

Community Solutions Network

# Showcasing Solutions: Innovations in public spaces

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# ACKNOWLEDGEMENT OF INDIGENOUS LANDS AND TREATIES ACROSS CANADA

The sacred lands and waterways upon which Evergreen operates and the built communities and cities across the country are the traditional territories, homelands and nunangat of the respective First Nations, Métis Nations and Inuit who are the long-time stewards of these land. These lands are occupied lands and subject to inherent rights, covenants, treaties and self-government agreements to peaceably share and care for the lands and resources across Turtle Island. These regions are still home to diverse Indigenous peoples who are still fighting for their sovereign rights and tirelessly protecting their traditional territories. As uninvited guests who live and work on these lands, we have a responsibility to know the treaties that tie us together, advocate for Indigenous rights and commit to learning our responsibilities to each other.

## ACKNOWLEDGEMENTS

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The Community Solutions Network is a program led by Evergreen in partnership with Open North. Our team works with communities to build capacity and improve the lives of residents using data and connected technology approaches. We deliver advisory services, workshops and online resources that focus on key areas such as climate resilience, data governance, inclusive public space, technology procurement and public engagement. The Community Solutions Network is supported by funding from the Government of Canada. The views expressed in this publication do not necessarily reflect those of the Government of Canada.

## EXECUTIVE SUMMARY

This introductory research brief is intended for community leaders in Canada who are interested in exploring the benefits of data and technological innovations in public spaces. It showcases replicable examples of smart solutions that support better public spaces across Canada and highlights the diversity of low- and high-technological solutions that can be implemented at various scales to best suit the needs and interests of communities of different sizes.

## INTRODUCTION

Smart innovations can help address local challenges facing communities across Canada. Innovative solutions can be applied at different scales and should be implemented to best suit the specific needs and challenges of the community. Sometimes a low-tech solution is the most feasible and effective option whereas some challenges require more complex, high-tech solutions.

For example, building local **climate resilience** can be achieved through implementing small-scale **nature-based solutions** and prioritizing **green spaces** in a community, but also by leveraging high-tech solutions that rely on **artificial intelligence** and **machine learning** with complex algorithms and predictive technology. Communities should approach decision-making and solutions that reflect their local challenges and realities.

## REPLICABLE SOLUTIONS ACROSS CANADA

Many communities in Canada are exploring data and technological innovations to address local-level challenges. Public spaces offer an opportunity to leverage existing spaces and infrastructure to meet the needs and interests of a community. Evergreen's [\*Smart and Multi-Solving Public Spaces\*](#) research brief explores these ideas with practical examples.

The **Internet of Things** (IoT) has streamlined the ways in which communities can leverage and rely on data and technological innovations. Automated sensors for lighting or heating public spaces, smart phone applications for public engagement and activations and digital signage can all rely on IoT. Further, artificial intelligence and remote sensing for predictive modeling can support communities in forecasting and planning for the future but often require new infrastructure and expertise. While IoT and other high-tech automations and analytics are useful, low-tech solutions are sometimes most effective to best reflect the needs of a community such as implementing **green infrastructure** or using phone calls or websites for communications. Public spaces with accessible surfaces, nature-based solutions (such as a garden or park) or low-impact developments (such as bioswales, green roofs or rain barrels) offer feasible, low-tech solutions. From high-tech automations to low-tech simplicity, smart innovations can be applied at different scales in communities of all sizes.

Below is a selection of smart solutions from a diversity of communities that work to address different local-level challenges. These case studies are meant to inspire others by the creativity and innovation communities have applied in their approaches and solutions.

## NATURE-BASED SOLUTIONS IN EDMONTON, AB

Population: 1,010,899<sup>1</sup>

This solution supports: climate resilience, biodiversity, access to nature, recreation

Data-informed nature-based solutions leverage nature and healthy ecosystems to protect people, optimise infrastructure and safeguard a stable and biodiverse future.<sup>2</sup> Edmonton, AB has a network of natural areas including forests, wetlands and lakes. These areas have multiple evidence-based benefits from encouraging biodiversity, sequestering carbon and providing access to nature for visitors and residents. Wetlands are abundant in Alberta covering approximately 20% of the province's surface area.<sup>3</sup> Wetlands are lands that are covered by water supporting aquatic plants and wildlife among other ecological services including flood protection by acting like a sponge to soak up precipitation and filtering water.<sup>4</sup>

Secord Wetland in Edmonton's west end is a natural area that consists of both a wetland and forested area embedded in a residential neighbourhood. The presence of both a wetland and a forest provides a "habitat for animals that require elements of both wetlands and forests, such as goldeneye ducks and frogs." The wetland is walkable from the neighbouring lots with a formal trail system providing recreation access and a view of the wetland and surrounding areas. The wetland provides a habitat for animals and diverse vegetation and includes three reservoirs that protect it from urban water sources.<sup>5</sup>

Hodgson Wetland in southeast Edmonton is another example of a nature-based solution surrounded by a residential neighbourhood. The wetland is home to many birds and amphibians and "serves as an ecological buffer, protecting water quality and nesting and feeding habitat for waterfowl."<sup>6</sup> In addition to the natural benefits, the wetland includes recreational space with a path and two formal viewing platforms, "providing an opportunity to view open water, emergent vegetation zones and upland shrub areas."<sup>7</sup> The wetland is also across from a playground and park expanding the availability of walkable, green space in the neighbourhood.

Secord Wetland and Hodgson Wetland are both surrounded by residential neighbourhoods, building walkable access to nature. Data and information about local natural assets can support the protection and revitalization of existing nature-based solutions in a community. Wetlands and other nature-based solutions not only provide ecosystem services but also support the wellbeing of the communities they serve through access to nature and walking trails, which has been shown to have positive effects on mental health.<sup>8</sup>

### *Recommendations for your public space:*

- Think creatively about how public spaces can be used for multiple purposes such as recreation and flood resilience
- Create an inventory of your community's natural assets and their value to be able to better advocate for their creation and preservation (see Evergreen's research brief on [Innovations in Data Collection](#))

## CREATING A FOOD FOREST IN SASKATOON, SK

Population: 364,641<sup>9</sup>

**This solution supports:** food security, community engagement and participation, sustainability, climate resilience, recreation

Saskatoon, SK is creating a Food Forest pilot project in two green spaces in the city. Food forests are resilient perennial gardens of edible plants that mimic natural ecosystems. The Food Forest pilot emerged from Saskatoon's [Pathways for an Integrated Green Network](#), a 10-year implementation plan to create an integrated green network in Saskatoon.

Data collection through public consultations identified the community's interest in food-related initiatives which led to the idea of creating a food forest as part of the city's green space. Food forests can provide multi-solving benefits by creating green, open spaces that have inherent, data-supported natural values, by producing food to help minimize food deserts and by creating community-building opportunities through activities and events as well as a space for recreation and outdoor enjoyment.

The locations of the two food forest pilot projects were selected by analysing existing spaces to identify spaces that were publicly owned with sun access and drainage that could support plant growth (including irrigation considerations), easy to access by the public (through public transit or walking) and in neighbourhoods facing higher rates of food insecurity that would benefit most from food access.

The City of Saskatoon engaged community members, associations and other organizations through surveys, workshops and other data collection methods to better understand their interests and concerns about the food forest project. The feedback they received informed changes to the project's plan, highlighting the importance of community consultations and data-informed decision-making. For example, community members recommended relocating one of the sites to be further away from an existing community garden<sup>10</sup> which was updated in subsequent plans of the project. Further, surveys to the surrounding neighbourhoods asked about plant preferences<sup>11</sup> resulting in the prioritization of Saskatoon berries, apple trees, raspberries, strawberries and pollinator plants. Suggestions and feedback from the community are reflected in the construction drawings with installation beginning in the fall of 2024 and scheduled to be completed by the end of 2025.

Shannon Dyck, Sustainability Specialist at the City of Saskatoon, encourages communities interested in undertaking similar projects to connect with their communities and share knowledge. "Knowing what's happening in your community will help with the design of these spaces, including what the community wants and in which locations will best address community needs."

*Recommendations for your public space:*

- Engage your community to understand their needs and interests

- Identify areas that are facing food insecurity, such as neighbourhoods with limited access to grocery stores and with lower income households
- Evaluate suitable sites through a comprehensive assessment of existing and feasible open spaces
- Develop a maintenance plan to ensure the long-term sustainability of the project

### FOREST PAVILION IN WINNIPEG, MB

Population: 749,607<sup>12</sup>

**This solution supports:** climate resilience, warming and cooling spaces, recreation, accessibility, washroom availability

The Forest Pavilion in Winnipeg, MB is a four-season community hub that was created following data-informed flood design standards. The building resides in Crescent Drive Park, a popular recreation destination in the Red River flood zone.<sup>13</sup> The Forest Pavilion includes tables, washrooms, an insulated room (that can be used as a warming or cooling space),<sup>14</sup> a roofed Shade Room, as well as open-air room with a fire feature.<sup>15</sup> The materials used in the design and construction of the space can be submerged in water without impact due to the concrete base. Further, design elements (such as limiting right angles, no floor mounted fixtures) help keep water flowing.<sup>16</sup> The construction of the space took advantage of the topography to help reduce flooding and includes native plantings, super low-flow plumbing fixtures, LED lighting and IoT-based occupancy sensors to reduce energy use.<sup>17</sup> The mix of data-informed innovative technology and IoT help to create a sustainably designed and functioning public space.

#### *Recommendations for your public space:*

- Work with consultants who will think creatively about the design and construction of a built structure
- Design with nature to incorporate environmental elements and visuals
- Create amenities that reflect the needs of the location and its uses (such as washrooms, seating, shading)
- Leverage IoT and smart technology to implement sustainable features

## NET-ZERO PUBLIC LIBRARY IN VARENNES, QC

Population: 21,198<sup>18</sup>

**This solution supports:** climate resilience, access to information, community gathering, recreation

Varenes, Quebec is home to the first institutional **net-zero** energy building in Canada. The two-storey, 24,000-square-foot library can “autonomously manage its heating, lighting and electricity systems.”<sup>19</sup> The design of the library aimed to reduce energy use through optimal light and cross ventilation with high energy performance windows, IoT-based occupancy sensors and southern exposure for wall and roof surfaces.<sup>20</sup> Data-based simulations were run to help determine which designs would be most effective and efficient.<sup>21</sup>

The library uses photovoltaic/thermal technology to extract heat and electricity from solar panels, ground source geothermal heat pumps, motorized windows for natural ventilation and natural light in its energy-efficient design.<sup>22</sup> The library uses artificial intelligence to track occupancy of the building to adjust its temperature levels which operates using IoT.<sup>23</sup> Further, the net-zero library could be developed to be net-positive by using its entire roof to produce solar heat, creating more energy than it needs, which could then be used to heat adjacent buildings.<sup>24</sup>

The Varennes Public Library is an example of a beautiful and sustainable public space, which provides a place to gather and helps Canada to meet its target of reducing greenhouse gas emissions by 80 per cent by 2050.<sup>25</sup>

### *Recommendations for your public space:*

- Consider green energy and net-zero options when upgrading or building facilities (see Evergreen’s toolkit on [Green Energy Solutions](#)).
- Take advantage of natural elements including strategically designed windows to capitalize on natural lighting

## SMART ACCESSIBLE PLAYGROUND IN MOUNT PEARL, NL

Population: 22,477<sup>26</sup>

This solution supports: accessibility, climate resilience, recreation, child development

St. David's Smart Accessible Playground in Mount Pearl, NL embeds smart technology, improved lighting and accessible play and recreation features (including a rubber surface, accessible swing set, water fountains and picnic tables).<sup>27</sup> In addition to two play structures, the space features an augmented reality game through the Biba Smart Park Add-on application that encourages physical, imaginative play while also tracking park usage, weather impacts and equipment condition.<sup>28</sup> The application uses IoT to gather data about the use and maintenance needs of the playground to inform the ongoing management and maintenance of the space. The space also includes accessible, gender-neutral washrooms that were designed to bring in fresh air that is tempered before being introduced inside to reduce the load on baseboard heaters.<sup>29</sup> The playground is a unique space that prioritizes the needs of its community in its design and implementation as well as in its ongoing management.

### *Recommendations for your public space:*

- Centre children in the design and implementation of your playground
- Incorporate accessibility features to build an inclusive play space for all to enjoy

## INNOVATION INSIGHTS

Innovations in public spaces can meaningfully and effectively offer solutions to local-level challenges. The case studies showcased in this brief are examples of the variations and scope of innovations in public spaces that build local climate resilience while also providing additional community benefits. Built structures that use creative design elements and green energy solutions (such as in the Forest Pavilion in Winnipeg, MB, the net-zero library in Varennes, QC and the accessible playground in Mount Pearl, NL) leverage IoT to become attractive public spaces that encourage the use of innovative technologies. Maximizing natural spaces for their ecological benefits alongside community benefits can help address other challenges like food insecurity (such as the food forest in Saskatoon, SK) and flood protection (such as in the wetlands in Edmonton, AB). These case studies provide a snapshot of the possibilities and approaches to creatively implement smart solutions. Below are some insights from the case studies that can be applied to innovative public space projects across Canada that contribute to climate resilience:

- Engage with community members to identify needs and implement a sustainable and manageable solution for the benefit of everyone
- Think holistically about the public space and ways to multi-solve and combine solutions



- Foster partnerships to learn from local expertise and support cross-departmental and inter-organizational collaborations
- Leverage shared resources and existing infrastructure

## CONCLUSION

There are many ways that data and technology can be leveraged to address the challenges facing communities in Canada and public spaces offer a venue and opportunity in which to implement these solutions. Smart innovations can help public spaces respond to community needs through low-tech solutions like nature-based solutions or high-tech solutions like artificial intelligence. It is important to keep in mind that communities have varying needs and should choose the solution that best fits their situation. The examples outlined in this brief showcase the various degrees of technological sophistication and offer inspiration to communities about what is possible in the future.

# GLOSSARY

**Artificial Intelligence (AI)** is the “simulation of human intelligence in programmed machines.”<sup>30</sup> AI can play a major role in climate adaptation, mitigation and resilience efforts by collecting and interpreting large datasets in real time, which can help detect early warnings for severe weather occurrences and implement prevention efforts earlier.<sup>31</sup>

**Climate resilience** describes the capacity to respond to and adapt to or cope with climate change impacts and is “the capacity of social, economic and environmental systems to cope with a hazardous event or trend or disturbance, responding or reorganizing in ways that maintain their essential function, identity and structure, while also maintaining the capacity for adaptation, and learning and transformation.”<sup>32</sup>

**Green infrastructure** is infrastructure that manages and controls elements of the natural vegetative systems and green technologies that collectively provide society with a multitude of economic, environmental, health and social benefits.<sup>33</sup>

**Green space** refers to green infrastructure, natural spaces, open space or engineered green spaces that promote health and climate change mitigation.<sup>34</sup>

**Machine learning** is a form of artificial intelligence where computers use data and algorithms to “learn” over time, improving the performance of tasks over time and mimicking how humans learn.<sup>35</sup>

**Nature-based solutions** leverage nature and the power of healthy ecosystems to protect people, optimise infrastructure and safeguard a stable and biodiverse future.<sup>36</sup>

**Net zero** is used to describe strategies and targets aimed at eliminating the emissions of greenhouse gases (zero carbon) in various regions around the world.<sup>37</sup>

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<sup>1</sup> Government of Canada, Statistics Canada. (2022a, April 27). *2021 Census of Population geographic summary: Edmonton, City (CY) [Census subdivision], Alberta.* <https://www12.statcan.gc.ca/census-recensement/2021/search-recherche/productresults-resultatsproduits-eng.cfm?LANG=E&GEOCODE=2021A00054811061>

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<sup>3</sup> Wetlands Alberta. (n.d.). *What is a Wetland?* <https://wetlandsalberta.ca/what-is-a-wetland/>

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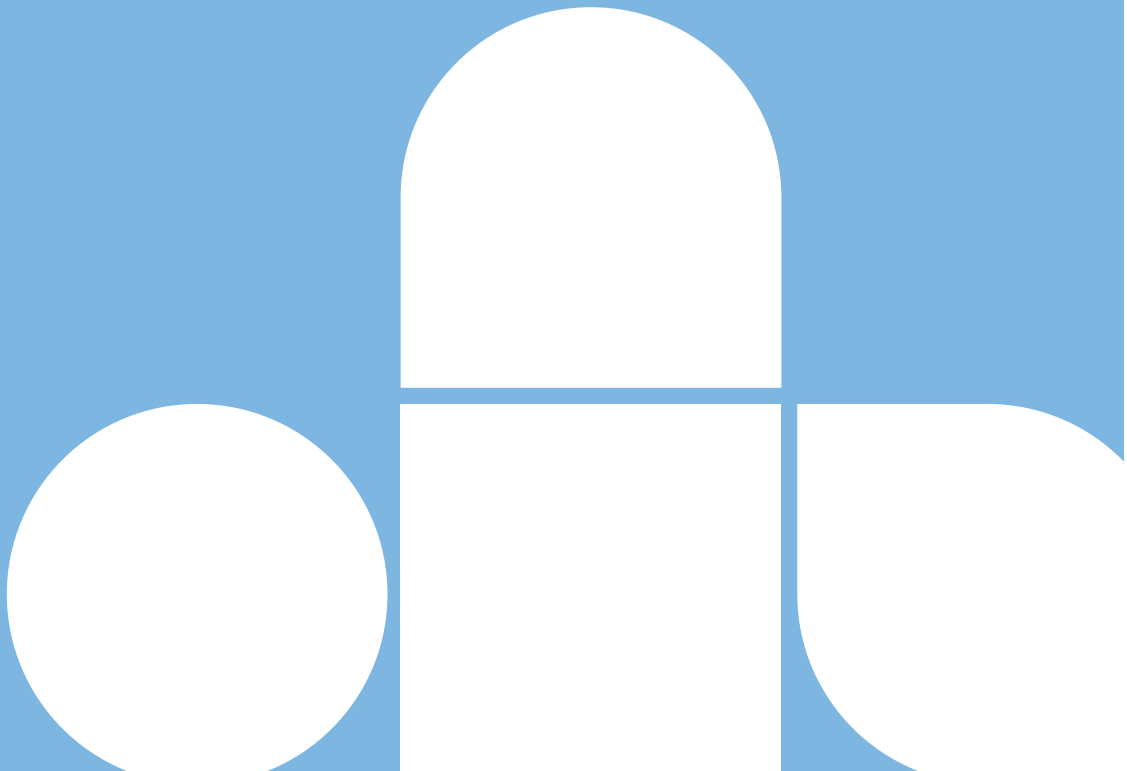
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