a new river innovation challenge

WATERFRONT TORONTO MARCH 01 2021

WATERFRONTtoronto

Toronto and Region Conservation Authority

RBC Foundation

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INTRODUCTION

Waterfront Toronto's Port Lands Flood Protection (PLFP) project will protect 240 hectares of downtown Toronto from flooding by transforming the existing mouth of the Don River into a natural and ecologically functioning river channel. Through this project, we will generate a wealth of data about the new river mouth and the natural systems that support it.

This challenge invites data scientists and designers to develop creative, compelling and innovative ways to interpret and communicate this scientific information to the public. Our intent is to leverage our partnerships and the data we generate to foster innovation in science communication. The outcome will be to stimulate interest and knowledge about how natural systems function, and the benefits they bring to urban systems; to share this information with the people who will use and enjoy the river valley; and to encourage stewardship of the river's water, wildlife and habitats.

Rendering looking south towards the future River Valley Park in the Port Lands.

BACKGROUND & CONTEXT

WATERFRONT TORONTO

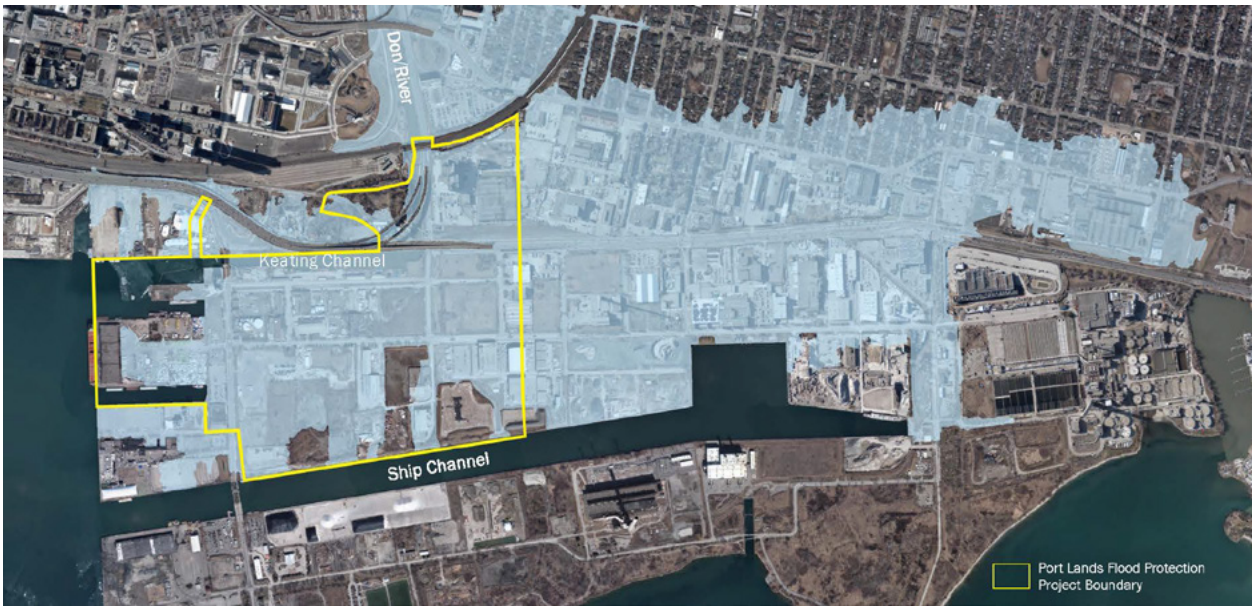
Waterfront Toronto was established by the Government of Canada, the Province of Ontario and the City of Toronto in 2001 to lead and oversee the renewal of Toronto's Waterfront. As public advocates and stewards of Toronto's waterfront revitalization, our mandate is to transform our city's waterfront by creating extraordinary new places to live, work, learn and play.

The Port Lands Flood Protection Project is the largest urban renewal project currently underway in North America and one of the largest waterfront redevelopment initiatives in the world. Waterfront Toronto is delivering a leading-edge city-building model that seeks to place Toronto at the forefront of global cities in the 21st century.

Waterfront Toronto's vision includes transforming the waterfront into beautiful and sustainable communities, fostering economic growth in innovation-based industries and ultimately redefining how Toronto, Ontario and Canada are perceived by the world. It is guided by our Resilience and Innovation Framework for Sustainability, which outlines a set of values to guide revitalization efforts:

- **Climate Positive:** Waterfront Toronto's projects and initiatives support the development of low carbon communities with an aspiration to reduce greenhouse gas emissions below zero.
- **Inclusive Resilience:** Toronto's waterfront is a dynamic, adaptive and flexible environment with the ability to respond to technical, social and environmental changes.
- **Intelligent & Connected:** Technologies are used to support community needs and improve quality of life.
- **Human Experience-Driven:** Waterfront communities are healthy, safe, just, active, multi-generational, human scale and accessible. Design excellence enriches the human experience.
- **Biophilic:** The waterfront is a place where people learn from and are inspired by nature.

Looking east during construction of the Keating Channel in 1914. Source: City of Toronto Archives



PLFP Project Boundary within Floodplain.

Construction at the Port Lands: Crews installing geosynthetic clay line. *Along with geomembrane and protective sand, the liner provides a barrier between the soil below the river and the river bottom finishes.*

Construction at the Port Lands: Welders working on the reclaimed metal girders from Marine Terminal 35. *The girders will be used as guard rails on the new bicycle bridges in the parks.*

Construction at the Port Lands: Several hundred species of plants will grow in the Port Lands in 2024. *These colourful wires repel geese and other birds from areas with tender new plants, in order to help them get established.*

PROJECT CONTEXT

For thousands of years, the mouth of the Don River was a fertile wetland, fishing ground and important gathering place for Indigenous people who lived in the region. In the early 1900s, Toronto filled in the wetland now known as the Port Lands to make space for growing industry—and redirected the Don River with an unnatural ninety-degree turn down the Keating Channel. At about 356 hectares (880 acres) this extensive, underutilized area on Toronto's eastern waterfront presents an unprecedented opportunity to revitalize this massive brownfield site into new communities on prime waterfront land. However, about 290 hectares (715 acres) of the area are currently at risk of flooding from the Don River watershed and as a result flood protection is required before any redevelopment can occur.

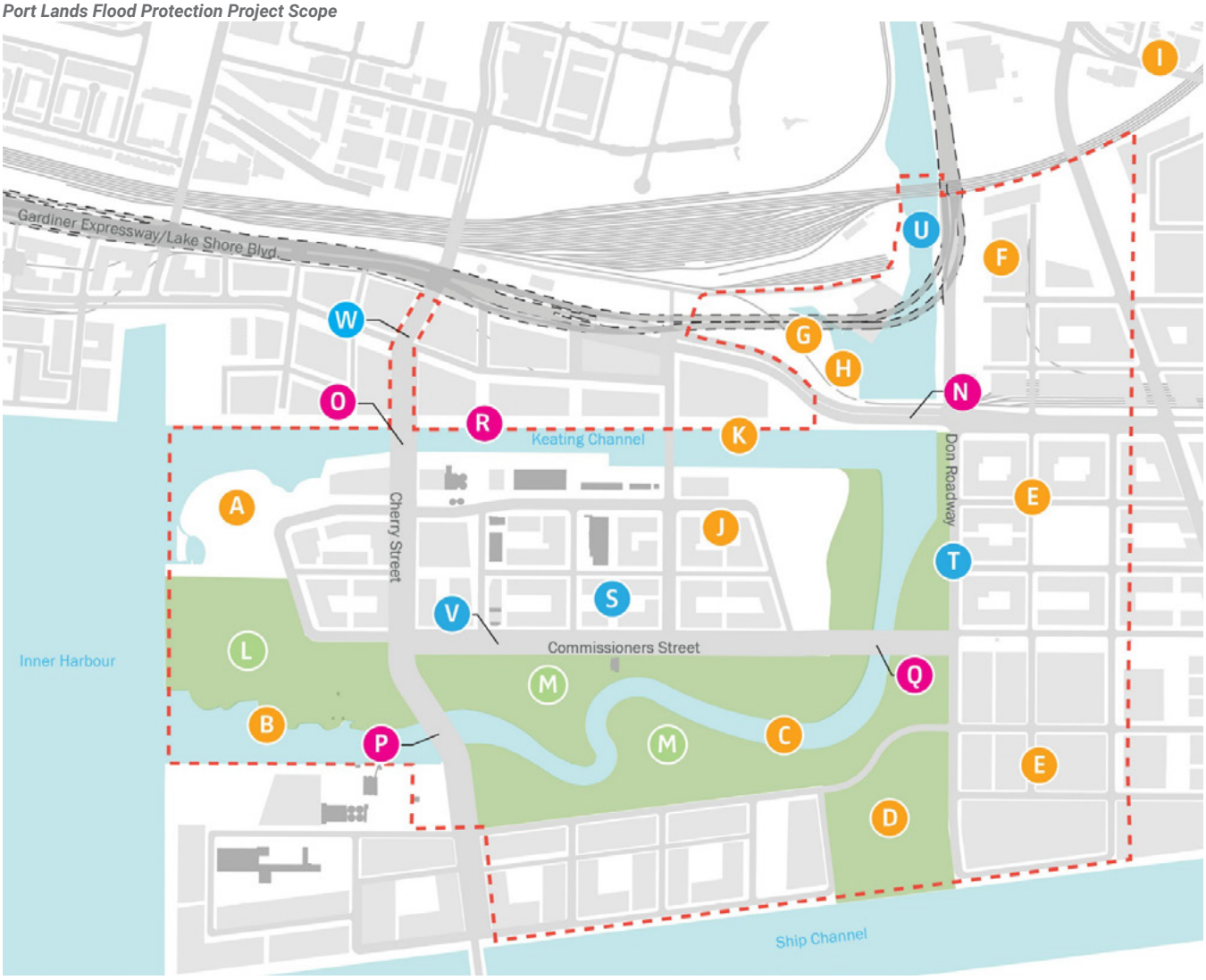
A new mouth for the Don River will be created by excavating a new channel, as well as a green spillway to help accommodate any overflow. PLFP will result in two new outlets for the river into Lake Ontario, new parks and green space along the river and inner harbour, four new bridges and new public roads throughout the area. It will also enhance habitat for natural species and will re-establish wetlands and aquatic habitat in the area, which provide social and environmental benefits and naturally moderate the effects of flooding and erosion.

In June 2017, the three levels of government announced $1.25 billion in funding for Waterfront Toronto to naturalize the mouth of the Don River, provide flood protection and lay the groundwork for new communities. Michael Van Valkenburgh and Associates (MVVA) has been retained as the lead designer for this project. Construction began in 2018 and will be complete in 2024.

For more detail about the Port Lands Flood Protection Project please visit: https://portlandsto.ca/

For more detail about the History of the Port Lands please visit: https://portlandsto.ca/history-of-the-port-lands/

Port Lands Flood Protection Project Scope



- A Cherry Street Stormwater and Lakefilling
- B Polson Slip Naturalization
- C Flood Protection - River Valley
- D Don Greenway (Spillway & Wetland)
- E Don Roadway Valley Wall Feature
- F East Harbour Flood Protection Land Form
- G Sediment and Debris Management Area
- H Flow Control Weirs
- I Eastern Avenue Flood Protection
- J Villiers Island Grading
- K Keating Channel Modifications
- L Promontory Park South
- M River Park
- N Lake Shore Road and Rail Bridge Modifications
- O Cherry Street Bridge North
- P Cherry Street Bridge South
- Q Commissioners Street Bridge
- R Old Cherry Street Bridge Demolition
- S Site Wide Municipal Infrastructure
- T Don Roadway
- U Hydro One Integration
- V Commissioners Street
- W Cherry Street Re-alignment

- Port Lands Flood Protection and Enabling Infrastructure Boundary
- Earthworks/Flood Protection
- Parks
- Bridges & Structures
- Roads and Municipal Infrastructure

CHALLENGE DESCRIPTION AND GOALS

CHALLENGE DESCRIPTION

As part of the Don Mouth Naturalization and Port Lands Flood Protection Environmental Assessment (a provincial assessment process to evaluate potential environmental effects ahead of major infrastructure projects), Waterfront Toronto along with Toronto Region Conservation Authority (TRCA) and its partners have been gathering scientific data to measure the performance of PLFP. A comprehensive monitoring program has been in place since the pre-design stage and will continue throughout construction and after the project has been completed.

Current monitoring objectives include data collected around the following categories (as laid out in the Environmental Assessment):

Biophysical Component	**Environmental Performance Monitoring Requirements**
Aquatic Habitat and Species	• Identify trends of aquatic habitat and species targets through post-establishment • Evaluate aquatic habitat and species against intended modelled outcomes and historical conditions
Wetland Function	• Evaluate wetland function against intended modelled outcomes
River Form and Function	• Observe impact of major flow events on river form and the effectiveness of river management features • Observe major flow events to evaluate effectiveness of flood protection measures
Terrestrial Habitat and Species	• Evaluate the trajectory of newly created terrestrial habitat against intended outcomes
Surface and Groundwater Quality	• Evaluate the effectiveness of on-site stormwater controls • Observe the effectiveness of contaminated groundwater isolation measures
Flow and Precipitation	• Document changes in flow and participation patterns over time to inform the need for management adjustments

For more details about the Environmental Assessment please visit: https://trca.ca/conservation/green-infrastructure/don-mouth-naturalization-port-lands-flood-protection-project/don-mouth-environmental-assessment/

Please see Appendix A for further details regarding the data collected as part of PLFP.

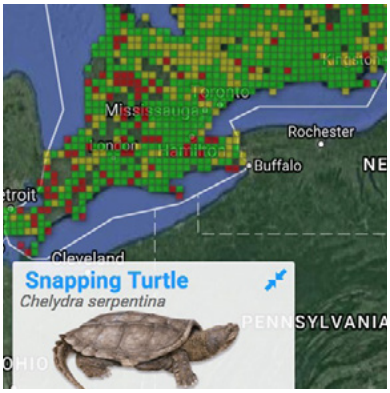
After its completion in 2024, PLFP will leave an engineered ecological system legacy to many generations of Torontonians. Lined with wetlands, aquatic habitat, and lush new parks, this infrastructure project will deliver:

- 1,000 m river channel
- 9.8 ha. of created wetlands
- 25 ha of publicly accessible greenspace
- 23.6 ha. of permanent and ephemeral fish habitat

Rendering looking north towards the future River Valley Park in the Port Lands.

Bumble Bee Watch App
Source: https://www.xerces.org/blog/citizen-science-is-wonderful-thing

SENTRY, a bio-electrode microbial activity and water quality monitoring platform.
Source: https://techhub.wwf.ca/innovator/real-time-bio-electrode-monitoring-of-water-environments/



Ontario Reptile and Amphibian Atlas
Source: https://appadvice.com/app/ontario-reptile-and-amphibian-atlas/1213924432

This challenge asks: How do we collect, interpret and share environmental data from these new ecosystems to educate visitors and motivate conservation behavior in the wider community?

Waterfront Toronto is inviting innovators to identify and/or originate new ways of creating wider public knowledge of conservation science generated by PLFP. The outcome could result in either a physical or a digital platform.

The submitted ideas should aim to collect, reveal and decode scientific data in compelling and appealing ways in order to educate citizens about nature and encourage stewardship and sustainable development. This can be done through innovations in environmental data collection platforms/methods/instruments as well as data interpretation and representation.

Who can participate?

This challenge encourages multi-disciplinary collaboration and is open to a wide variety of experts including designers, scientists, engineers, computer scientists and others from private, public or nonprofit sectors. We encourage corporate applicants to consider opportunities to include students or young professionals on their team.

Waterfront Toronto and TRCA staff are ineligible to participate. Individual or corporate applicants who have previously or are currently employed by Waterfront Toronto are invited to participate in this challenge however they are ineligible to receive prize money.

Waterfront Toronto is committed to representing the diversity of Toronto and encourages diverse and multidisciplinary teams.

COMPETITION GOALS

We are looking for ideas that support the following objectives:

1. **Contributes to the Scientific Body of Knowledge:** the design collects and conveys information in a way that contributes to the body of knowledge regarding urban natural environment systems.

2. **Promotes Environmental Stewardship:** the design supports individuals learning about the impact of their actions on the environment and promotes conservation behavior. Change theory is logical and well supported by research.

3. **Compelling Experience/ Design Excellence:** the user experience is of excellent graphical, interactive or physical quality and is engaging, persuasive and simple.

4. **Accessible:** the resulting platform is designed to be physically and digitally barrier-free. Designs are encouraged that, through new technologies or data collection/management/representation, will make the roads, parks, public spaces and neighbourhoods in the Port Lands more accessible to people of diverse mental and physical abilities.

5. **Data & privacy:** the submission considers how data is used, and (where the platform collects new data) how the data is made available for use by others. Where the design uses data about individuals or groups of people, any relevant privacy protections are explicitly described.

6. **Reduced Environmental Footprint:** designs incorporate sustainability considerations, including source of materials, energy use, and physical impact on environment.

7. **Feasible Implementation:** the design is technically feasible and reasonably implementable/scalable.

COMPETITION CATEGORIES

Designs and ideas can engage with one or more of the following areas of study:

A **Water –** flooding, hydrology, stormwater, water quality

B **Terrestrial ecosystem –** plants and animals above the water line

C **Aquatic ecosystem –** fish and plants under water

D **Environmental change –** lake levels, average temperature, etc

E **Human Ecology –** waste, transportation, carbon footprint, impact on the natural environment

DATA AND PRIVACY CONSIDERATIONS

Projects can leverage data from TRCA's data portal and potentially other third-party sources to generate ideas that can combine the physical environment with data that they generate to interpret and communicate scientific learnings to the public. Project teams will need to demonstrate their commitment to responsibly manage data through its lifecycle with security and privacy considerations addressed.

Appendix C provides detailed guidance on data and privacy considerations.

Waterfront Toronto collects information solely for the purposes of A New River Innovation Challenge. Any data and/or private information is collected, used and shared by Waterfront Toronto or their contest partners is in accordance with the Personal Information Protection and Electronic Documents Act, S.C. 2000, c. 5 (PIPEDA).

Rendering of the future wetlands at the Port Lands.

CHALLENGE TIMELINE

CHALLENGE KICKOFF

Challenge Brief is released on March 1st, 2021.

QUESTION DEADLINE

All questions to be submitted by 11:59pm on March 25, 2021 to innovationchallenge@waterfrontoronto.ca. Responses to all questions will be posted on the project website by April 9, 2021.

CHALLENGE DEADLINE

All submissions must be received by Waterfront Toronto by *11:59pm on May 2, 2021* through submission to innovationchallenge@waterfrontoronto.ca for consideration by our selection panel.

REVIEW AND SELECTION PROCESS

Submissions will be evaluated by a panel of expert judges who will select the top three submissions. Each team whose submission is selected will receive a **$10,000 award.**

The selection panel will identify one of the top three submissions to move forward with further development and potential integration in the PLFP project. **Waterfront Toronto will offer the selected design team an honorarium of $30,000 to further advance their design.**

Winners will be announced by end of May. Selected winners will be notified via email and will be announced on our website: https://portlandsto.ca/a-new-river-innovation-challenge/

DESIGN DEVELOPMENT

Waterfront Toronto staff and the selected winning team will work together to advance the winning design. Project team will be expected to present a progress update to Waterfront Toronto six months from the date the honorarium is awarded.

CHALLENGE SUBMISSION INSTRUCTIONS

SUBMISSION REQUIREMENTS

Please submit designs to innovationchallenge@waterfrontoronto.ca before 11:59pm on May 2, 2021. We cannot accept submissions after the deadline.

The email subject line should contain the following title: A New River Innovation Challenge Submission.

Please ensure that your submission includes all the items outlined under 'Submission Content', below. To facilitate evaluation, organize the content in your submission in the same order as they are outlined.

Successful submissions will receive a receipt message. If you do not receive this message, please reach out to innovationchallenge@waterfrontoronto.ca.

SUBMISSION FORMAT

Submissions should be a PDF formatted on 8.5" x 11" size paper and no longer than 20 pages, single-sided. In addition to the 20 pages, you may include appendices that may consist of CVs and promotional literature. Please use a font no smaller than 10-point.

SUBMISSION CONTENT

Aim to provide relevant, concise, and compelling information about the following:

1. Summary

Submit a one-page summary of the submission, including a name for your project.

2. Project Team

Submit materials that highlight the unique strengths, talents, and breadth of knowledge and experience of each team member. Submission must include:

- An outline of the proposed ***team structure,*** identifying the names of all participating team members and their specific roles. A team lead and contact information should be clearly identified.
- An organization chart illustrating the proposed ***roles and responsibilities*** of key team members working on the project.

Please identify if any team members are students on the chart.

- A brief description highlighting the ***qualifications and experience of the key team members.*** Curricula vitae indicating professional affiliations can be included as an appendix. If applicable, specify any team members that have previously or are currently under contract with Waterfront Toronto.

3. Project Description

Submit materials that provide a clear and concise overview of your proposal. Submission must include:

- A detailed ***approach and methodology*** and the audience that this project hopes to reach if the project is developed. Include the ***study subject*** and what kind of data set(s) will be analyzed or generated. Appendix A provides examples of the types of data that are currently collected as part of PLFP and could be leveraged for this project.
- A statement on how your proposal contributes to ***the scientific body of knowledge*** and ***environmental stewardship*** of the future new river and Port Lands area.
- A brief impact assessment of the ***environmental footprint*** of your proposed design.
- An overview of the ***accessibility principles*** included in your design and their implementation.
- Please describe if your submission falls in one or more of the competition categories listed on page 14.
- A section that explains the ***relationship of your project with the future landscape,*** river and parks.

We encourage teams to include images, diagrams, and precedents that might strengthen their submissions.

4. Data Privacy Statement

Submit a preliminary data management plan for your proposal. Submission must include:

- The ***ways in which any data being leveraged has been collected, stored and used*** in a manner compliant with the Personal Information Protection and Electronic Documents Act (PIPEDA) and other relevant municipal, provincial or

federal privacy regimes.

- *Types and methods of data collection, generation, analysis, storage, and transmission,* and plans for re-use, re-distribution, derivative production, archiving, and preservation that reflects the entire data lifecycle in project design.
- Efforts made to i*ntegrate security and privacy considerations into project design.*
- *Identification of risks* and development of appropriate mitigation strategies.

Waterfront Toronto values and respects your privacy. Any submissions and/or private information is collected, stored, used and shared by Waterfront Toronto or their contest partners is in accordance with the Personal Information Protection and Electronic Documents Act, S.C. 2000, c. 5 (PIPEDA). Any questions regarding the collection or use of information contact innovationchallenge@waterfrontoronto.ca.

5. Steps to Implementation and Schedule

Provide a description of the process and timing of bringing the proposed design to a final product. Submission must include:

- A timeline (a Gantt chart is not required but could be submitted).
- A description of each of the steps to implementation.

6. Cost Estimate

Include a high-level one-page estimate of the costs to develop the idea into a final product. The estimate should also allocate a percentage towards contingency.

Questions?

You can submit questions via email to innovationchallenge@waterfrontoronto.ca by March 25, 2021. We will publish all responses to the questions submitted to us on the project website by April 9, 2021.

Please refer to **Appendix B** to learn more about Contest Rules.

EVALUATION, SELECTION AND AWARD PROCESS

EVALUATION CRITERIA

The submissions will be evaluated according to the following criteria and associated weightings. Note that the criteria reflect the submission requirements set out on page 17– Submission Content.

EVALUATION CRITERIA	
Project Team	
• Team Structure (See Submission Requirements)	5 pts
• Team Qualifications (See Submission Requirements)	5 pts
Project Description	
• Approach and Methodology (See Submission Requirements)	10 pts
• Contributes to the Scientific Body of Knowledge (See Competition Goals)	5 pts
• Promotes Environmental Stewardship (See Competition Goals)	5 pts
• Compelling Experience, Excellent Design (See Competition Goals)	5 pts
• Accessible (See Competition Goals)	5 pts
• Data & Privacy Protections (See Competition Goals)	5 pts
• Reduced Environmental Footprint (See Competition Goals)	5 pts
Steps to Implementation and Cost	
• Feasible Implementation (See Competition Goals)	20 pts
• Costs Estimate (See Submission Requirements)	20 pts
Background and Context	
• Relationship to the future landscape, river and parks (See Background and Context)	10 pts
Total Score	**100 pts**

Waterfront Toronto and its partners look forward to receiving your ideas and thank you for your participation in the challenge.

CHALLENGE PARTNERS

TORONTO AND REGION CONSERVATION AUTHORITY

The Toronto and Region Conservation Authority (TRCA) works with its partners to ensure that Toronto and Region is built upon a natural foundation of healthy rivers and shorelines, greenspace and biodiversity, and sustainable communities. With more than 60 years of practical experience in protecting the environment, educating young people, and creating resilient communities, TRCA works with government, businesses, local organizations and individuals to build a greener, cleaner, healthier place to live.

TRCA is one of 36 conservation authorities in Ontario. Its jurisdiction includes Canada's largest urban centre, nine watersheds and the Lake Ontario shoreline from Mississauga to Ajax. Working with the regional municipalities of York, Durham, Peel, the City of Toronto, TRCA protects and restores the natural environment and the fundamental ecological services that our environment provides.

RBC TECH FOR NATURE GRANT

This competition is made possible through RBC's Tech for Nature Grant Program. The Tech for Nature Grant Program brings together charitable organizations and technology experts to build multi-partner coalitions to address and help solve our shared environmental challenges.