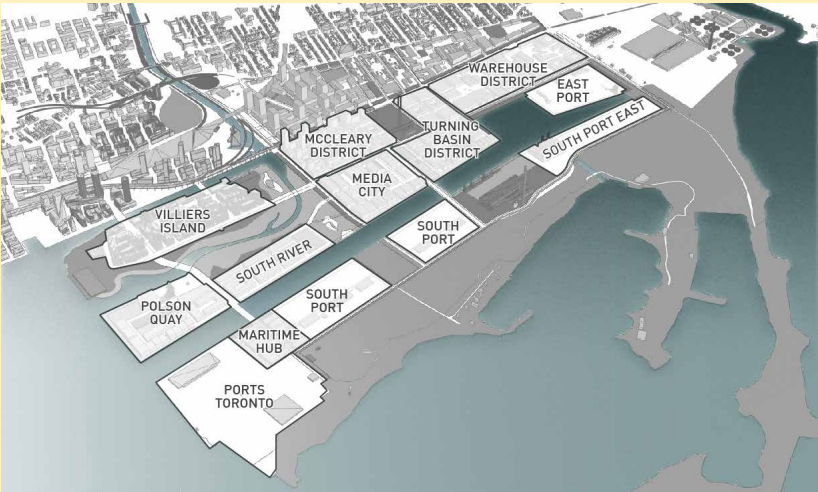


Figure 5: Several districts are identified in the Port Lands Planning Framework including Media City, Turning Basin District, Warehouse District, East Port, South Port East, Maritime Hub, South Port, South River, Villiers Island, Polson Quay, McCleary District and Ports Toronto.

Source: [www.toronto.ca/wp-content/uploads/2019/03/963b-city-planning-port-lands-districts.jpg](http://www.toronto.ca/wp-content/uploads/2019/03/963b-city-planning-port-lands-districts.jpg).

## THE VILLIERS ISLAND PRECINCT PLAN

A Villiers Island Precinct Plan is a planning tool that lays out potential streets, blocks, and building sizes and identifies the assets needed to create a complete community: a mix of residential and commercial spaces, community services and facilities, schools, public art, heritage conservation, transportation and more. The precinct plan for Villiers Island is a blueprint for a new climate-positive neighbourhood that will include new market and affordable homes, jobs and memorable parks and greenspace along Toronto's water's edge.



Figure 6: Villiers Island demonstration plan from the 2017 Precinct Plan. The massing shown is for illustrative purposes only. Source: [www.waterfronttoronto.ca/sites/default/files/styles/contextual\\_banner\\_lg/public/blogs/vision-map.png?itok=\\_\\_1ERqgy](http://www.waterfronttoronto.ca/sites/default/files/styles/contextual_banner_lg/public/blogs/vision-map.png?itok=__1ERqgy).

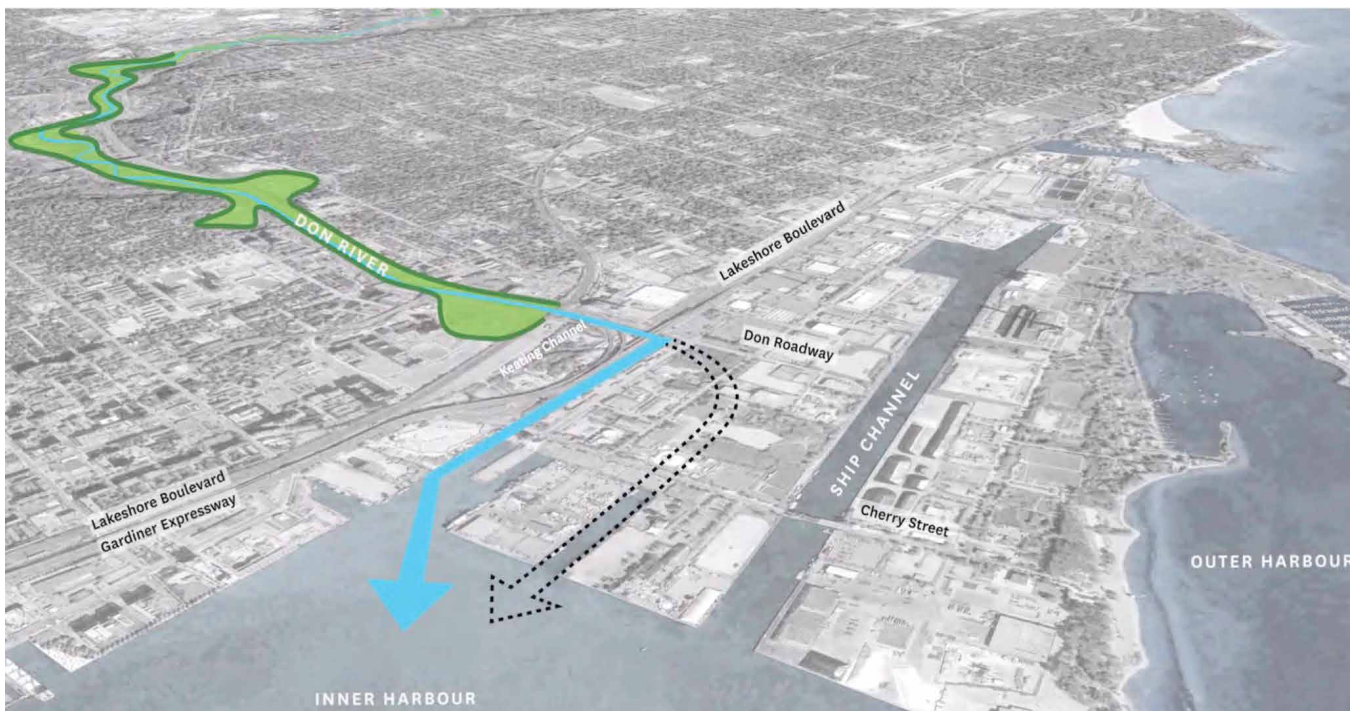


Figure 7: The Don River currently makes a 90-degree turn at the human-made Keating Channel (blue) before entering the inner harbour at Lake Ontario. The new mouth of the Don River (dashed line) will effectively flood proof the area through its naturalized conveyance pathway. When the Port Lands Flood Protection project concludes, the Don River will have two outlets to the lake, encircling the newly formed Villiers Island. Source: [thelocal.to/wp-content/uploads/2022/06/2\\_villiers\\_thelocal-2048x1075.jpg](https://thelocal.to/wp-content/uploads/2022/06/2_villiers_thelocal-2048x1075.jpg).

In June 2017, \$1.25 billion in municipal, provincial and federal funding was awarded to PLFP. In October of that year, the *Port Lands Planning Framework* and *Villiers Island Precinct Plan* were adopted by Toronto City Council. With Council approval achieved, construction began in December 2017, beginning with the Cherry Street Lakefilling project (see Figure 3). Construction began on the full Port Lands Flood Protection project in July 2018, including site clearance to prepare for excavation of the river valley, an area for the first of two soil treatment facilities, and the demolition of several existing buildings.

In the intervening years, 1.4 million cubic metres of soil was excavated to create the naturalized mouth and new river valley – enough soil to fill the Rogers Centre. A large portion of the soil excavated was remediated and used to raise the grade in most of the project area by an average of two metres. These changes to the area’s topography altered the flood plain, protecting 240 hectares of land from flooding.



Figure 8: Wetlands in the foreground create new habitats and manage lake level fluctuations (October 2023). Photo by the author.

#### A RIVER RUNS THROUGH IT

On January 31, 2024, Waterfront Toronto began pumping an amount equivalent to 30 Olympic-sized swimming pools of water into the newly constructed, kilometre-long river valley. The new river valley establishes a second outlet for the Don River, allowing floodwaters to drain into the Inner Harbour instead of damaging the surrounding area.

The renaturalized river valley brings wetlands and marshes back to the waterfront, creating renewed habitats

for wildlife and more public access to the shoreline and water. The wetlands have been designed to address lake level fluctuations as a result of climate change. With undulating river depths, there will remain a diversity of wetland habitats and functions regardless of lake level changes. The valley system has also been designed to accommodate water flows equivalent to a Hurricane Hazel-sized flood event, plus an additional 0.5 metres of water clearance to allow for increases in flood flow due to





“As we look to the future, the Port Lands Flood Protection Project serves as a model for urban development that prioritizes environmental stewardship, community engagement, and long-term sustainability.



climate change. Furthermore, the wetland control structure will allow for the wetland to be temporarily closed off from Lake Ontario. This will allow the system to draw down the water in the wetland to encourage regrowth of species in the event of disruption due to prolonged high lake levels, ice damage or other causes that may result from climate change.

In addition to achieving flood protection, the new river valley also carved out a new island bordered by the Keating Channel in the north, the inner harbour in the west, and by the river itself to the east and south. This new island will be home to a new waterfront community, temporarily called Villiers Island (as part of the City's commitment to Indigenous reconciliation, the Island will be renamed in an effort to reclaim Indigenous histories along the waterfront).

The planning work for Villiers Island includes a focus on climate resilience – to enable the community to ‘bounce back’ from current and future climate change impacts, including heavy rainfall events. Waterfront Toronto, tasked with overseeing the design of public realm and infrastructure on the Island, will embrace green infrastructure and biomimicry – the imitation of biological forms in design –

to capture and treat storm water where it falls. This is reflected in the Precinct's Stormwater Management Plan, which will achieve the following outcomes:

- Support the establishment of the urban tree canopy
- Increase the amount of soft landscaping within City streets
- Enhance infiltration and groundwater recharge
- Improve the quality of rainfall-runoff
- Protect the receiving waters from human activities
- Provide quantity control measures to manage runoff and protect from flooding during major storm events
- Add areas of parkland and public use space

In this way, Villiers Island will let *nature* do the work, an ethos that underpins the entire Port Lands Project.

The completion of the Port Lands Flood Protection Project will mark a significant milestone not only for the revitalization of Toronto's waterfront but also for the city's resilience in the face of climate change. The project both mitigates flood risk and fosters habitat restoration, providing crucial spaces for wildlife and recreational opportunities for residents and visitors alike. Moreover,

the incorporation of green infrastructure and biomimicry principles in the design of Villiers Island showcases a forward-thinking approach to climate resilience, leveraging nature-inspired solutions to address contemporary challenges.

As we look to the future, the Port Lands Flood Protection Project serves as a model for urban development that prioritizes environmental stewardship, community engagement, and long-term sustainability. By harnessing the power of nature and embracing a holistic vision for waterfront revitalization, Toronto has set a precedent for cities around the world seeking to adapt and thrive in an era of climate uncertainty. With continued dedication to these principles, the Port Lands project will not only protect Toronto's waterfront but also inspire generations to come to cherish and preserve our natural resources for the benefit of all.

**Corey Bialek** is a Senior Analyst within Waterfront Toronto's Innovation and Sustainability team, where he's worked for over two years to embed sustainability and resiliency into all of Waterfront Toronto's projects. ■

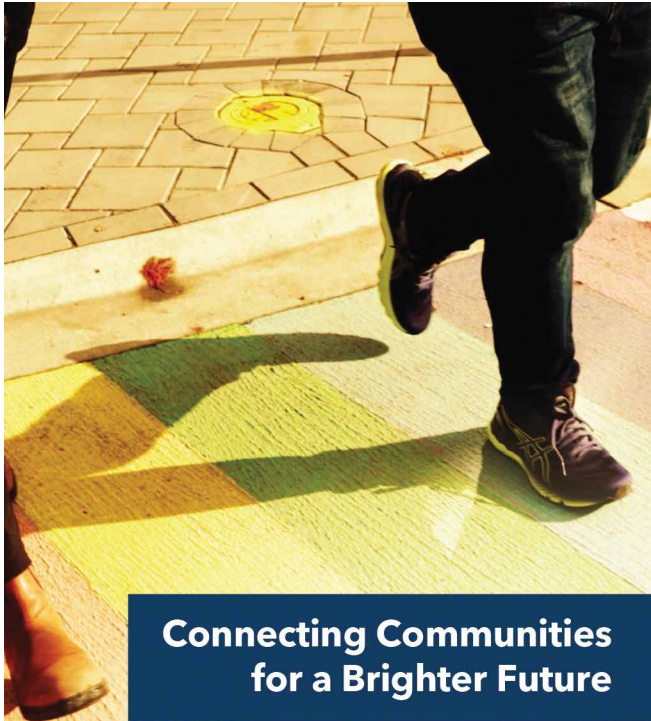




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# EAU SECOURS

De Gabrielle Roy-Grégoire et Antoine Camion

## SOMMAIRE

Cet article aborde le droit humain à l'eau tel qu'adopté par les Nations Unies en 2010, ainsi que la reconnaissance de ce droit par le gouvernement canadien. Les auteurs es mettent en lumière les enjeux d'iniquité dans l'accès à l'eau à travers les mécanismes de tarification volumétrique ainsi qu'à travers la situation des personnes en situation d'itinérance. En guise de conclusion, le projet Communauté bleue est présenté comme levier de reconnaissance du droit à l'eau et de protection de la ressource à une échelle locale.

## SUMMARY

This article addresses the human right to water as adopted by the United Nations in 2010 and the recognition of this right by the Canadian government. The authors highlight issues of inequity in access to water through volumetric pricing mechanisms, as well as through the situation of homeless people. In conclusion, the Blue Community project is presented as a lever for recognizing the right to water and protecting the resource on a local scale.





## RECONNAISSANCE DU DROIT HUMAIN À L'EAU

En juillet 2010, l'Assemblée générale des Nations unies reconnaissait le droit à l'eau potable comme un droit fondamental. L'Assemblée déclare que « le droit à une eau potable propre et de qualité et à des installations sanitaires est un droit de l'homme, indispensable à la pleine jouissance du droit à la vie »<sup>1</sup>. Le Conseil des droits de l'homme des Nations unies précise que la responsabilité première de faire respecter ces nouveaux droits est assurée par les gouvernements.

La résolution de reconnaissance du droit humain à l'eau a été portée par une citoyenne canadienne, Maude Barlow<sup>2</sup>. Plus de dix ans plus tard, des avancées peuvent être constatées pour la sécurisation de l'accès à l'eau potable et aux services d'assainissement, mais le contexte de crise écologique exacerbe la pression sur les ressources en eau. Selon Statista, « 51 pays seront confrontés à des niveaux de stress hydrique « extrêmement élevés » ou « élevés » à l'horizon 2050 » en raison de l'évolution du climat, de la croissance démographique et du développement urbain<sup>3</sup>. Même en 2023, l'accès sécuritaire à une eau propre est un enjeu important. En effet, le dernier rapport annuel des Nations Unies dénombre plus de 800 000 morts annuelles pour cause de maladie attribuée à l'eau insalubre, aux services d'assainissement inadéquats et à de mauvaises habitudes d'hygiène<sup>4</sup>.

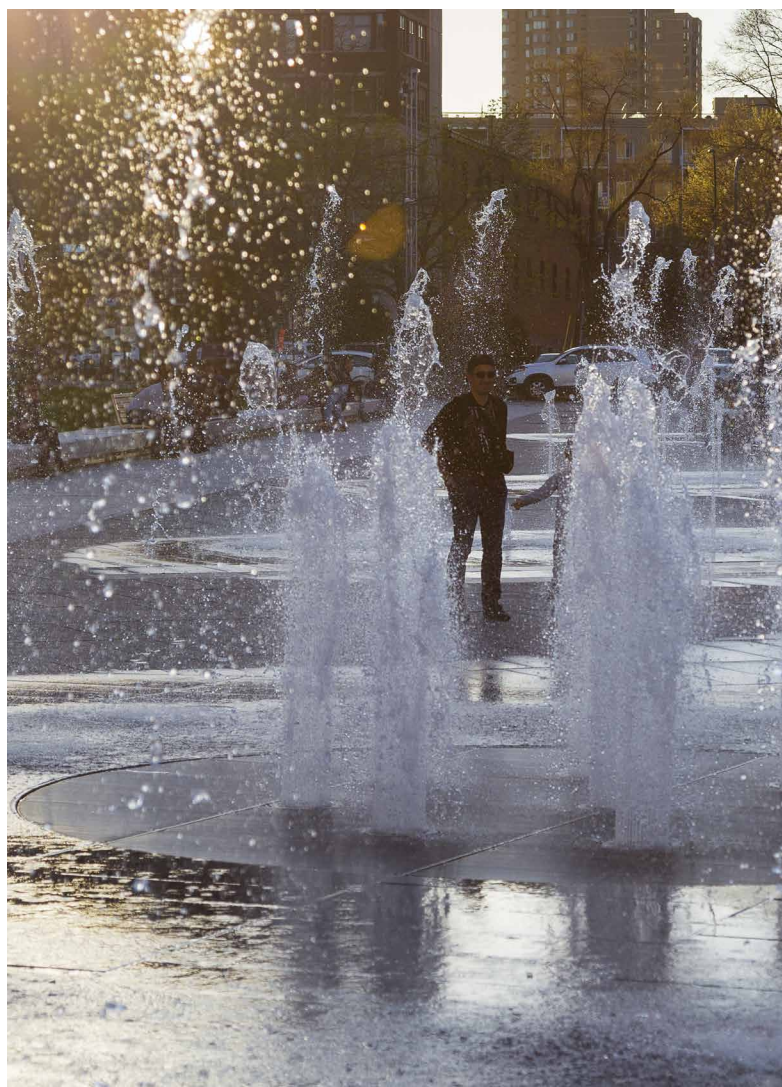
Les enjeux actuels sont de prévenir les conflits entre les usages, puisque l'utilisation de l'eau augmente d'environ 1% par année depuis 1980. Plus précisément, « les prélèvements dans les municipalités ont augmenté de 3 % tandis que les prélèvements à des fins agricoles ont augmenté de 5 %, représentant désormais 72 % du total de toutes les extractions d'eau » entre 2010 et 2019. Ces constats démontrent comment les conflits entre les utilisations agricoles, industrielles et municipales risquent de se multiplier et de s'intensifier. En définitive, la surconsommation et les sources d'eau contaminées finiront par porter atteinte au droit humain à l'eau, même au sein de populations n'ayant jamais eu de soucis d'approvisionnement jusqu'alors.

## GOVERNANCE DE L'EAU AU CANADA

Le Canada considère l'eau en tant que composante essentielle de l'environnement et l'eau répond aux critères des ressources communes<sup>7</sup>. Les problématiques de la gestion intégrée de la ressource en eau (GIRE) sont dorénavant un défi qui relève davantage des mécanismes de gestion, et de la façon dont ces derniers peuvent incorporer ces nouvelles considérations, plutôt que des innovations scientifiques et technologiques<sup>8</sup>. Le concept même de GIRE nécessite la collaboration de l'ensemble des acteurs de la société afin d'atteindre des objectifs de protection et de partage de la ressource. L'eau étant une composante essentielle au développement économique, social et environnemental, il est facile d'imaginer à quel point les acteurs sont nombreux autour de la gestion intégrée de l'eau.

Alexandre Lillo, chercheur postdoctoral en droit environnemental sur les enjeux relatifs à l'eau, est explicite sur le manque de coopération et collaboration entre les acteurs dans la gouvernance actuelle au Canada:

« [...] l'absence de cadre national de coopération nuit à la prise en compte de la crise émergente de l'eau et favorise la multiplication



d'initiatives sectorielles et locales. Cette combinaison de facteurs contribue par conséquent à produire une importante fragmentation dans la réalisation d'une gestion de l'eau canadienne harmonisée. »<sup>9</sup>

De nombreux défis doivent être relevés afin d'assurer une gestion responsable et concertée de l'eau au Canada. Parallèlement, des mesures de prévention des conflits d'usage et les cas de pénuries d'approvisionnement en eau doivent être développés.

## DISTINGUER LES COMPTEURS D'EAU DE LA TARIFICATION

L'un des défis majeurs auxquels font face les Québécoises et les Québécois est celui de la surconsommation d'eau. La quantité d'eau consommée par personne par jour est de 573 litres, alors que la moyenne canadienne se situe plutôt à 447 litres selon le dernier bilan provincial<sup>10</sup>. Cette utilisation excessive de la ressource découle d'une part de son abondance sur le territoire, et d'autre part d'un manque de données sur son utilisation par les différents acteurs. C'est dans cette optique que l'installation de compteurs d'eau est une mesure privilégiée par le gouvernement québécois, telle que mise de l'avant dans la Stratégie québécoise d'économie d'eau







potable 2019-2025. Cette stratégie s'inscrit dans une "optique de gestion intégrée", visant une gestion responsable et concertée, et a pour l'un de ses trois objectifs principaux la réduction de 20% de la quantité d'eau distribuée par personne par jour<sup>11</sup>.

La Stratégie d'économie d'eau potable distingue l'installation de compteur d'eau d'une tarification volumétrique, ce qui permet de privilégier l'acquisition de connaissance et d'appliquer le principe du pollueur-payeur aux grands utilisateurs d'eau. L'installation de compteur d'eau est recommandée dans 10 à 15% des résidences, de manière à estimer la consommation de l'ensemble du secteur résidentiel. Toutefois, c'est plutôt pour 90% des immeubles non résidentiels qu'est recommandée l'installation de compteurs, soit dans les industries, les commerces et les institutions (ICI)<sup>12</sup>. Ces installations permettent une estimation beaucoup plus juste de la consommation d'eau du secteur non résidentiel. Pour ce secteur non résidentiel, la Stratégie québécoise prévoit l'inclusion et la mise à jour d'une forme de tarification volumétrique dans la réglementation municipale. En 2022, la Ville de Montréal adopte ces recommandations et commençait à tarifier les ICI en janvier 2024<sup>13</sup>.

Lors d'une consultation publique tenue à l'automne 2023 pour l'avenir de l'eau de Montréal, la commission chargée de ces consultations souligne l'importance de conscientiser la population de Montréal sur ses habitudes de consommation<sup>14</sup>. Partant du constat que la consommation d'eau du secteur résidentiel avait diminué de 11% depuis 2020 alors qu'elle avait augmenté dans les ICI pour la même période, la commission estime que la sensibilisation de sa population est porteuse de résultats<sup>15</sup>. Le rapport de cette consultation publique pour l'avenir de l'eau à Montréal (publié en 2024) réitère que l'installation des compteurs d'eau dans le secteur résidentiel est « mesure pragmatique pour inciter à modifier rapidement les comportements [...] vers l'adoption d'habitudes plus durables et écoresponsables »<sup>16</sup>. Ce même rapport recommande à l'administration de la Ville de Montréal de poursuivre l'installation de compteurs d'eau dans les ICI et de leur « faire porter à terme le coût réel de l'eau »<sup>17</sup>.

Cette distinction entre les compteurs d'eau et la tarification volumétrique de la consommation d'eau est cruciale pour deux raisons. Elle permet d'abord de maintenir l'acceptabilité sociale de l'installation des compteurs d'eau, et demande aux plus grands consommateurs d'eau, les ICI, de contribuer de manière équitable au coût de la gestion des services d'eau municipaux.

#### ACCÈS À L'EAU MUNICIPALE : SITUATION DE LA POPULATION ITINÉRANTE À MONTRÉAL

En 1976, le Canada a ratifié le Pacte international relatif aux droits économiques, sociaux et culturels (PIDESC). En vertu de ce dernier, le droit à l'eau se doit d'être adéquat « au regard de la dignité humaine, de la vie et de la santé »<sup>18</sup>. On y retrouve particulièrement un critère de disponibilité et d'accessibilité (physique et non discriminatoire)<sup>19</sup>.

En 2022, on recensait 4690 personnes en situation d'itinérance (PSI) « visibles » à Montréal<sup>20</sup>. Nous savons que la plus grande concentration de cette population se trouvait dans les alentours du parc Émilie-Gamelin (dans l'arrondissement Ville-Marie), quartier dans lequel on retrouve la plus grande densité de ressources dédiée à cette couche de la population<sup>21</sup>. Parmi ces ressources, cinq blocs sanitaires sont disponibles, dont un se trouvant au parc Émilie-Gamelin. Les refuges pour les PSI peuvent également être considérés comme des ressources leur permettant de satisfaire leurs besoins de base, mais durant l'hiver 2023, plus de 1 500 PSI n'ont pas réussi à trouver une place dans un hébergement d'urgence à cause du manque de places<sup>22</sup>.

Qu'il n'y ait qu'un seul bloc sanitaire au parc Émilie-Gamelin semble insuffisant pour répondre au critère de disponibilité énoncé dans le PIDESC. En effet, comment une installation peut-elle permettre à des milliers de PSI d'avoir un approvisionnement en eau suffisant et constant pour les usages personnels? Ensuite, le manque de place dans les hébergements semble contrevenir au critère d'accessibilité physique énoncé dans le

PIDESC. Effectivement, les PSI dépendent des places dans les refuges pour se laver et pour nettoyer leur linge. Il n'est donc pas possible d'affirmer que la présence d'installation et de service est physiquement accessible sur l'île de Montréal.

Finalement, dans l'arrondissement Ville-Marie et autour du parc Émilie-Gamelin, la problématique de l'accès à l'eau potable et à l'assainissement semble impacter la couche sociale sans logement. Ainsi, le plein droit à l'eau semble être accordé de manière discriminatoire, du fait qu'il n'est pas mis en œuvre de la même façon pour les citoyens possédant un toit, et les citoyens n'en possédant pas. Les PSI méritent un droit d'accès à l'eau potable et à l'assainissement au même titre que tous les individus. L'établissement d'un plus grand nombre de refuges et de blocs sanitaires serait un excellent début pour permettre à cette couche de la population de jouir plus amplement de ce droit fondamental.

### PROMOTION DES COMMUNAUTÉS BLEUES

Le projet des Communautés bleues représente une volonté de promouvoir le droit humain à l'eau à l'échelle locale et de lutter contre la privatisation à travers le monde. La certification Communauté bleue se comprend comme un cadre de référence pour la reconnaissance de l'eau comme un bien commun. Il s'agit d'un outil accessible dont peuvent se doter les paliers de gouvernance locale afin de lutter contre la privatisation de l'eau et protéger son accès équitable. Pour plus d'information, visitez le site du Conseil des Canadiens ([conseildescanadiens.org/communautesbleues](http://conseildescanadiens.org/communautesbleues)) ou d'Eau Secours ([eausecours.org/communautes-bleues](http://eausecours.org/communautes-bleues)).

**Gabrielle Roy-Grégoire** est chargée de projet pour la gouvernance de l'eau chez Eau Secours. Son travail porte sur la reconnaissance du droit humain à l'eau et aux services d'assainissement et la protection de cette ressource comme bien commun. Elle a complété une maîtrise en sciences de l'environnement de l'Université du Québec à Montréal. Elle s'est impliquée dans les luttes citoyennes à titre de chercheuse engagée depuis 2018 et collabore au projet de recherche Résistaction, associé au Centre de recherche en éducation et formation relatives à l'environnement et à l'écocitoyenneté (Centr'ERE) de l'UQAM. **Antoine Camion** est un étudiant au Baccalauréat en Droit international et

Relations internationales à l'UQAM. Ses intérêts portent majoritairement sur le développement des enjeux environnementaux internationaux, et plus particulièrement sur le droit international de l'accès à l'eau potable et à l'assainissement. Ses travaux et cours universitaires lui ont permis d'approfondir plusieurs notions de droit international environnemental et de droits humains. Il agit comme stagiaire au sein de l'organisation Eau Secours durant l'été 2024.

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# A GLOBAL INITIATIVE DEDICATED TO WATER EMERGES IN GEORGIAN BAY

By Dan Travers

## SUMMARY

The Canadian Museum of Water, a newly formed member of The Global Network of Water Museums, is dedicated to confronting our deteriorating relationship with water by building a new culture of 'Water,' starting with a paradigm change to youth environmental education, particularly at the elementary level.

## SOMMAIRE

Le Musée canadien de l'eau, nouveau membre du Réseau mondial des musées de l'eau, a pour mission de lutter contre la détérioration de notre relation avec l'eau en créant une nouvelle culture de l'eau, en commençant par un changement de paradigme dans l'éducation environnementale des jeunes, en particulier au niveau élémentaire.



**T**he Global Network of Water Museums (WAMU-NET) was founded in 2017 to foster water awareness, education, and support actions to build 'a new culture of water.' Endorsed by the United Nations Educational, Scientific and Cultural Organization's (UNESCO) 'International Hydrological Programme' (UNESCO-IHP) as a 'flagship initiative,' the network has since grown to 80+ members in 30 countries.

One of the newest members is the Canadian Museum of Water (CMW), based in Georgian Bay, Ontario. Formed in 2023 by a diverse group of individuals concerned about society's deteriorating relationship with water, the Museum's mission is dedicated to youth education about water stewardship and water advocacy. A key aim is to nurture the next generation of leaders and to inspire more farsighted uses of water with examples of nature-based solutions and zero-waste technology.

Out of scale with its small population and the size of its GDP, Canada is the steward of six per cent of the world's renewable supply of fresh water and 20 per cent of the global freshwater resource overall. The magnitude of these assets imposes a responsibility for wise actions, which is why the museum centres its approach to learning from First Nations, with strong links to the Indigenous and Metis communities, the Huronia Museum, and the Georgian Bay Heritage League.

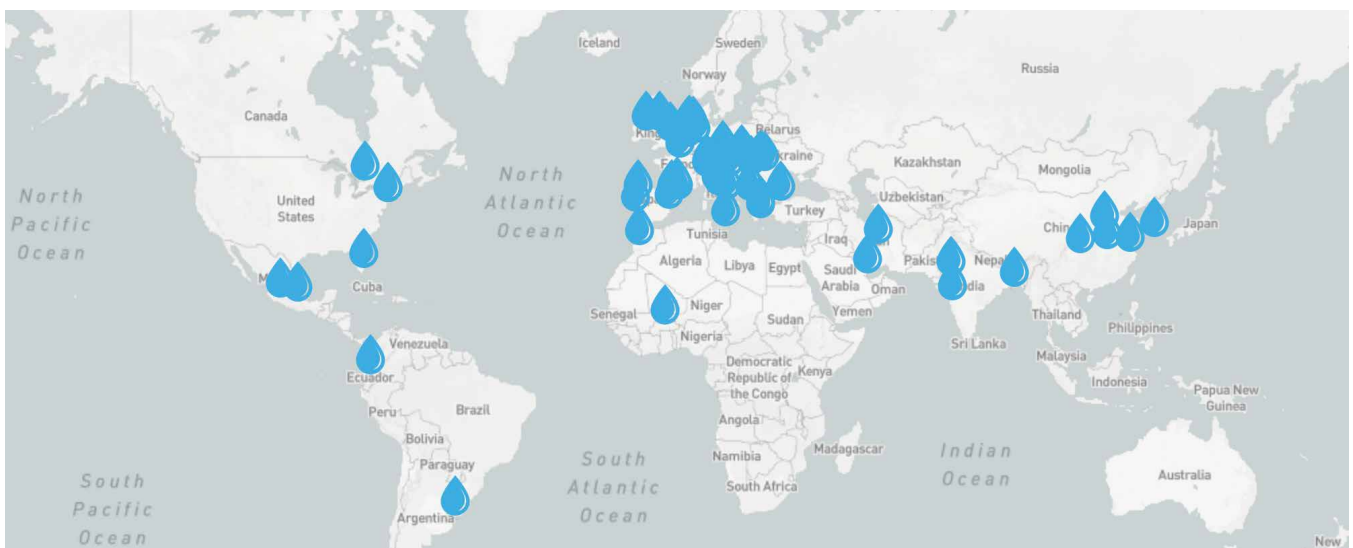
At the core of the museum's educational programs is the 'personification of water,' a concept originally developed by a team of Canadian designers and writers. 'I Am Water,' coupled with the use of interactive AI, enables young people – especially elementary students – to communicate and carry on conversations, conduct research, play and interact much more directly with water in all its forms. Current plans include working with the Town of Pentanguishene on a feasibility study for a Lab School on the Pentanguishene waterfront to serve colleges and universities in Ontario.

In addition, the museum is contributing to the proposed Springwater Groundwater

Study, a five-year research project being conducted at the Elmvale Groundwater Observatory (located in Elmvale, Ontario). Led by a team from the University of Alberta and other institutions, researchers specializing in isotopic analysis, microbiology, hydrogeology, and trace element geochemistry, aim to quantify the impacts of human activities on what has been established as the purest groundwater known to science, and is the benchmark for water purity. Supported by diverse stakeholders, including the education sector, Indigenous communities, and governments, the project seeks to unravel the secrets of Springwater's pristine water.

As momentum grows, the Canadian Museum of Water anticipates moving beyond its digital base to establish a physical home for its activities. More information can be found at [www.canadianmuseumofwater.org](http://www.canadianmuseumofwater.org).

Dr. **Dan Travers** is a college professor, public historian, and the author of two books on history and identity. He has served as the President of the Canadian Museum of Water since its founding in March 2022. ■



Museums around the world dedicated to the human/water relationship. Courtesy of Global Network of Water Museums: [www.watermuseums.net](http://www.watermuseums.net).

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# WASTE NOT, WANT NOT:

## Planning for Sustainable and Adaptable Wastewater Surveillance Infrastructure

By Alex Ho Shing Chik

### SUMMARY

In an era defined by pandemics and climate change, a community's resilience hinges upon the rapid characterization and management of public health and environmental threats. During the COVID-19 pandemic, monitoring of disease targets in wastewater emerged as a tool that can be leveraged to tackle human and environmental health risks to our communities. We must leverage lessons learned about the usefulness of this tool to help establish a lasting infrastructure that can be adapted to keep our communities healthy.

### SOMMAIRE

À une époque marquée par les pandémies et le changement climatique, la résilience d'une communauté dépend de la caractérisation et de la gestion rapides des menaces pour la santé publique et l'environnement. Au cours de la pandémie de la COVID-19, la surveillance des cibles de la maladie dans les eaux usées s'est révélée être un outil qui peut être exploité pour s'attaquer aux risques sanitaires humains et environnementaux pour nos communautés. Nous devons tirer parti des enseignements tirés de l'utilité de cet outil pour contribuer à la mise en place d'infrastructures durables qui pourront être adaptées pour maintenir nos communautés en bonne santé.



Sample collection for COVID-19 wastewater surveillance. Photo by the author.



## A PRIMER ON WASTEWATER SURVEILLANCE

Although the role of water sanitation in public health has been recognized since ancient times, Dr. John Snow's pioneering work during the 1854 London cholera outbreak established the modern understanding of the connection between contaminated water sources and disease transmission. Continued urbanization and industrial growth spurred improvements in water treatment and management throughout the 20th century, while advancements in microbiology and epidemiology expanded our grasp of the inextricable link between water and public health. The latter half of the century witnessed a revolution in testing methods and technologies, with advances in molecular biology in particular enabling rapid and sensitive detection of pathogens, chemicals, and biomarkers. However, despite these advancements, medical/clinical testing and environmental testing have largely been performed separately and independently.

The realization that the virus responsible for the COVID-19 pandemic is fecally shed by those infected – and therefore can also be tracked in wastewater – sparked global interest in the field of 'wastewater-based epidemiology.' Also known simply as wastewater surveillance, the COVID-19 pandemic marked a shift to leverage the combined power of clinical surveillance with environmental surveillance to proactively track infectious diseases and human health. Today, wastewater surveillance is a rapidly growing multidisciplinary field at the intersection of public health, environmental science and urban planning, offering valuable insights into community health trends and informing evidence-based public health decision-making.

## FROM PROOF-OF-CONCEPT TO VERSATILE TOOL FOR COMMUNITY PUBLIC HEALTH

Since Dutch researchers first demonstrated proof-of-concept that tracking the community spread of COVID-19 through sewage was possible,<sup>1</sup> scientists worldwide embarked on establishing wastewater surveillance programs. However, early efforts faced significant challenges, and even skepticism from within the scientific community. While epidemiologists have long been adept at interpreting clinical testing



results, few were accustomed to interpreting and making use of inherently variable wastewater testing results before the COVID-19 pandemic. As many early efforts were also necessarily discovery-driven, some were dismissed as academic exercises that lacked clear actionability and guiding ethical contexts. Detractors often cited the technical complexities of tracking the fate and transport of disease signals within sewer networks, as well as the uncertainties of a temporally transient system, potentially yielding data that may not actually be reflective of disease spread. Many others that accepted the validity of wastewater testing results questioned the added value of these efforts relative to ongoing clinical testing – at least until clinical testing capacity itself was overwhelmed.

The height of the Omicron wave of the COVID-19 pandemic in late 2021 across many countries and regions proved to be a critical turning point and catalyst for the broader acceptance of wastewater surveillance when it became the primary status indicator of community infection. During this time, other conventional epidemiological metrics, such as clinical case counts, case positivity, and hospitalization rates, were compromised.

The close-to-real-time nature of wastewater surveillance, along with its ability to indiscriminately capture both symptomatic and asymptomatic infections, provides an unbiased, cost-efficient indicator of disease spread.

Over the course of the pandemic, data from many wastewater surveillance programs have been shown to align with various conventional epidemiological indicators within the geographical region monitored.<sup>2</sup> Even though wastewater surveillance on its own is not often cited to yield actionable outcomes, key concerns related to the validity of the results have been addressed. As data and use cases continue to be generated, capturing lessons learned and the wide-ranging applications for this tool will be beneficial to managing the lasting impacts of COVID-19 and for future pandemics.

Practitioners around the world are already exploring the expansion of wastewater surveillance systems to track other pathogens or health markers in wastewater. Many COVID-19 wastewater surveillance programs have been leveraged to also include other respiratory viruses including influenza and Respiratory Syncytial Virus (RSV). Most recently in response to the bird flu outbreak in dairy

cattle, assays were developed to specifically identify H5N1 in wastewater,<sup>3</sup> demonstrating the potential of using wastewater surveillance as a tool to track diseases with zoonotic potential across human and animal populations. Antimicrobial resistance, which has been designated by World Health Organization (WHO) as one of the top ten public health threats to humanity, is also increasingly integrated as part of wastewater surveillance programs.

#### WHAT DOES THIS MEAN FOR PLANNERS?

Wastewater surveillance has quietly emerged as a powerful yet inconspicuous tool in urban planning and public health. Establishment and integration of wastewater surveillance infrastructure marks a distinct paradigm shift towards holistic community health management, as it offers a unique lens through which community health can be directly assessed. Insights can be gained into population health trends, disease burden, water usage patterns, and potential environmental risks. For example, wastewater surveillance, with appropriate ethical considerations, can be used to evaluate how disease burden may disproportionately impact vulnerable groups within a community. Such an assessment can then lead to tailored strategies and programs to reduce those impacts. Identification of areas with high pathogen concentrations in wastewater can also help inform prioritization of sanitation infrastructure upgrades, treatment strategies, or even adjust land use policies to mitigate health and environmental impacts. Urban planners can clearly play important roles in the planning, implementation and evaluation of a wastewater surveillance program (Figure 1).

#### MOVING FROM HEALTH CRISIS MANAGEMENT TO ADAPTIVE, HOLISTIC PLANNING FOR COMMUNITY HEALTH

Significant resources and investment were committed to establishing wastewater surveillance infrastructure while managing the COVID-19 public health crisis, serving as a catalyst for interdisciplinary collaboration between urban planners, public health experts, and environmental scientists. In the province of Ontario alone, \$47 million was invested in wastewater surveillance through the first three years of Ontario's

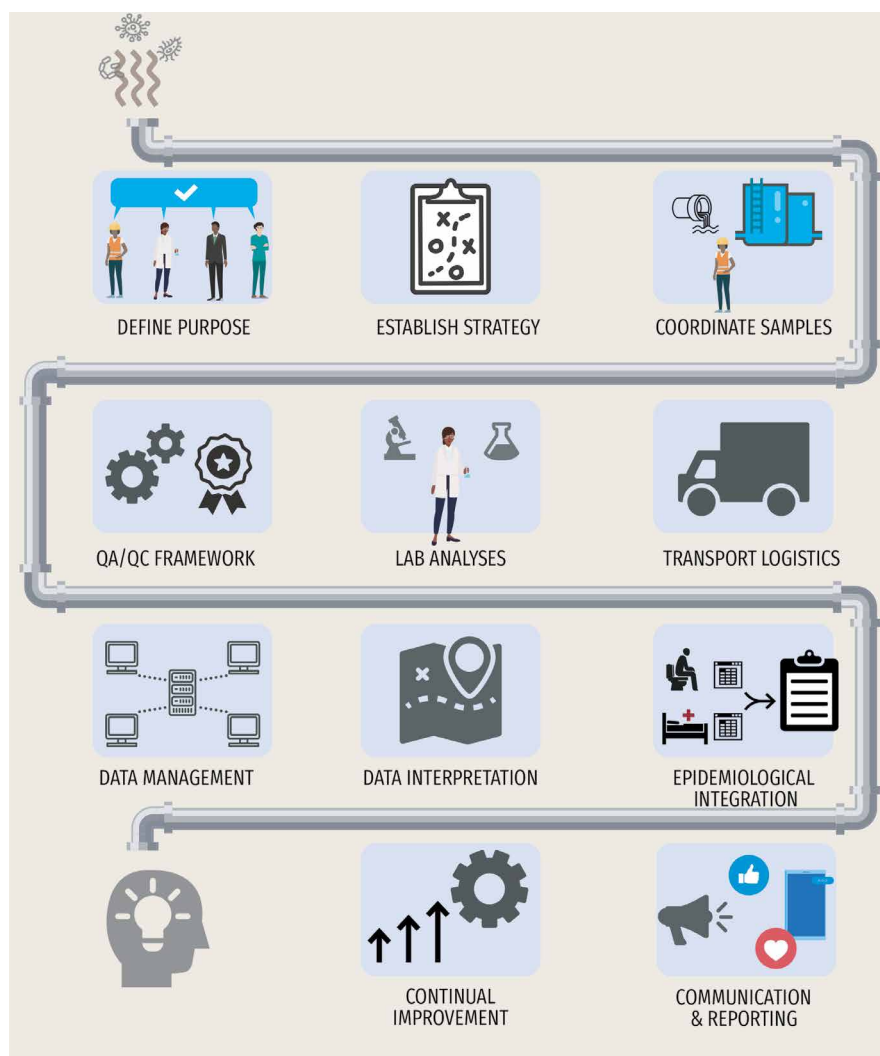


Figure 1: Key elements of a wastewater surveillance program, and roles planning professionals can play.

pandemic response.<sup>2</sup> However, fragmented/ overlapping jurisdictional responsibilities and waning interest amidst competing priorities leave the legacy of this newly established infrastructure at stake. It would be imprudent to only reactively re-build such infrastructure when future crises arise rather than building upon the lessons learned to take a proactive approach to public and environmental health protection.

Although urban and environmental planners have not traditionally been involved in public health planning,<sup>4</sup> few other professions are better prepared to facilitate strategic integration of wastewater surveillance into broader public policy frameworks. Whether it be geospatial analysis expertise or leadership

in community engagement, it is clear that planners can play many important roles in wastewater surveillance that would contribute to its long-term success. In ensuring the legacy of this tool, planners in return, also gain a whole new dimension of evidence-based insights that facilitate an adaptive, holistic approach to keeping our communities healthy.

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	DESCRIPTION	ROLES PLANNING PROFESSIONALS CAN PLAY
<i>Define purpose of the Wastewater Surveillance Program:</i>	Wastewater monitoring programs range in size from facility level (e.g., long-term care, hospitals, and correctional facilities) to community wastewater systems; goals and ethical considerations must be aligned.	Facilitate conversations between stakeholders, including public health officials, scientists, facility owners, the public, and regulators. Establishing ethical guidelines, (e.g., identify and protect vulnerable groups to avoid stigmatization).
<i>Establish a Sampling Strategy:</i>	Determining where and how frequently to collect wastewater samples to ensure representative data.	Assist in identification of strategic locations of sample sites based on demographic and infrastructure, and land-use considerations.
<i>Coordinate Sample Collection:</i>	Working with wastewater utility/facility professionals to coordinate sample collection activities.	Assess potential environmental impacts of sample collection activities and recommendation of mitigation measures (e.g., traffic and safety considerations for manhole access in upstream locations).
<i>Transport and Storage:</i>	Safe transportation and storage of collected samples to preserve their integrity until analysis.	Determine efficient sample transport routes; optimize courier services.
<i>Laboratory Analysis:</i>	Proficient analysis of wastewater samples for the target of interest.	Awareness of evolving laboratory methods that are critical to support interpretation of data.
<i>Quality Assurance and Quality Control:</i>	Implementing measures to ensure the accuracy, reliability, and validity of the surveillance data through quality control procedures and validation frameworks.	Awareness of evolving quality management frameworks that provide checks and balances to maximize transparency and public trust.
<i>Data Management:</i>	Establishing systems for managing and storing collected data securely, including protocols for data sharing and collaboration.	Design and implement data management systems to securely handle wastewater surveillance data.
<i>Data Interpretation &amp; Epidemiological Integration:</i>	Interpreting the results of laboratory analyses to uncover underlying trends; corroborate surveillance results with epidemiological information	Application of geospatial and statistical tools to assist in the interpretation of data to identify trends and patterns relevant to public health outcomes. Facilitate integration of wastewater surveillance data into epidemiological models and decision-making processes.
<i>Communication and Reporting:</i>	Communicating findings to relevant stakeholders, such as public health officials, policy makers, and the general public, through reports, presentations, dashboards and other channels.	Serve the public interest; develop strategies and guidance to effectively communicate findings to stakeholders.
<i>Continual Improvement:</i>	Continuously evaluating and refining the surveillance program based on feedback, new scientific developments, and evolving public health priorities.	Explore opportunities for enhancing effectiveness and efficiency of overall program and its integration with other core planning activities and initiatives (health, water/wastewater infrastructure)

Environmental Science & Technology Letters 7 (7): 511–16.

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<sup>4</sup> Public health planning involves the design, implementation, and management of systems and resources aimed at promoting and protecting public health within communities. It captures a broad range of activities, including disease surveillance, emergency

preparedness, health promotion, environmental health monitoring, and access to healthcare services.

Dr. **Alex Chik** PhD, PEng is a Program Manager at Ontario Clean Water Agency, leading the development of a first-of-its-kind accredited Proficiency Testing program for wastewater surveillance. He is appointed to Royal Society Canada's Expert Panel on COVID-19 Wastewater Surveillance. ■

# MAKING WAVES

## IN UTILITY PLANNING THROUGH THE DEVELOPMENT OF VANCOUVER'S FIRST HEALTHY WATERS PLAN

By Lauren Foote and Zoe Greenberg



### SUMMARY

To achieve its 'One Water' vision, the City of Vancouver must adopt a holistic and sustainable approach to water management. This vision entails tackling issues such as combined sewer overflows (CSOs) and pollution from urban runoff, while also ensuring that the upkeep of ageing infrastructure accommodates rapid population growth and mitigates the impacts of climate change. Vancouver's Healthy Waters Planning process is an inter-jurisdictional and multistakeholder approach to meeting this challenge by integrating urban and environmental planning with traditional utility planning through its strategic approach to green and grey infrastructure investments.

### SOMMAIRE

Pour réaliser sa vision « One Water », la ville de Vancouver doit adopter une approche holistique et durable de la gestion de l'eau. Cette vision implique de s'attaquer à des problèmes tels que les débordements d'égouts combinés et la pollution due au ruissellement urbain, tout en veillant à ce que l'entretien d'infrastructures vieillissantes permette de faire face à la croissance rapide de la population et d'atténuer les effets du changement climatique. Le processus de planification des eaux saines de Vancouver est une approche intergouvernementale et multipartite visant à relever ce défi en intégrant la planification urbaine et environnementale à la planification traditionnelle des services publics grâce à son approche stratégique des investissements dans les infrastructures vertes et grises.

Imagine a 'One Water' community that acknowledges the interconnectedness and value of all water sources.<sup>1</sup> What thoughts come to mind? Poop might not be the first idea that emerges, yet the holistic

management of sewage and stormwater through nature-based solutions is key in the development of cost effective, sustainable, and resilient communities. Vancouver is located on the unceded territories of the Musqueam, Squamish

and Tsleil-Waututh First Nations. Like many older Canadian cities, settlers built combined sewer systems to divert wastewater. Today these legacy systems transport sewage and stormwater together to wastewater treatment





plants before being released into the environment. A combined sewage overflow (CSO) occurs when rain events exceed the system's capacity, resulting in untreated sewage and pollution-laden stormwater infiltrating waterways (Figure 1). Talk about a stinky situation! Evolving stressors including population growth, climate change, and ageing infrastructure frequently exacerbate CSO events. Since untreated water poses serious concerns to ecosystems and human health, mitigating CSO events through stormwater and sewage management is key in the development of healthy, sustainable, and resilient communities.

Like many urban centres across the nation, Vancouver grapples with the ongoing challenge of growth management. Vancouver is surrounded on three sides by the Salish Sea, so to accommodate population growth, the City will need to densify. Today's sewage infrastructure serves single family homes across much of the City. Increased population growth and density will strain Vancouver's combined sewage system (CSS), which is already ageing and in need of repair. The infrastructure upgrades and pollution control needed will cost billions of dollars, challenging the affordability of an already expensive City. Taking a strategic and integrated approach to grey and green infrastructure investments is critical towards managing risk. The ongoing land use changes will increase Vancouver's impervious surfaces by approximately 15 per cent.<sup>2</sup> This decrease in permeability, coupled with a continuous escalation in the frequency and severity of extreme rainfall events due to climate change, will lead to increased urban runoff and CSO events throughout the city. Innovative approaches to urban planning and sustainable water management practices are necessary to reduce the input of raw sewage and pollutants to our water systems.

**PURPOSE OF THE HEALTHY WATERS PLAN**

In 2019, the City of Vancouver approved the Rain City Strategy, which is an innovative award-winning plan that values water in all its forms and reimagines how rainwater is managed. This paradigm shift has resulted in a number of green infrastructure installations across the City (Figure 2).

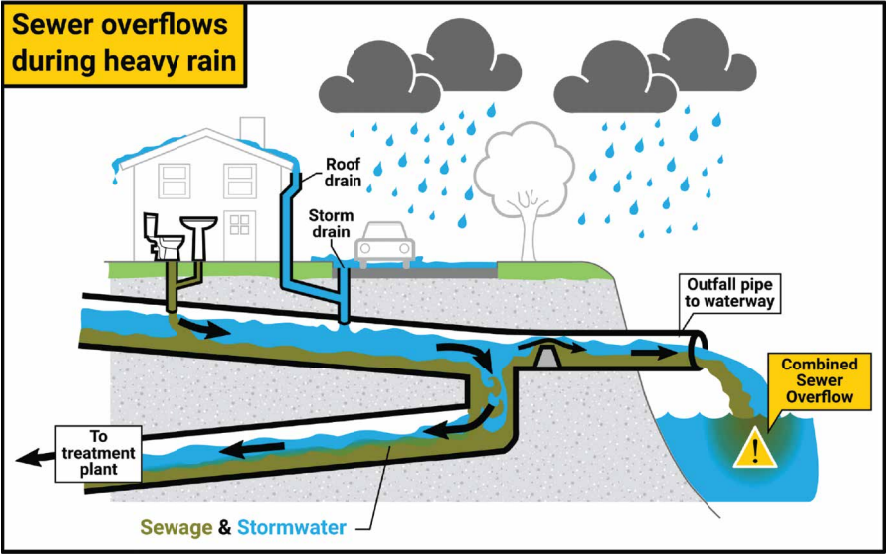


Figure 1: A combined sewage system (CSS) experiencing a combined sewer overflow (CSO). When water or sewage inputs exceed the capacity of a CSS, untreated sewage and pollutant-laden stormwater gets diverted away from treatment facilities and sent to waterways. Source: ECOSS.org.



Figures 2.1, 2.2, 2.3: Selection of nature-based solutions defined in Vancouver's Rain City Strategy.

# “Implementing infrastructure that manages sewage and is resilient to continuously evolving stressors including population growth, climate change, and ageing infrastructure can feel like uncharted waters.”

In 2020, the City of Vancouver initiated the development of the Healthy Waters Plan in tandem with the City's Vancouver Plan and the Region's Liquid Waste Management Plan. The Healthy Waters Plan aims to holistically link grey piped sewer management with the nature-based rainwater management solutions defined in the Rain City Strategy.

The multi-stakeholder and inter-jurisdictional Healthy Waters Plan is being developed, with collaboration from subject matter experts, a project advisory group, a leadership forum, and a technical working group, which includes the Musqueam, Squamish and Tsleil-Waututh host nations. This plan identifies what partner collaboration, long-range strategic investments, and policies are required to

address the following key issues across the City of Vancouver's five drainage basins (Figure 3):

- Pollution from CSOs;
- The need for increased sewer system capacity to accommodate population growth and development;
- Pollution from urban rainwater runoff;
- Climate change impacts on Vancouver's sewage and rainwater system (flooding caused by extreme rainfall and sea level rise, summer heat and drought, etc.);
- Ageing infrastructure in need of repair and replacement.

The City of Vancouver adopted the UNDRIP Strategy in 2022 and the Healthy Waters Plan works to respond to the UNDRIP Calls to Action through its planning process and deliverables.

## PROJECT WORK PLAN

The Healthy Waters Plan is being developed in three distinct phases (Figure 4). Phase 1, which is now complete, involved the creation of seven Current State Assessment reports, a Foundations for a Healthy Waters Plan summary report, and a strategic framework of Guiding Principles, Goals Areas, and Objectives (Figure 5). The plan is currently in Phase 2. In this phase, a 'Preferred Pathway' will be developed for each of the five drainage basins in Vancouver. Each Preferred Pathway will consist of policy and program choices called 'Options.' The Options will reflect the Guiding Principles, Goal Areas and Objectives defined in Phase 1. Phase 3 will focus on implementing the Preferred Pathways throughout Vancouver.

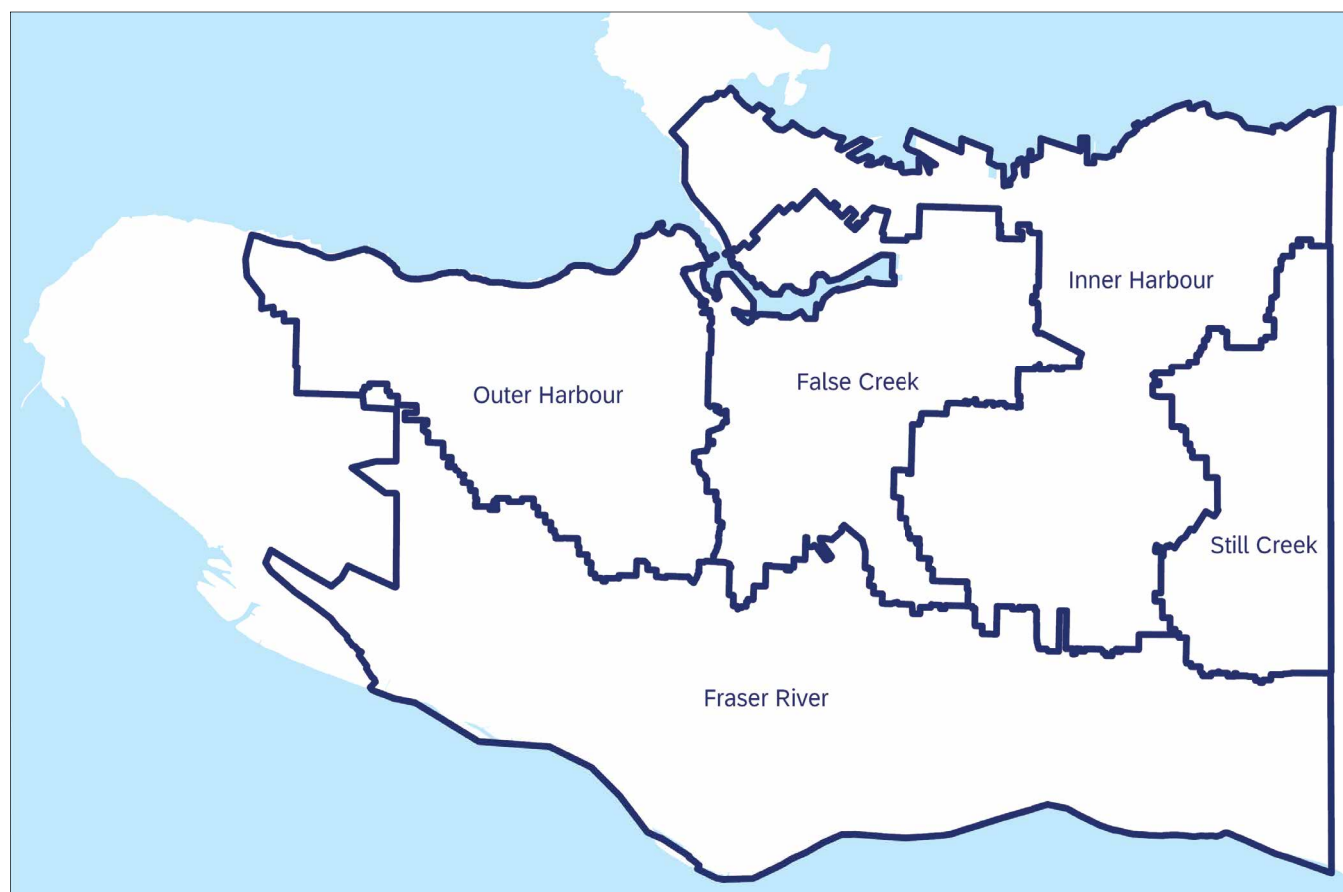


Figure 3: The Healthy Waters Plan will be developed at a drainage basin scale. It will provide direction on the long-range strategic collaboration, investments, and policies required for the following five drainage basins in Vancouver: Outer Harbour, Inner Harbour, False Creek, Fraser River, and Still Creek.



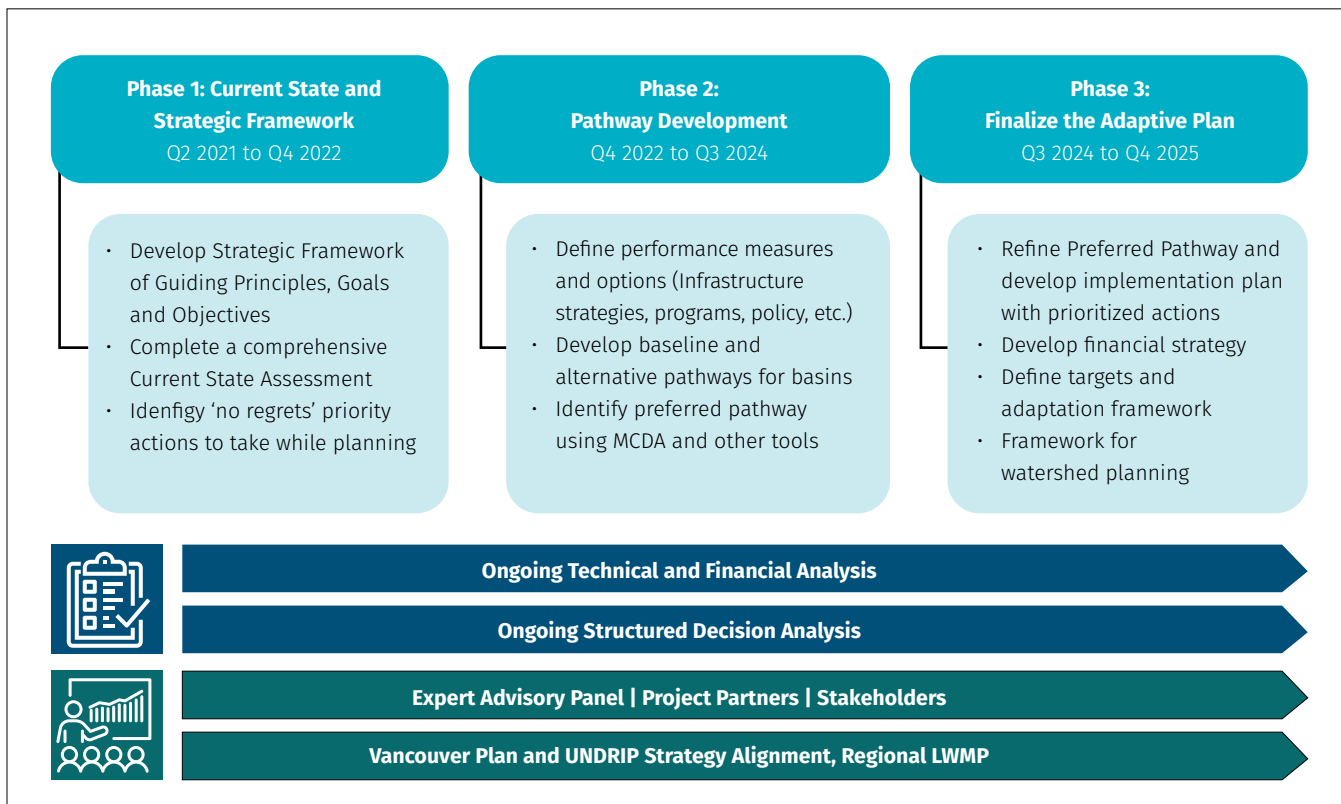


Figure 4: The Three-Phase approach used in the development of the Healthy Waters Plan. Technical and financial analysis, structured decision analysis, engagement, and LWMP and Vancouver Plan alignment are ongoing throughout all phases of the project.

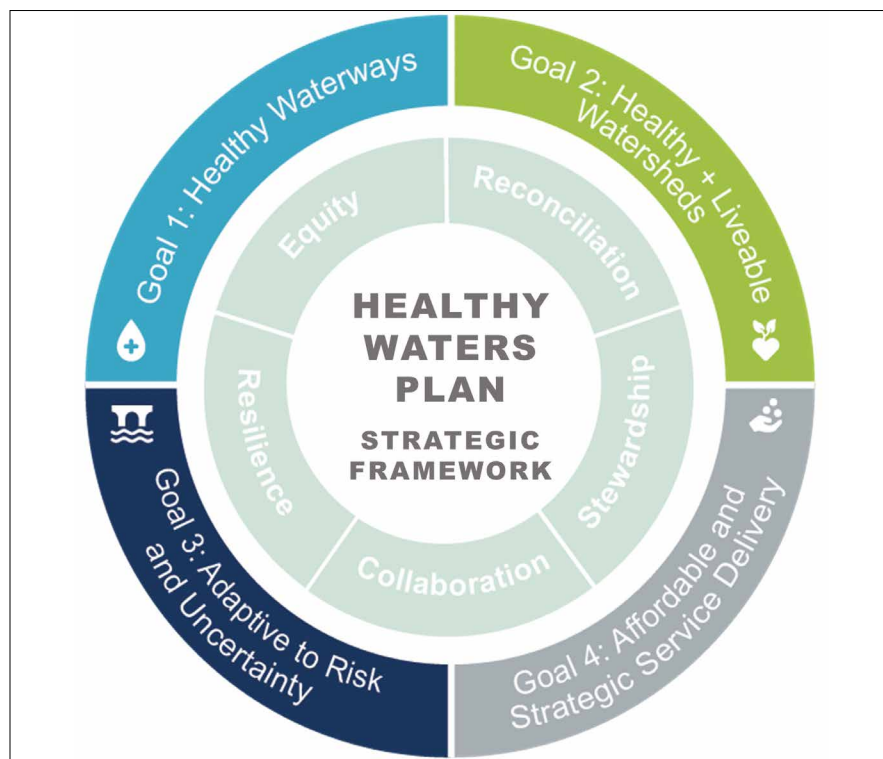


Figure 5: The Guiding Principles (inner circle) and Goal Areas (outer circle) that form the basis of the Healthy Waters Plan. The Healthy Waters Plan Guiding Principles and Goal Areas were collaboratively developed across government, industry, and advocacy groups to advance reconciliation, emphasise equity, and focus on integration, coordination, and collaboration. Strategic Objectives were then determined in line with the Goal Areas.



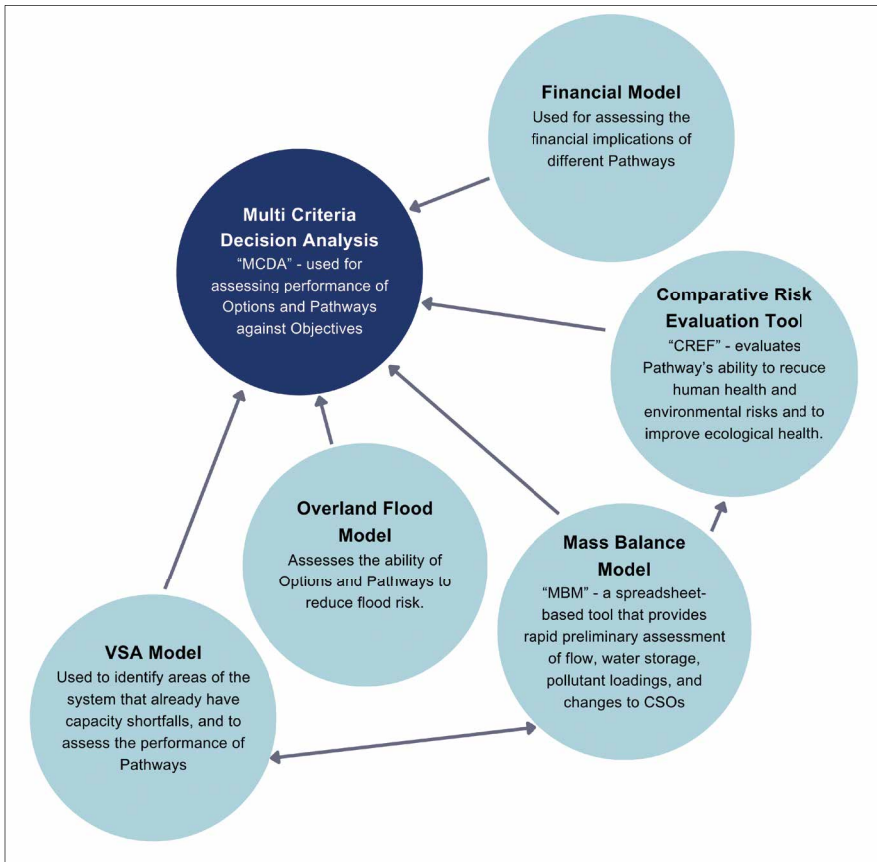


Figure 6: The five analytical tools that feed into the MCDA.

## PHASE 2: PROGRESS SNAPSHOT

To aid in the development of Preferred Pathways, a structured decision process supported by Multi-Criteria Decision Analysis (MCDA) will be used. Five analytical tools will feed into the MCDA. The following four tools will be created during Phase 2: a Financial Model and Options Costs Tool, a Comparative Risk Evaluation Framework, a Mass Balance Model, and an Overland Flood Model. A pre-existing Vancouver Sewage Area

model from Metro Vancouver will also be used in the MCDA framework (Figure 6).

In March 2024, partners and stakeholders from public, private, and non-profit sectors participated in a two-day Basin Planning Charrette at Creekside Community Centre in Vancouver. During the Charrette, basin-scale playable gameboards (Figure 7) and Gestalt Maps (Figure 8) for each of Vancouver's five drainage basins were placed at tables throughout the room. Groups of participants gathered around the basin-specific tables to



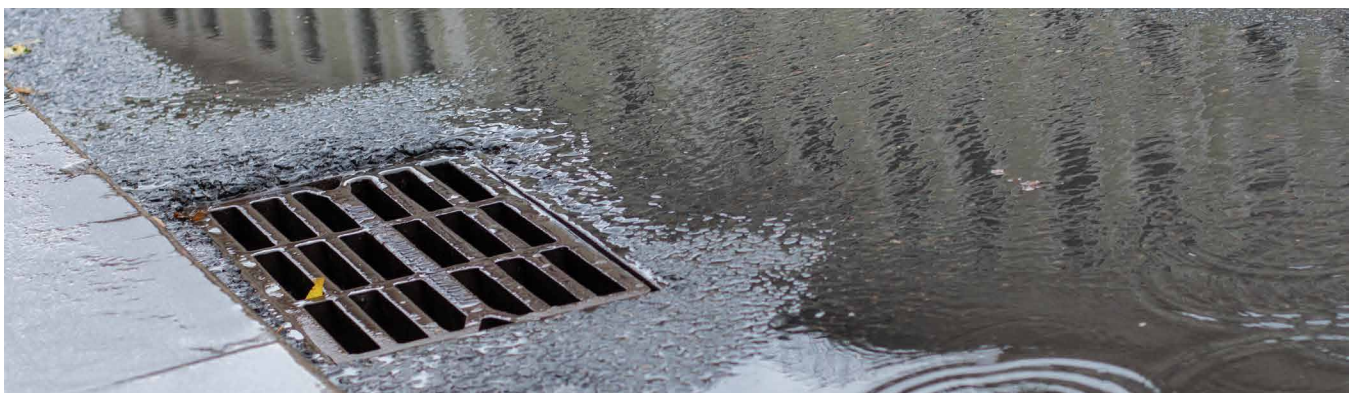
Figure 7: Charrette participants referring a basin-scale gameboard. Stickers and writing on the board indicate thoughts about Options and potential locations for select Options.



Figure 8: Charrette participants and facilitators referencing a Gestalt Map of Still Creek Basin, one of Vancouver's five water basins. In addition to a gameboard, maps of each basin, which were characterised during a Gestalt Mapping Workshop in January 2024, helped Charrette participants visualise areas with strengths, challenges, and opportunities.



Figure 9: Charrette participants and facilitators watching their selected Option's performance in real-time using the spreadsheet-based Mass Balance Model.





explore the unique water quality, financial, and Goal Area trade-offs associated with various combinations Options. These trade-offs were explored in real-time using the Healthy Water Planning team's Excel-based Mass Balance Model (Figure 9). After assessing the trade-offs, groups would ultimately select their ideal combination of Options for each basin, referred to as a 'Hybrid Pathway.' All the Hybrid Pathways that were developed at the Charrette are undergoing refinement to remove redundancies and fill gaps to inform the development of Preferred Pathways.

A Preferred Pathway will be determined for each basin by November 2024. Phase 3, which will commence in December 2024, will focus on defining the adaptive plan for the Preferred Pathway, including how investments will be prioritised across the city and a financial strategy to ensure that the strategy is deliverable.

#### LOOKING AHEAD

Implementing infrastructure that manages sewage and is resilient to continuously evolving stressors including population growth, climate change, and ageing

infrastructure can feel like uncharted waters. The City of Vancouver will holistically address these stressors through an integrated and adaptive Healthy Waters Plan. For up-to-date information about our plan and progress, please refer to our Healthy Waters Plan webpage where you can read our Phase 1 report. Our Phase 2 report, which will include details about our Charrette process and Preferred Pathway development, will be available on our webpage in December 2024.

#### ENDNOTES

- <sup>1</sup> The City of Vancouver uses an integrated One Water approach to managing water that recognizes value in the interconnected types of water: drinking water, rainwater, wastewater (such as sewage), groundwater, and waterbodies.
- <sup>2</sup> City of Vancouver. 'Healthy Waters Plan.' *One Water*. 2022.
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Internal dataset, *Healthy Waters Planning Branch*, Vancouver, British Columbia.

<sup>5</sup> City of Vancouver. 'Rain City Strategy.' 2019.

<sup>6</sup> City of Vancouver. 'The Vancouver Plan.' 2023.

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# Prairie Spotlight: **NATURAL INFRASTRUCTURE FOR WATER SOLUTIONS**

By Rebecca Row, Josée Méthot, and Ashley Rawluk



## **SUMMARY**

Planners play a crucial role in addressing community water management and infrastructure needs across the Canadian Prairies. Despite declining investments in water infrastructure, natural infrastructure is emerging as a viable approach to complement or replace grey infrastructure, offering environmental benefits along with reliable stormwater management, wastewater treatment, water supply, flood protection, and drought resilience. Planners possess the expertise to develop solutions that integrate land-use planning, infrastructure service delivery, and climate adaptation strategies. This article presents examples of successful water-based natural infrastructure projects across the Prairies and offers key entry points to support planners in implementing natural infrastructure within their professional practice.

## **SOMMAIRE**

Les urbanistes jouent un rôle crucial en répondant aux besoins des collectivités en matière de gestion de l'eau et d'infrastructures dans les Prairies canadiennes. Malgré la baisse des investissements dans les infrastructures hydrauliques, les infrastructures naturelles apparaissent comme une approche viable pour compléter ou remplacer les infrastructures grises, en offrant des avantages environnementaux ainsi qu'une gestion fiable des eaux pluviales, un traitement des eaux usées, un approvisionnement en eau, une protection contre les inondations et une résistance à la sécheresse. Les urbanistes possèdent l'expertise nécessaire pour développer des solutions qui intègrent l'aménagement du territoire, la fourniture de services d'infrastructures et les stratégies d'adaptation au climat. Cet article présente des exemples de projets réussis d'infrastructures naturelles aquatiques dans les Prairies et offre des points d'entrée clés pour aider les urbanistes à mettre en œuvre des infrastructures naturelles dans le cadre de leur pratique professionnelle.

**A**cross the Canadian Prairies, many local governments face a goldilocks challenge related to water. Too much causes flooding – damaging homes, washing out roads, stretching the capacity of stormwater systems, and saturating crop land. Too little water limits supply or spurs drought – threatening water availability,

reducing crop quality and yield, and increasing the risk of wildfire. Either way, 'too much' and 'too little' are both costly, and the money needed to shore up local infrastructure is mounting.

Across the Prairies, the depreciation of water infrastructure outpaced investments by nearly \$3 billion (21.9 per cent) between 2017 and 2021.<sup>1</sup> Local governments struggle

to take stock of their infrastructure assets and continue to face mounting costs. For example, Alberta Municipalities' latest 'Let's Talk About Infrastructure' campaign highlights how provincial funding for municipal infrastructure in Alberta dropped from \$420 per capita in 2011 to \$150 in 2023, representing about \$1.3 billion less investment each year.<sup>2</sup>





The total economic impact of climate change on the prairies is “projected to be overwhelmingly negative and significant”, with estimated losses of \$1.2 billion to \$1.8 billion from river and stormwater flooding each year, and \$1.6 billion to 3.8 billion from damages to transportation infrastructure, among other sectors.<sup>3</sup>

Natural infrastructure is a way to plan and work with nature to help meet infrastructure needs, including conserved ecosystems (e.g., wetlands), restored ecosystems (e.g., replanted shorelines), or nature-based constructed features (e.g., floating treatment wetlands, green roofs). While local governments grapple with reliable service delivery, natural infrastructure is gaining traction as an effective approach to deliver water infrastructure services, on its own, or in a hybrid infrastructure approach that enhances the function of traditional grey infrastructure (e.g., human-made structures like culverts, pipes, water treatment facilities, control structures) (Figure 1).<sup>4</sup>

Natural infrastructure alone is not a silver bullet, but can play a larger role to support cost-effective and resilient water infrastructure. Unlike grey infrastructure, which typically addresses a single infrastructure need, natural infrastructure can provide a ‘just right’ solution to the goldilocks challenge – often more affordable, resilient to climate change, and providing multiple services and benefits.<sup>5</sup>

While natural infrastructure is not yet a go-to option, momentum is building across Canada, as evident by federal efforts like the National Adaptation Strategy, the Natural Infrastructure Fund, and the forthcoming National Infrastructure Assessment. Meanwhile, leading local governments across the Prairies are implementing natural infrastructure to provide community benefits while delivering services for stormwater, wastewater, water supply, flood protection, and drought resilience including:

- **Stormwater:** In Edmonton, EPCOR’s *Stormwater Integrated Resource Plan* (SIRP), a 20 to 30- year, \$1.6 billion

- system-wide plan, prioritizes natural infrastructure with about half of the funding dedicated to low impact development (an approach to natural infrastructure that includes rain gardens, bioretention basins, soil cells), and dry ponds (Credit Valley Conservation, 2021).
- **Flood protection:** Parkland County, Alberta assessed the value and function of its natural assets to build a business case to use natural infrastructure to reduce the impact of floods on roads and cropland. This assessment enabled the county to integrate natural infrastructure across municipal operations, such as retaining wetlands in development proposals, prioritizing natural infrastructure in the new Stormwater Master Plan, and including policy for developers to identify and mitigate damage to natural assets.
- **Wastewater:** A tertiary treatment wetland in the Rural Municipality of La Broquerie, Manitoba uses the power of plants to ensure phosphorus levels

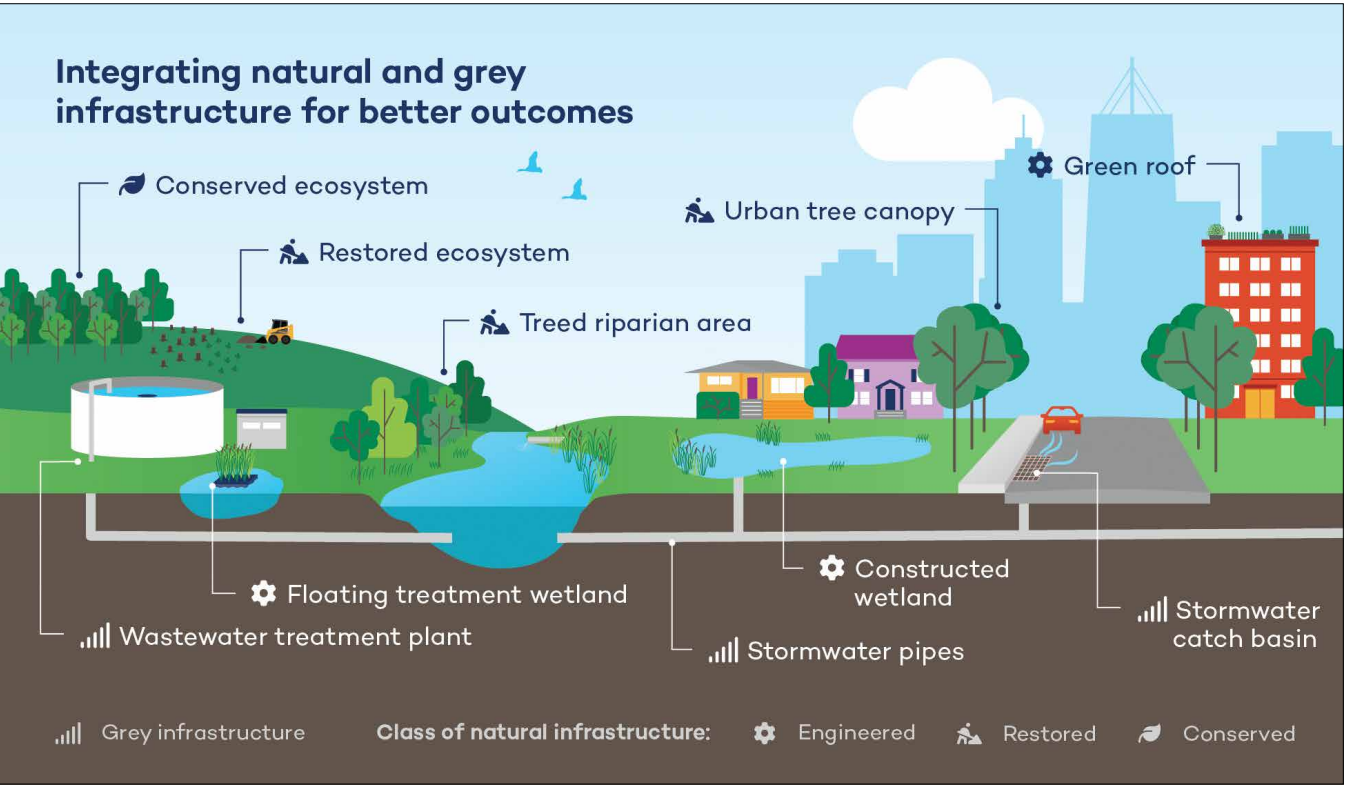


Figure 1: Infrastructure types. Source: Methot et al.

meet regulatory requirements before discharging to the Seine River.

- **Drought Resilience:** Okotoks, Alberta promotes natural solutions and drought resilient landscapes with the Water Conservation Rebate Program, supporting drought-tolerant or alternative turf and vegetation on public and private lands. Okotoks also completed a natural asset inventory, quantifying how local natural assets contribute to surface and groundwater provision, water flow regulation, and local heat regulation.<sup>6</sup>

Progress is being made, however, according to a 2023 report by the International Institute for Sustainable Development (IISD), more work is needed to realize impactful outcomes.<sup>4</sup> With over 675 local governments across the Prairies and alongside Indigenous communities across treaty lands, capacity is a key challenge, particularly in smaller, rural, or underserved communities. And planners are leading the charge – helping local governments connect the dots between issues related to infrastructure, development, conservation, and risk reduction. Planners can consider these key entry points to scale up natural infrastructure to address aging infrastructure, climate change, and water management.

### POLITICAL BUY-IN

The benefits of natural infrastructure have a much broader application to communities than just environmental considerations; for example, there are positive effects on service delivery, asset management, and community health and well-being. Raising awareness of the ways that natural infrastructure can support core municipal priorities with elected officials and administrators is a key step toward adoption.

One practical avenue to begin a conversation about natural infrastructure is to link it to climate adaptation efforts. *Talking It Through: A Discussion Guide for Local Government Staff on Climate Adaptation* is a great resource developed by ICLEI Canada,<sup>7</sup> including a guidebook and customizable presentation template, to help staff, including planners, initiate conversations with senior decision makers and elected officials about water, community services, and how natural infrastructure can help.

### START WITH NATURAL ASSET MANAGEMENT

Natural asset management is gaining momentum with local governments to help manage municipal infrastructure assets while supporting multiple community needs. Examples of natural assets include wetlands that store precipitation and reduce flood risk, urban tree canopies that provide shade and intercept rainfall, or riparian areas that slow the velocity of water and replenish groundwater.

Taking stock of the community's natural assets is an important place to begin to incorporate natural infrastructure. Natural asset management helps communities identify the location and type of existing natural assets, value the municipal services provided from those assets, and integrate them into asset management plans to monitor, manage, and maintain for better performance (i.e. identify the investments or upgrades that are needed in the future).<sup>8</sup>

Prairie-based resources are available to assist planners. For example, the Natural Assets Initiative (NAI) has supported over 100 local governments in Canada to consider natural assets in their financial planning and asset management programs, with multiple resources including a 12-step guidance tool developed specifically for planners, and a new natural asset management planning.

### LEVERAGE PARTNERSHIPS

Natural infrastructure solutions for flood mitigation and stormwater management can accrue more benefits when implemented at regional scales, as water resources go beyond jurisdictional boundaries. Capacity building may involve partnering with Indigenous communities, municipal regions, and/or watershed-based organizations to share resources and technical expertise to address funding and capacity limitations that hinder smaller, local governments.

In the Saskatoon region, the city partnered with adjacent municipalities, through the Saskatoon North Partnership for Growth (P4G) planning district, to fund mapping and modelling of the regional green network, including critical regional drainage patterns and an analysis and inventory of natural asset data on wetlands, significant wildlife and plant species, and important heritage resources. This allowed

the regional partners to take a cost-effective, cooperative approach to joint data collection, flood risk modelling, and natural infrastructure policy management in the rural-urban fringe.

Partnering together across the Prairies to integrate natural infrastructure into water infrastructure systems allows for sharing of local knowledge, increased capacity, and provides pathways for future discussions on shared infrastructure management and funding.

### COMPREHENSIVE POLICY FRAMEWORK

Communities have many bylaws, policies, and standards that can help make natural infrastructure a go-to for the delivery of water services, like stormwater management, wastewater treatment, and flood protection (e.g., Official Community Plan, engineering standards/guidelines, parks master plan, municipal tree bylaws). As these policies are reviewed, planners should collaborate across municipal departments to include natural infrastructure as a critical approach to deliver water infrastructure services, while building climate change resilience and increasing community benefits. Breaking down silos allows for more effective policy alignment and helps ensure natural infrastructure is embedded in municipal decision-making, with practical and achievable outcomes.

Planners can also encourage harmonious intermunicipal policy frameworks that meaningfully include natural infrastructure solutions. A review of the planning hierarchy in the Halifax Regional Municipality demonstrates how they are successfully prioritizing natural infrastructure in high level, regional plans, which then guide the lower-level plans and strategies, leading to consistent, on-the-ground implementation of natural infrastructure throughout the region.<sup>9</sup>

### SEEK TRAINING

Capacity and professional development can support natural infrastructure efforts, with a variety of training and resources available for planners and other professionals, such as Royal Roads University and NAI's online course 'Natural Asset Management Fundamentals,' or IISD's Nature-based Infrastructure online training modules.





## ATTRACT FUNDING

Budgetary pressures are mounting, with planners being challenged to find external funding to support data collection, mapping, modelling, and implementation. Luckily, there is growing support for funding at the various stages of water-based natural infrastructure projects. For example, the Green Municipal Fund announced the Local Leadership for Climate Adaptation, \$530 million dedicated to 1,400 municipal projects by 2030-2031. Projects that prioritize nature-based solutions (including natural infrastructure) will score higher on their application and will receive a higher cost share ratio. Prairie provinces also offer their own programs – for example, the Manitoba Conservation Trust and Alberta's Watershed Resilience and Restoration Program both promote natural infrastructure.

Thoughtfully planned communities that incorporate natural infrastructure into stormwater management, wastewater treatment, water supply, flood protection, and drought management can realize improved bottom lines, better delivery of water infrastructure services and asset management, more community health benefits, and enhanced biodiversity. Advancing these key entry points will help planners respond to the intersecting challenges facing local governments, addressing the goldilocks challenge of too much and too little water in a cost effective and climate resilient manner.

**Rebecca Row** RPP, MCIP, is the Executive Director for the Saskatoon North Partnership for Growth (P4G), a regional planning district with one rural municipal and four urban municipalities in Saskatchewan, who are coordinating intermunicipal growth plans for a regional population of 1 million people. **Josée Méthot** is a Senior Policy Specialist with the International Institute for Sustainable Development (IISD), spearheading the Natural Infrastructure for Water Solutions initiative, including research and partnerships to scale up natural infrastructure across the prairies.

**Ashley Rawluk**, IISD, works with ranchers, farmers, and municipalities to understand and implement natural infrastructure projects, like conserved wetlands, naturalized stormwater ponds, and native grassland restoration, providing support in their journeys towards climate change resilience.

## ENDNOTES

- <sup>1</sup> Statistics Canada. 2023. 'Infrastructure Economic Accounts, investment and net stock by asset, industry, and asset function [Table 36-10-0608-01].'
- <sup>2</sup> Alberta Municipalities. 2023. *Background: Funding of Local Infrastructure*.
- <sup>3</sup> Boyd, Richard. 2023. *Costs of Climate Change on the Prairies*. Prepared by All One Sky Foundation for ClimateWest.
- <sup>4</sup> Méthot, Josée, Ashley Rawluk, Dimple Roy, Thomas Saley, and Emily Kroft. 2023. 'The State of Play of Natural Infrastructure on the Canadian Prairies.' The International Institute for Sustainable Development.
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- <sup>6</sup> Fiera Biological Consulting Ltd. 2020. *Natural Asset Inventory and Ecosystem Service Assessment for the Town of Okotoks*. Fiera Biological Consulting Report #1978. Prepared for the Town of Okotoks, Okotoks, Alberta. Pp. 46 + Appendices.
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- <sup>8</sup> Natural Assets Initiative. 2024. *Nature Is Infrastructure: How to Include Natural Assets in Asset Management Plans*. Natural Assets Initiative.
- <sup>9</sup> Rawluk, Ashley, and Josée Méthot. 'A Scan of Natural Infrastructure Approaches: Bright Spots from the City of Nelson, Halifax Regional Municipality, and EPCOR.' The International Institute for Sustainable Development. ■



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# WATER IS ALL:

## Integrated Water Management in the Regional District of Nanaimo

By Kim Fowler

### SUMMARY

Water is an essential element for survival that shapes livelihoods, landscapes and ecosystems. Freshwater is increasingly under stress from land development and changing climate. Sea levels continue to rise, threatening shoreline development and impacting aquifers. The Regional District of Nanaimo has responded to these risks for water in three key integrated regional services of Drinking Water and Watershed Protection, Regional Growth Strategy and Climate Action Technical Advisory Committee. Water doesn't respect political or organizational boundaries, so neither should our planning and management of this essential resource.

### SOMMAIRE

L'eau est un élément essentiel à la survie qui façonne les moyens de subsistance, les paysages et les écosystèmes. L'eau douce est de plus en plus menacée par l'aménagement du territoire et le changement climatique. Le niveau de la mer continue de s'élever, menaçant le développement du littoral et ayant un impact sur les aquifères. Le district régional de Nanaimo a réagi à ces risques pour l'eau dans le cadre de trois services régionaux intégrés clés : Drinking Water and Watershed Protection, Regional Growth Strategy et Climate Action Technical Advisory Committee. L'eau ne connaît pas les frontières politiques ou organisationnelles, il devrait en être de même pour la planification et notre gestion de cette ressource essentielle.





**M**any people mistakenly believe they own the water on their property. In British Columbia (and generally in other provinces and territories in Canada), water is owned by the Crown on behalf of the residents of the province. A significant change enacted in the Water Sustainability Act (2016) requires landowners to obtain authorization to use groundwater for anything other than domestic use.<sup>1</sup> The majority of groundwater users, however, are domestic, and water licenses are not regularly checked for compliance, which is cause for concern, particularly with climate change impacts.

Like many regions in Canada, the Regional District of Nanaimo (RDN) is experiencing significant changes in climate, particularly:

- Longer, drier, and hotter summers that strain water resources for community use, agricultural irrigation, and temperatures and baseflows for fish
- More intense short-duration storm events bringing high volumes of precipitation causing flash flooding and land instability
- More precipitation falls as rain due to warmer winter temperatures, which results in less snowpack accumulation at elevation

The RDN has responded to these risks for water in three key integrated regional services of Drinking Water and Watershed Protection, Regional Growth Strategy, and Climate Action Technical Advisory Committee.

The Drinking Water and Watershed Protection (DWWP) service was created in 2009 to proactively address watershed challenges facing the region and the need for better water information to inform local decisions, and coordinate across jurisdictions (see Figure 1). Key priorities in the second-decade strategic plan are:

- integrate water information into key plans
- make progress towards rainwater management commitments
- develop targets for watershed function
- explore valuation of watershed natural assets
- model water availability
- continue to collect local water data to build long-term datasets

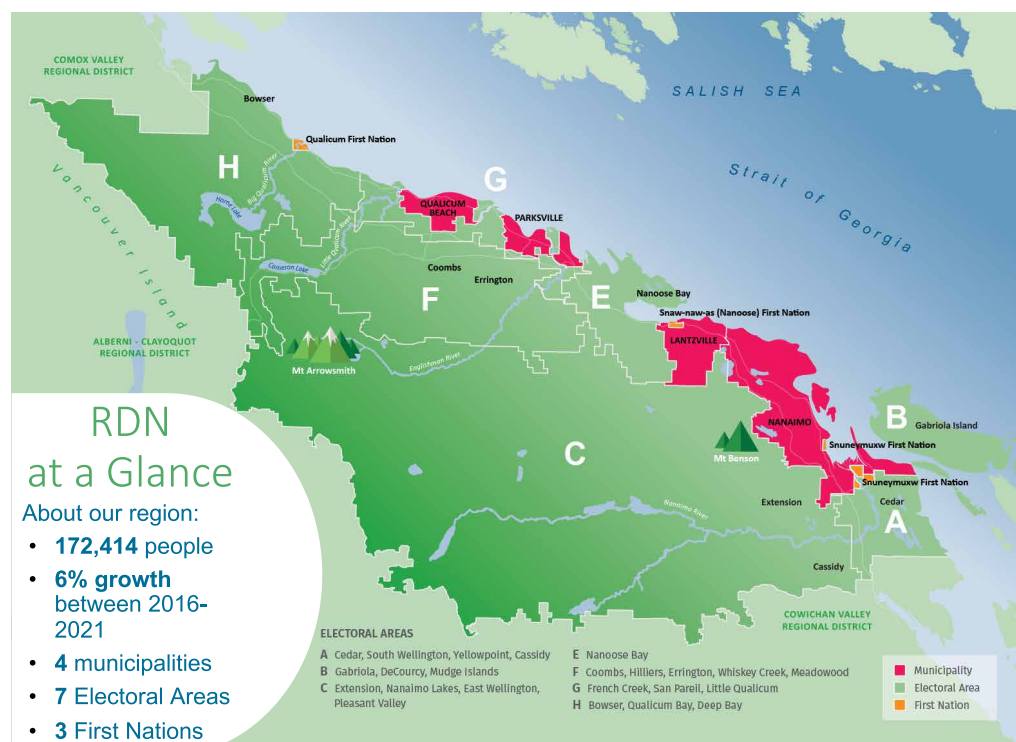
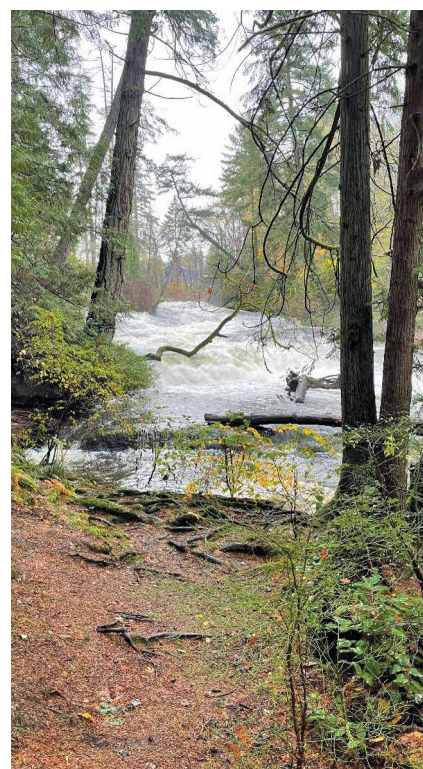


Figure 1: RDN at a Glance, Source: RDN

- perform trend analysis to inform land use, water allocation, and infrastructure decisions
- Continuing severe drought conditions and low streamflows in the summer are stressing aquatic species, and in some aquifers, declining levels foretell limits to water consumption and water quality concerns that will require collaboration across jurisdictions.

The Regional Growth Strategy (RGS) service, which sets regional land use planning, has policy that supports the creation of an aquifer protection development permit area (DPA) in Electoral Area F (EA-F), where residents and businesses rely on groundwater aquifers as their main water source, with approximately 1,000 known wells within the Plan Area. The DPA is based on DWWP information, rainwater targets, model rainwater management plan, and watershed targets, along with updated Provincial aquifer and groundwater well mapping and assessments. Land development interferes with natural hydrologic processes of infiltration, evaporation, and transpiration by replacing vegetation and soils with impervious surfaces (e.g., pavement and rooftops). Population growth and climate change generate additional demands and stresses



on groundwater sources, prompting proactive land and water management to create a sustainable relationship with this limited resource. Some aquifers in EA-F are showing declining trends in water level and quality in recent years.<sup>2</sup>

The DPA manages land development overlying the most vulnerable sources of groundwater in two classes. The first class is intensive land use designations in the Official Community Plan, as the permitted uses within the Local Service Centre, Industrial, Mixed Use and Tourist Commercial designations often require larger volumes of groundwater supply, and pose potential water quality risks associated with contamination. The second class applies to lands residing atop aquifers rated as high-stress based on supply and demand and/or low productivity based on known well yields, and the inherent nature of the aquifer materials and their ability to store water. Based on their hydrogeology, the vulnerable aquifers are also susceptible to water quality risks associated with surface contamination and are within areas of increased groundwater demand.

A second DPA protects the natural assets of forests and wetlands as vital components of the overall landscape that provide ecosystem services supporting a

healthy economy and social well-being. This designation was based on the Natural Asset Management program, which undertook a natural asset inventory, condition and risk assessment analysis and mapping. EA-F is within both the Coastal Douglas Fir and Coastal Western Hemlock Biogeoclimatic Zones that provide a home to a variety of rare ecosystems and endangered species. The Coastal Douglas Fir Biogeoclimatic Zone spans a narrow strip of southeast Vancouver Island, and is the most at-risk biogeoclimatic zone in British Columbia. Much of this zone has been altered due to human activity. In EA F, forests (including older forest, older second growth and woodland ecosystems) provide habitat for many species-at-risk, including the Marbled Murrelet and Townsend's Big-eared Bat.

Wetlands are vital ecosystems and productive natural environments, providing a range of ecosystem services and habitats for many species. Little Qualicum and Englishman River watersheds are both located within the Plan Area, encompassing

numerous wetlands that provide habitat for many species of birds, amphibians, reptiles, insects, and fish, including Painted Turtles, Western Toad, and the Great Blue Heron. Electoral Area F also includes a portion of the Parksville-Qualicum Beach Wildlife Management Area (WMA), which has been designated to conserve important habitats for waterfowl and fish. Wetland ecosystems in the WMA and elsewhere in EA-F provide both habitat and ecological services to the community, including freshwater supply and groundwater recharge, flood attenuation and erosion mitigation, water filtration, temperature regulation and climate change impact mitigation.

Another water-centric project under the RGS service is coastal and river floodplain mapping updates. The 188 km of shoreline was mapped with an analysis of sea level rise impacts under various scenarios. Existing river floodplain maps were also updated for the Englishman, Little Qualicum and Nanaimo rivers. Both of those projects generated amendments to the Floodplain

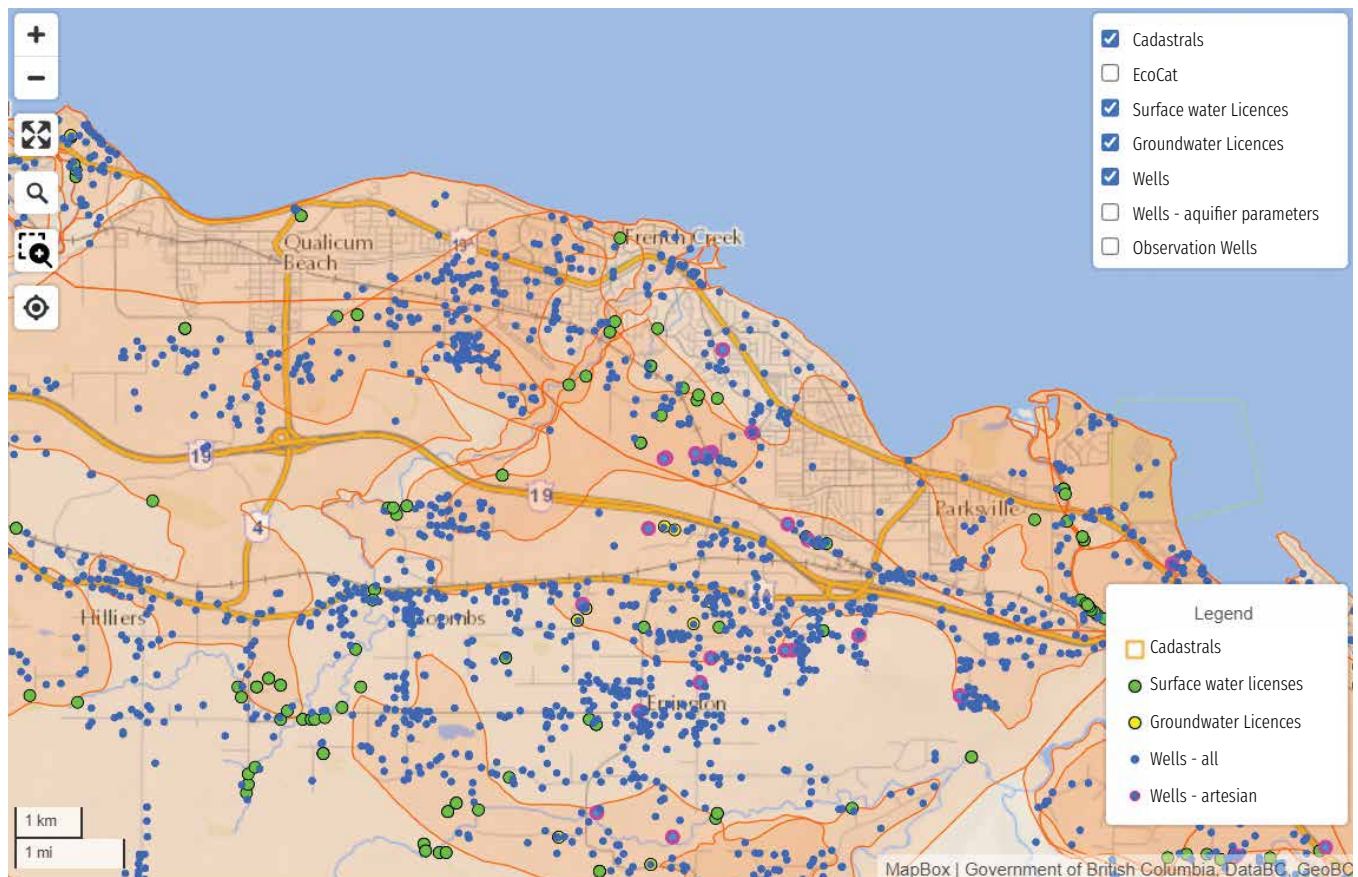


Figure 2: Aquifer and Groundwater Well Mapping, Province of BC, Area of Errington, Coombs, Whisky Creek, Qualicum Beach & Parksville.

Source: [apps.nrs.gov.bc.ca/gwells/aquifers](https://apps.nrs.gov.bc.ca/gwells/aquifers).



Bylaw and related Board policy and the creation of a new coastal hazard DPA. The next project stages underway are a climate risk assessment for the coastal floodplain, and a geohazard risk prioritization study (see Figure 2).

In 2019, a Climate Action Technical Advisory Committee (CATAC) was created to provide advice and recommendations to the RDN Board on actions to address local impacts of global climate change. Comprised of seven diverse registered professionals and three RDN Board representatives, CATAC was tasked with preparing a Climate Adaptation and Mitigation strategy with recommendations to the Board for immediate action.

The first of three top priorities recommended to the RDN Board was water supply resilience supported by natural asset management. The goal was to ensure water services the RDN provides (both current and any proposed for the future) and areas within the RDN not served by community water systems have water supply resilience, including emergency back-up under expected future climate scenarios (an approximate 40–50-year time horizon). A final report, approved by the RDN Board, developed best practices for climate-informed water supply planning. Current practices in the RDN were summarized, along with water supply profiles for the region's five local government water service providers. The direction of the final report is consistent with a recommendation from the Phase 3 Water Budget Model for French Creek Water Region report (prepared by the DWWP service) that the Board direct staff to write a letter on behalf of the RDN to the Ministry of Water, Land and



Resource Stewardship formally requesting an appropriately resourced body be struck to initiate discussions on a regional water supply strategy for the French Creek Water Region/Oceanside Area.

We know water doesn't respect political or organizational boundaries, so neither should our planning and management of this essential resource, which is increasingly under stress. All living organisms rely on water, so it must be a strategic and operational priority, particularly in land use planning. Water is all.

#### ENDNOTES

<sup>1</sup> [www2.gov.bc.ca/gov/content/environment/air-land-water/water/water-licensing-rights](http://www2.gov.bc.ca/gov/content/environment/air-land-water/water/water-licensing-rights).

<sup>2</sup> Water Quality and Quantity Risk Assessment for RDN Electoral Area F, GW Solutions Inc., June 2020. Available at [www.rdn.bc.ca/sites/default/files/inline-files/GWS\\_RDN%20Area%20F\\_RevJune15\\_2020.pdf](http://www.rdn.bc.ca/sites/default/files/inline-files/GWS_RDN%20Area%20F_RevJune15_2020.pdf).

**Kim Fowler** is a professional planner and sustainability expert with over 30 years of experience working with local governments in Canada. The Planning Institute of BC awarded Kim the Individual Outstanding Achievement Award for Innovation and Advocacy in 2022. ■

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Hugh Kellas



Fraser River Delta, British Columbia

#### FELLOWS CORNER

## WATER MOVES TO THE FOREGROUND

A simple planning exercise when assessing a new problem is to distinguish between the areas of stability and the areas of change. The stable areas move to the back and the change areas become the focus for action. Water was usually in the stable category. The rain and snow fall, the rivers run, the tides ebb and flow. Water was in the background.

But that changed in Metro Vancouver as climate change increasingly took hold and sustainability became a challenge for the century. Major storms with atmospheric rivers produced floods with an unexpected

magnitude. Raging urban streams and storm water management required more attention. The prospects for sea level rise from melting glaciers and ice caps became more than an intriguing modelling exercise. Water restrictions became a part of planning and urban management. Drying forests on the urban edge presented a greater fire hazard and the pace of ecological change was visible. Water moved from the background in planning to an area of change.

It was water that got regional planning started in Metro Vancouver and the Lower Mainland region of BC. The undammed Fraser River running through the region

## L'EAU PASSE AU PREMIER PLAN

#### DE CÔTÉ DES FELLOWS

Un simple exercice de planification lors de l'évaluation d'un nouveau problème consiste à faire la distinction entre les zones de stabilité et les zones de changement. Les zones stables sont reléguées à l'arrière-plan et les zones de changement deviennent le point central de l'action. L'eau fait généralement partie de la catégorie des éléments stables. La pluie et la neige tombent, les rivières coulent, les marées vont et viennent. L'eau figurait toujours à l'arrière-plan.

Mais les choses ont changé dans la région métropolitaine de Vancouver à mesure que le changement climatique s'installait et que la durabilité devenait un défi pour le siècle. Des tempêtes majeures avec des rivières atmosphériques ont produit des inondations d'une ampleur

inattendue. Les cours d'eau urbains en furie et la gestion des eaux pluviales ont nécessité une attention accrue. Les perspectives d'élévation du niveau de la mer dues à la fonte des glaciers et des calottes glaciaires sont devenues plus qu'un simple exercice de modélisation. Les restrictions d'eau sont devenues un élément de la planification et de la gestion urbaine. Le dessèchement des forêts en bordure des villes présentait un risque accru d'incendie et le rythme des changements écologiques était visible. L'eau est passée de l'arrière-plan de l'urbanisme à un domaine de changement.

C'est l'eau qui a donné le coup d'envoi de l'urbanisme régional dans la région métropolitaine de Vancouver et dans la région du sud-ouest de la Colombie-Britannique. Le fleuve Fraser, qui traverse la région sans avoir été endigué, s'étend





stretches for 1375 kilometers, and drains a quarter of the province. Much of the best land in the region for development and agriculture is in the floodplain formed from the 20 million tons of sediment the river carries each year. The valley flooded periodically, but it was a disastrous flood in 1948 with unprecedented damage that prompted the Province of BC to form the Lower Mainland Regional Planning Board the following year.

The Planning Board was charged with coming to grips with urban development and the floodplain. The Board's valley-wide 'Official Regional Plan' in 1966 was built on a vision of "cities in a sea of green";

a key policy was to "keep the floodplain free of urban development" except where urban development is committed, in which case floodproofing is required. These same objectives can be found in all the subsequent regional plans for Metro Vancouver and the Lower Mainland for nearly 60 years through the ever-changing provincial legal framework for planning policy and floodplain management in BC.

In the 1970s, Metro Vancouver's 'Livable Region 1976/1986' strategy built on the Official Regional Plan through targets for sharing growth among municipalities, with the most important criterion being "preserve farmland and prevent

development on the floodplain." Growth was directed towards the high ground and de-emphasized in urban areas which require dike protection and floodproofing measures, such as the City of Richmond.

By the 1990s, as Metro Vancouver was rebuilding regional planning following a period when the provincial government did not permit it, the policies began to embrace sustainability as a framework. The 'Livable Region Strategic Plan' of 1996 acknowledged that the concern with water was more than just flooding. Urban development policy was framed by a 'Green Zone' forming about two-thirds of the region's land base which included farmland and the floodplain, the

sur 1 375 kilomètres et draine un quart de la province. La plupart des meilleures terres de la région pour le développement et l'agriculture se trouvent dans la plaine d'inondation formée par les 20 millions de tonnes de sédiments que le fleuve transporte chaque année. La vallée est périodiquement inondée, mais ce fut une inondation désastreuse en 1948, avec des dégâts sans précédent, qui a incité la province de la Colombie-Britannique à créer l'année suivante le Lower Mainland Regional Planning Board (conseil régional d'urbanisme du sud-ouest de la Colombie-Britannique).

Le conseil d'urbanisme a été chargé de s'attaquer au problème du développement urbain et de la plaine d'inondation. En 1966, le « Plan régional officiel » du conseil pour l'ensemble de la vallée s'appuyait sur une vision de « villes dans

une mer de verdure »; une politique clé consistait à « maintenir la plaine d'inondation libre de tout développement urbain », sauf là où le développement urbain était déjà engagé, auquel cas la protection contre les inondations était nécessaire. Ces mêmes objectifs se retrouvaient dans tous les plans régionaux ultérieurs pour la région métropolitaine de Vancouver et le sud-ouest de la Colombie-Britannique depuis près de 60 ans, par le biais du cadre juridique provincial en constante évolution pour la politique d'urbanisme et la gestion des plaines d'inondation en Colombie-Britannique.

Dans les années 1970, la stratégie « Livable Region 1976-1986 » de la région métropolitaine de Vancouver s'est appuyée sur le Plan régional officiel en fixant des objectifs de partage de la croissance entre les municipalités, le critère le plus

important étant de « préserver les terres agricoles et d'empêcher le développement dans les plaines inondables ». La croissance a été orientée vers les hauteurs et a été réduite dans les zones urbaines qui nécessitent des mesures de protection contre les digues et les inondations, comme c'est le cas pour la Ville de Richmond.

Dans les années 1990, alors que la région métropolitaine de Vancouver reprenait la planification régionale après une période où le gouvernement provincial ne l'autorisait pas, les politiques ont commencé à adopter la durabilité comme cadre. Le « Livable Region Strategic Plan » de 1996 a reconnu que le problème de l'eau ne se limitait pas aux inondations. La politique de développement urbain a été encadrée par une « zone verte » représentant environ deux tiers du territoire de la région et comprenant les terres

**“More people means that water conservation will be ever more essential. There will be continued attention to raising dikes and floodproofing to address not only more frequent and intensive floods but also sea level rise and storm surges.”**

protected mountain watersheds, wetlands and wildlife habitats, and major parks. The Green Zone established an urban growth boundary and the plan's 'Growth Concentration Area,' and targets built on earlier strategies to reduce pressure on farmland, greenspace and the floodplain to make the best use of urban infrastructure.

'Metro Vancouver 2040, Shaping Our Future,' approved by the Metro Vancouver Board in 2010, updated the regional growth strategy. By this time Metro Vancouver had established a corporate 'Sustainability Framework' and the update related the growth management strategy to a constellation of plans for Metro's broad

range of regional services, including the drinking water and liquid waste plans. The linkages to drinking water flagged the connection between urban form and water conservation, and the importance of protecting drinking water sources. The linkages to liquid waste management flagged the need to limit expansion to rural areas, increased attention to storm water management, and energy recovery from the system. The regional growth strategy embedded policies to research and address climate change impacts and natural hazard risks.

Metro Vancouver's current regional growth strategy, 'Metro 2050,' approved

in 2023, builds on and reinforces the sustainability-driven growth management strategy and moves further with expanded policies and actions to "advance land use, infrastructure and human settlement patterns that improve resilience to climate change impacts and natural hazards."

Many of the impacts and hazards are water-related – earthquakes which would have particular implications for diked urban areas, sea level rise and ocean storm surges, floods and landslides from heavy precipitation events, a decrease in snowpack for drinking water reinforcing the need for water restrictions, longer

agricoles et les plaines inondables, les bassins versants montagneux protégés, les zones humides et les habitats de la faune et de la flore, ainsi que les principaux parcs. La zone verte a établi une limite de croissance urbaine et la « zone de concentration de la croissance » du plan, et les objectifs se sont appuyés sur des stratégies antérieures visant à réduire la pression sur les terres agricoles, les espaces verts et la plaine inondable afin d'utiliser au mieux les infrastructures urbaines.

Le plan « Metro Vancouver 2040, Shaping Our Future », approuvé par le conseil de la région métropolitaine de Vancouver en 2010, a mis à jour la stratégie de croissance régionale. À cette époque, la région métropolitaine de Vancouver avait établi un « cadre de développement durable » et la mise à jour reliait la stratégie de gestion de

la croissance à une constellation de plans pour le large éventail de services régionaux de la région métropolitaine de Vancouver, y compris les plans relatifs à l'eau potable et aux déchets liquides. Les liens avec l'eau potable soulignaient le lien entre la forme urbaine et la conservation de l'eau, ainsi que l'importance de la protection des sources d'eau potable. Les liens avec la gestion des déchets liquides soulignaient la nécessité de limiter l'expansion vers les zones rurales, d'accorder une plus grande attention à la gestion des eaux pluviales et de récupérer l'énergie du système. La stratégie de croissance régionale intégrait des politiques de recherche et répondait aux impacts des changements climatiques et des risques naturels.

L'actuelle stratégie de croissance régionale de la région métropolitaine de

Vancouver, « Metro 2050 », approuvée en 2023, s'appuie sur la stratégie de gestion de la croissance axée sur la durabilité, la renforce et va plus loin encore avec des politiques et des actions élargies pour « faire progresser l'utilisation des terres, les infrastructures et les modèles d'intégration humaine qui améliorent la résilience face aux impacts des changements climatiques et des risques naturels ».

Un grand nombre des effets et des risques sont liés à l'eau : les tremblements de terre, qui auraient des conséquences particulières sur les zones urbaines endiguées, l'élévation du niveau de la mer et les marées de tempête océaniques, les inondations et les glissements de terrain dus à de fortes précipitations, la diminution de la couverture de neige pour l'eau potable renforçant la nécessité





***L'augmentation de la population signifie que la conservation de l'eau sera de plus en plus essentielle. L'attention portée à l'élévation des digues et à la protection contre les inondations se poursuivra pour faire face non seulement aux inondations plus fréquentes et plus intenses, mais aussi à l'élévation du niveau de la mer et aux marées de tempête.***

drought periods in summer, and wildfires on the urban edge.

Implementing the strategy's objectives relies on Metro Vancouver's functions, collaborative planning systems and shared responsibility. Detailed analysis and actions are taking place through municipalities, the province and many other organizations to address sustainability objectives and the impacts of climate change.

Today's planners will experience substantial change during their careers, not only from environmental change but also the significant flows of people and capital this century is likely to experience. It is always useful in planning to look

deeply into the background – the stable areas – for possible environmental or societal changes. Low density residential areas have long been considered stable, but not now as a result of housing demand. For Metro Vancouver, water will increasingly be a feature of regional growth and related strategies during this century. More people means that water conservation will be ever more essential. There will be continued attention to raising dikes and floodproofing to address not only more frequent and intensive floods but also sea level rise and storm surges. The region will need to extract more unused energy from urban systems, such

as the gas and heat available in the liquid waste system. Water, and how we manage and use it, is now clearly in the foreground.

**Hugh Kellas** FCIP is a retired planner who worked in neighbourhood planning in Toronto and regional planning in Metro Vancouver. He is a former manager of planning for Metro Vancouver, and a Past-President of CIP. ■

de restrictions d'eau, les périodes de sécheresse plus longues en été et les incendies de forêt en périphérie des villes.

La mise en œuvre des objectifs de la stratégie repose sur les fonctions de la région métropolitaine de Vancouver, les systèmes d'urbanisme collaboratifs et le partage des responsabilités. Les municipalités, la province et de nombreuses autres organisations procèdent à des analyses détaillées et prennent des mesures pour atteindre les objectifs de durabilité et pour faire face aux effets des changements climatiques.

Les urbanistes d'aujourd'hui seront confrontés à des changements substantiels au cours de leur carrière, non seulement en raison de l'évolution de l'environnement, mais aussi des flux importants de personnes et de

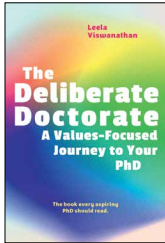
capitaux que ce siècle est susceptible de connaître. En matière d'urbanisme, il est toujours utile d'examiner en profondeur l'arrière-plan, les zones stables, pour y déceler d'éventuels changements environnementaux ou sociétaux. Les zones résidentielles à faible densité ont longtemps été considérées comme stables, mais ce n'est plus le cas aujourd'hui en raison de la demande de logements. Pour la région métropolitaine de Vancouver, l'eau sera de plus en plus un élément de la croissance régionale et des stratégies connexes au cours de ce siècle. L'augmentation de la population signifie que la conservation de l'eau sera de plus en plus essentielle. L'attention portée à l'élévation des digues et à la protection contre les inondations se poursuivra pour faire face non seulement aux inondations

plus fréquentes et plus intenses, mais aussi à l'élévation du niveau de la mer et aux marées de tempête. La région devra extraire davantage d'énergie inutilisée des systèmes urbains, comme le gaz et la chaleur disponibles dans le système des déchets liquides. L'eau, et la manière dont nous la gérons et l'utilisons, est désormais clairement au premier plan.

**Hugh Kellas** FICU est un urbaniste à la retraite qui a travaillé dans le domaine de l'urbanisme de quartier à Toronto et de la planification régionale dans la région métropolitaine de Vancouver. Il a été directeur de l'urbanisme pour la région métropolitaine de Vancouver et ancien président de l'ICU. ■

Readers are invited to submit short summaries (maximum 100 words) of new or recently released books on planning and related topics to [glennrobinmiller@gmail.com](mailto:glennrobinmiller@gmail.com). Preference will be given to books by Canadian authors. Full reviews of books are also welcome.

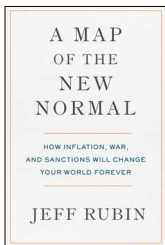
Les lecteurs sont invités à soumettre de courts résumés (100 mots maximum) de livres nouveaux ou récemment publiés sur l'urbanisme et les sujets connexes à [glennrobinmiller@gmail.com](mailto:glennrobinmiller@gmail.com). La préférence sera donnée aux livres d'auteurs canadiens. Les critiques complètes de livres sont également les bienvenues.



### THE DELIBERATE DOCTORATE: A VALUES-FOCUSED JOURNEY TO YOUR PHD.

144 pages. Leela Viswanathan. UBC Press, 2023.

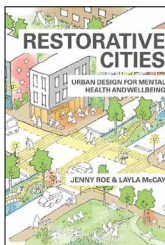
The range of challenges facing the planning profession over the next half century is increasingly complex. With few definitive solutions on offer, the opportunity for planning professionals with PhD-level capacity to conduct meaningful research and contribute to better outcomes has never been greater. Acknowledging that the path to completing a PhD can be fraught and – for those forced to give up the quest, hugely frustrating – CIP Fellow Leela Viswanathan has created a thoughtful roadmap for anyone considering a PhD, or currently engaged in the process. This step-by-step guide, based on the author's own journey to academic success, aims to help you avoid burn-out and maintain your equilibrium throughout.



### A MAP OF THE NEW NORMAL: HOW INFLATION, WAR AND SANCTIONS WILL CHANGE YOUR WORLD FOREVER

272 pages. Jeff Rubin. Penguin Random House, 2024.

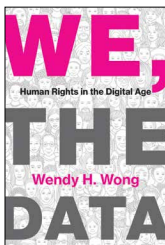
Jeff Rubin is not the first best-selling author to document the lasting impact of COVID-19 but his latest offering likely delivers one of the most riveting assessments of Canada's prospects resulting from international deficit spending. Connecting "a perfect storm of war, supply-chain disruption, geopolitical realignment, domestic upheaval, and energy scarcity," Rubin concludes that the combination of all these factors "will change everything" – from the Bank of Canada's ability to influence inflation, to mortgage rates, job security across many sectors, and the knock-on effect on investments in infrastructure and the built environment. Required reading for planners attempting to keep track of local prospects for growth.



### RESTORATIVE CITIES: URBAN DESIGN FOR MENTAL HEALTH AND WELLBEING

272 pages. Jenny Roe and Layla McKay. Bloomsbury Visual Arts, 2021.

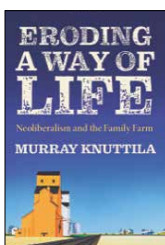
Influenced by shocks inspired by COVID-19, this inciteful investigation explores the cumulative impact of overcrowding, noise and air pollution on city dwellers. Advocating for a different, more creative approach to urban design to mitigate or even eliminate the worst aspects of city living, the authors – a psychiatrist/public health specialist, and an environmental psychologist with a passion for architecture – set out an intriguing, evidence-based blueprint that urges planners and designers to work with public health professionals to prioritize mental health as a way to inform the practice of placemaking at every scale from the neighbourhood to the city writ large.



### WE, THE DATA: HUMAN RIGHTS IN A DIGITAL AGE

280 pages. Wendy H. Wong. MIT Press (Penguin Random House), 2023.

The emergence of generative AI, which depends on huge amounts of data to 'train' algorithms that deliver AI products has put 'data' in the crosshairs of debates about technology, ethics and public policy. UBC professor Wendy Wong argues that, as stakeholders in a digital world, we all need to be wary of the pervasive tracking and monitoring of data. By treating people as 'sources' or 'data by-products,' tech companies and government are excluding us, and therefore undermining our potential as humans. Wong makes a strong case for improved data literacy and a code that preserves 'human rights in the age of data.'



### ERODING A WAY OF LIFE: NEOLIBERALISM AND THE FAMILY FARM

400 pages. Murray Knuttila. University of Regina Press, 2023.

Through the 1920s, wheat was Canada's leading export, accounting for 50% of world wheat exports. Much of this success was due to the role of family farms, which provided the economic driver for development of hundreds of small towns throughout Western Canada. But University of Regina Professor Emeritus Murray Knuttila contends that in the decades following post-Confederation nation-building, industrial-scale farming practices and neoliberal public policy have made it impossible for family farms to survive, causing farmers to sell off their land. "Rural communities are watching their schools, churches, and hospitals close, and many villages and small towns are ... reduced to plaques on the highway." ■





# Towards Sustainable Communities: Solutions for Cities and Their Governments

Mark Roseland, Margaret Stout, and Maria Spiliotopoulou

New Society Publishers, 2023 | US \$49.99 | CAN \$59.99 Paperback

Review By Emilie K. Adin

Happy anniversary Towards Sustainable Communities (TSC), a book that recently surpassed its 30th birthdate. Mark Roseland's ground-breaking work, fashioned with the assistance of generations of students, has long been the sustainability bible for anyone seeking a comprehensive model for changing the world. With the recent publication of TSC's fifth edition, this is truer than ever before. Mark is joined in the fifth edition by co-authors Margaret Stout and Maria Spiliotopoulou. Their scholarly expertise supports the addition of new areas of focus, including social sustainability and structural racism; increased international context; and the compass as an overarching metaphor for the book's expansive range. TSC is alive with ready-made indicators, clarion calls to action, and galvanizing ideas for implementation.

In the world of literature, it's the first edition that's rare and valued. Not so in nonfiction. In the context of the agitated pace of climate change and climate action, a fifth edition of TSC is essential reading. In many respects, TSC is more important at its 30th anniversary than at its inception in 1992.

As Julian Agyeman observes in the foreword for the fifth edition, previous editions of TSC represented an evolution, but the fifth edition of TSC stands out as truly transformational. Better organized, packed with more ideas and information, it appears at a time of tremendous upheaval, when the need for it is greatest.

How can TSC cover so much more ground, at only a dozen pages longer? The answer lies in the compass metaphor that organizes the book's structure, the migration of best practices to a separate (free access) website—[www.pando.sc](http://www.pando.sc), and a deeper focus on social sustainability. Regrettably, the transformation sacrificed the colour images and graphs from the fourth edition, and the migration of examples to a separate website. The eye candy for the hopeful climate activist is sorely missed. What I wouldn't give to see photos of green roofs, rain gardens, passive solar buildings and renewables sprinkled back into the text. Note to self: just check out the website.

## TOWARD SUSTAINABLE COMMUNITIES

Solutions for Citizens and their Governments



Mark Roseland, Margaret Stout, and Maria Spiliotopoulou

The compass that covers all the world, all things great and small, is apt as a metaphor for the fifth edition of TSC. The book is almost everything I could ask for. A good buy. ■

**Emilie K. Adin** RPP, MCIP, LEED AP, MLAI is President of the Planning Institute of British Columbia.

This digest presents recent research that deals directly with planning issues in Canadian communities. The articles are chosen for their potential interest to practicing planners, while covering a range of topics, community sizes, and regions.

Ce condensé a pour but de faire connaître les recherches récentes portant directement sur les questions urbanistiques touchant les collectivités canadiennes. Ses articles, qui abordent un large éventail de sujets, de collectivités et de régions, sont choisis en fonction de leur pertinence potentielle auprès des urbanistes professionnels.

### **INVESTIGATING SOCIAL INEQUALITIES IN CHILDREN'S INDEPENDENT MOBILITY, ACTIVE TRANSPORTATION AND OUTDOOR FREE PLAY IN TWO CANADIAN CITIES**

Aliyas, Zeinab, Patricia A. Collins, Marie-Pierre Sylvestre, and Katherine L. Frohlich. *Preventive Medicine Reports* 39, 2024.

Independent movement (the ability to walk around the neighbourhood independently or with peers within a reasonable distance from home), active transportation, and outdoor free play of children are physical activities that play a crucial role in shaping children's physical activity, social development, and overall health and wellbeing. Physical activity amongst children has declined over the last 20-30 years. This study presents new insights at the neighbourhood level, taking into consideration the socio-economic context and built environment context. This study reveals concerning low levels of these activities across neighbourhoods in Montreal, QC and Kingston, ON. Activity levels were even lower in low socioeconomic status areas. The authors call for researchers and practitioners to prioritize promoting children's physical activity, particularly in low socioeconomic neighbourhoods.

### **SUPPORTING HEALTHY COMMUNITY DECISION-MAKING IN MUNICIPALITIES: A SYNTHESIS OF EVIDENCE-INFORMED RESOURCES FROM ACROSS CANADA**

Kim, Minji Olivia, Genevieve Montemurro, Laura Nieuwendyk, and Candace I.J. Nykiforuk. *Wellbeing, Space and Society* 5, 2023.

Researchers reviewed 19 Canadian documents published between 2006 and 2020 to identify eight key healthy community factor themes: transportation, economic development, housing, neighbourhood design, food environment, natural environment, social environment, and child- and age-friendliness. Because these themes are interconnected and not mutually exclusive, systems-level solutions are needed to address the complex issues that underpin health disparities that exist within and across communities. The study findings are available at [www.healthycommunitiesathome.ca](http://www.healthycommunitiesathome.ca).

### **COUNTING THE UNDERCOUNTED: ENUMERATING RURAL HOMELESSNESS IN CANADA**

Schiff, Rebecca, Ashley Wilkinson, Terrilee Kelford, Shane Pelletier, and Jeanette Waegemakers Schiff. *International Journal on Homelessness* 3:2, 2022.

Homelessness is more than just an issue afflicting urban areas in Canada. This article presents research using data from Canadian rural homelessness enumerations. These enumeration reports show per capita rates of homelessness in rural communities exceed those seen in Canada's largest urban centres. These enumeration reports also show that a significant percentage of persons experiencing homelessness in rural Canada are unsheltered and fall into the category of absolute homelessness. Other information collected by these reports include proportion of homeless Indigenous Peoples, age and family status, and migration. The researchers suggest adjustments to policy and funding of homelessness programs that consider the evolving knowledge about the scale and scope of homelessness in rural Canada.

### **HOW TO SAVE CHINATOWN: PRESERVING AFFORDABILITY AND COMMUNITY SERVICE THROUGH ETHNIC RETAIL**

Chan, Collyn and Amy Zhou. *Berkeley Planning Journal* 32:1, 2022.

The COVID-19 pandemic exacerbated business closures, commercial vacancy, and gentrification in Chinatowns in North America. This article investigates the difference in retail changes across Chinatowns in Vancouver, San Francisco, and Los Angeles both prior and during the COVID-19 pandemic. The researchers find that measures taken through historic preservation, small business support, and pandemic relief have not significantly addressed core needs within Chinatown communities. The most effective forms of relief and preservation was affordable housing, community ownership of commercial businesses, and direct assistance for commercial rent. Some Chinatowns are faring better than others due to the ability of the Chinese community to fight against historic discriminatory planning practices, such as urban renewal, slum clearance, and highway building.



**GUIDING PRINCIPLES FOR INTEGRATING  
ON-DEMAND TRANSIT INTO CONVENTIONAL TRANSIT NETWORKS:  
A REVIEW OF LITERATURE AND PRACTICE**

Itani, Alaa, Willem Klumpenhower, Amer Shalaby,  
and Brendon Hemily. *Transport Policy* 147, 2024.

On-demand transit (ODT) has been widely piloted in recent years by many transit agencies in response to changing travel behaviour and preferences among people. Some agencies have adopted ODT to replace underperforming bus routes, as part of a continuous service planning process while others incorporated it within network re-design. All these trends highlight the critical need for transit agencies to have guidance for incorporating ODT into transit network planning both at the strategic, tactical, and service planning levels. This article presents a discussion of the key guiding principles to facilitate the development of transit networks with integrated on-demand and scheduled services. The article also provides discussions on the service goals and objectives of an integrated network design and highlights the key planning requirements for developing integrated networks.

**DISABLED PEOPLE'S ACCESSIBLE  
TAXI EXPERIENCES IN TORONTO, CANADA**

Comeau, Élyse, Siobhan Kelly, Yani Hamdani, and Timothy Ross. *Travel Behaviour and Society* 34, 2024.

This article presents findings from a study focused on understanding how disabled people experience accessible taxi services in Toronto. Findings emerged from a qualitative analysis of 590 customer complaint reports and 494 driver-reported incident reports that were provided by a local accessible taxi brokerage. The findings underscore the temporal experiences of disability, and highlights ableist aspects of accessible taxi services that are contributing to various barriers for disabled riders relating to service quality issues, safety concerns, and inflexible taxi service policies. The authors call for enhanced disability-related training for drivers, flexible accessible taxi policies that better account for the needs of disabled riders, improved communication protocols, and greater engagement with disabled people when developing new policies and operational changes.

**FLOOD RISK MAPPING IN SOUTHWESTERN NOVA SCOTIA:  
PERCEPTIONS AND CONCERNS**

Howard, Samantha and Kate Sherren. *Canadian Geographies* 67:4, 2023.

The study aims to understand flood experiences, the presence of resistance to flood risk mapping, and whether climax thinking could help explain this resistance. Climax thinking is a theory which considers why, when faced with land use changes that serve the public good, people often exhibit resistance and believe instead that the current land use is in its final and ideal form. Surveys were administered to residents in the Nova Scotian towns of Liverpool and Bridgewater. One third of respondents have experienced flooding, yet the majority have not seen a flood risk map, nor were they concerned about the potential impacts of flooding. Only one sixth of respondents exhibited resistance to flood risk mapping because of potential loss to property value. Dimensions of climax thinking were predictive of this resistance, specifically ignorance of an individual's own ability to adapt and inability to recognize the impact of their adaption decisions on others. These insights can be applied to support the acceptance of flood risk mapping.

**AIRBNB, LE PARTAGE DU LOGEMENT  
ET LE DROIT AU LOGEMENT À MONTRÉAL**

Kerrigan, Danielle and David Wachsmuth. *Nouvelles pratiques sociales* 31:2, 2020.

This article examines short-term rentals in Montreal. Short-term rentals, as well as the companies that operate them support, have sparked numerous heated debates in a growing number of cities regarding the appropriate use of residential properties. Are they assets that can be converted to a more profitable use as housing tourist, or is it accommodation for local residents? The article finds that in Montreal the financial benefits of rentals in the short term are highly concentrated, while the entire city suffers from the conversion of nearly 5,000 rental housing units. The article also explores the tensions between the growing ecosystem of companies that facilitate professionalization of hosts as well as residents and groups communities of Montreal who fight for their right to housing. The authors conclude by discussing the regulatory measures that would make it possible to divert the short-term rental market for tourist accommodations to actual home sharing. ■



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*Préparé en collaboration avec le Comité des fonctionnaires des provinces et territoires (CFPT) pour les administrations locales.*



Renderings by Henning Larsen Architects and KPMB Architects

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