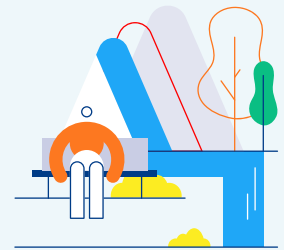


Mitigating urban floods with Nature-based Solutions



▶ Innovating with green infrastructure to address climate risks

Cities are leaders and innovators when it comes to utilizing Nature-based Solutions (NBS) to manage risks from extreme rainfall, surface water flooding, shortages, and water quality. In addition, cities adopting these solutions seek benefits on multiple fronts, such as improving quality of life in neighbourhoods lacking natural elements, diversifying landscapes, and providing recreational opportunities. There are varying experiences of how cities are integrating NBS to mitigate flooding risks, experimenting with different techniques, and involving communities to design, implement, and maintain the infrastructure. Peer networks for NBS, strong policy frameworks, and guidelines are helping to advance these practices.

The European Union has adopted robust policy frameworks to guide climate adaptation and Nature-based Solutions, such as the [EU Adaptation Strategy](#), the [EU Biodiversity Strategy for 2030](#), and the [European Green Deal](#). EU initiatives, such as [Horizon Europe](#) pilot projects, [NetworkNature](#), the New [European Bauhaus](#), the [EU Green Infrastructure Strategy](#), and the new [Urban Agenda for the EU](#), are helping cities across Europe and internationally to test, scale up, and mainstream NBS. International cooperation and knowledge sharing through the IURC North America programme promote innovations and the implementation of a range of best practices to improve community resilience.

Boston leads the way with a Street Green Infrastructure Policy

Boston's implementation of green infrastructure is a comprehensive set of measures that begins with clear policy requirements, includes science-based designs, the selection of competent expertise and contractors for project designs and construction, community involvement in implementation, and maintenance and monitoring approaches that integrate community volunteers. Their approach is driven by three key goals: (1) Revenue generation; (2) assistance from the public; and (3) municipality-wide behaviour change. For the city, NBS also supports equity and environmental justice goals by prioritizing neighbourhoods that have been historically underserved by green infrastructure. Their [Street Green Infrastructure Policy](#) integrates stormwater management into public works and planning. Financing is secured through a **stormwater fee system**, supported by a **credit and grant program** to incentivize private property owners. The Boston Water and Sewer Commission issues permits with specific technical requirements and compliance with the Massachusetts Wetlands Regulations ([Stormwater Handbook](#)).

Key Lesson: Managing stormwater is expensive. Stormwater Utilities creates a designated funding source that ensures better stormwater management and more green infrastructure by employing a 'carrot' and 'stick' approach.



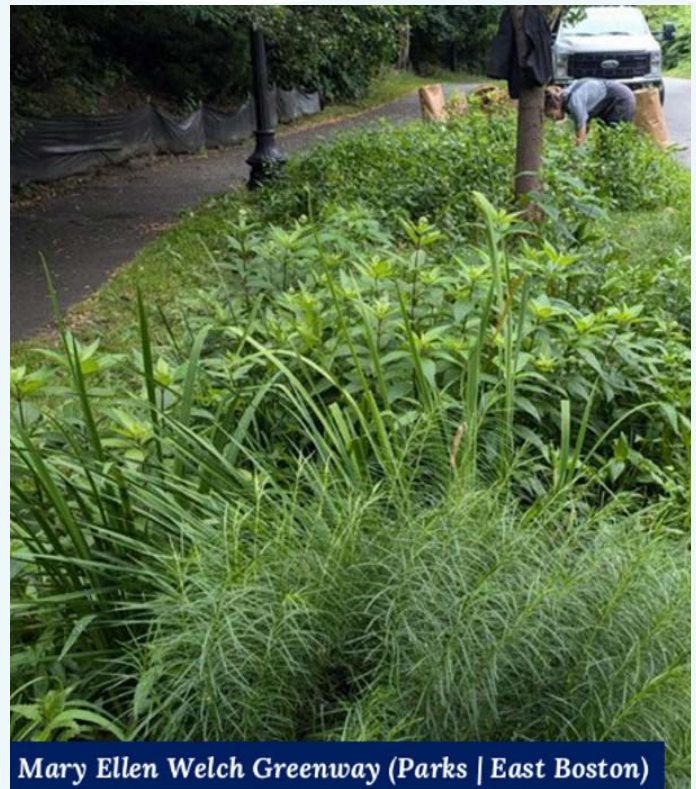
Figure 1. East Boston Early Education Center in Kate England's presentation from the IURC NA webinar *Mitigating Urban Floods with Nature-based Solutions*

Maintenance is addressed through dedicated contracts for landscape and porous paving, highlighting that green infrastructure also requires consistent and specialized care. However, **community engagement** is central to the approach. The Green Infrastructure Volunteer Program is a city-sponsored program, with City-branded gear, tools, and supplies. Volunteers receive maintenance training and resources from the City's Office of Green Infrastructure, enabling them to perform cleanup and beautification tasks on their own schedule. Programs like **"Thursdays with PowerCorps"** build green jobs while ensuring long-term maintenance. A digital application is also used for volunteers to report their observations by uploading photos and actions performed at the site. This is an integral part of the city's monitoring system, ensuring strategic and efficient use of resources.



Mary Ellen Welch Greenway (Parks | East Boston)

Figure 2. Mary Ellen Welch Greenway in Kate England's presentation from the IURC NA webinar *Mitigating Urban Floods with Nature-based Solutions*



Mary Ellen Welch Greenway (Parks | East Boston)

Figure 3. Mary Ellen Welch Greenway in Kate England's presentation from the IURC NA webinar *Mitigating Urban Floods with Nature-based Solutions*

Key Lesson: Integrate and support volunteers as part of your system and provide a variety of tools, opportunities, and support programs to maintain their engagement and sense of ownership.

► Calgary integrates nature-based solutions in its Stormwater Strategy

Calgary is a large city located at the confluence of two small rivers: the Bow and the Elbow Rivers. Wetlands historically provided natural flood control, but the vast majority have been lost to urbanization. Their 2023 Stormwater Strategy incorporates green stormwater infrastructure, aiming to mitigate the risks associated with high-intensity summer storms and prevent discharges to rivers and creeks that support sensitive aquatic ecosystems. The

implementation of various techniques, such as naturalized wet ponds, constructed wetlands, bioretention, and resilient landscaping, aims to reduce flooding, improve water quality, and enhance watershed health. Calgary's approach to stormwater sets the long-term direction for proactive and collaborative stormwater management actions; they publish useful resources for homeowners as well as regulatory requirements and, the stormwater plan and budget.

Dale Hodges Park is a large project that integrates art, ecology, and engineering by transforming a gravel pit into a stormwater treatment park featuring wetlands, a forebay, and multi-use trails. It treats an impressive 1,800 hectares of neighbourhood runoff before it enters the Bow River.



Figure 4. Calgary's Dale Hodges Park in Brier Reid's presentation from the IURC NA webinar *Mitigating Urban Floods with Nature-based Solutions*.

An interesting aspect of their approach is how they are looking to measure performance of the green infrastructure through targets adapted to climate change, including: peak flow rate, annual volume control, and water quality.

Key Lessons:

- Policies require developers to maintain **pre-development release rates**, ensuring construction does not worsen flood risk.
- **Wetlands are both ecological and social assets**, embedded within stormwater planning and asset management systems.
- **Indigenous communities** were acknowledged in the Strategy, embedding cultural reconciliation into environmental planning.
- **Sediment removal and long-term wetland maintenance** are important for dynamic systems stewardship.
- **Governance innovation** is necessary: some NBS are maintained by city services, while others are entrusted to **neighbourhood volunteer programs**, supported by mobile apps and guidance.

► The City Blues Project tests solutions in five countries bordering the Baltic Sea to guide cities



This unique project brought together five cities from Finland, Sweden, Estonia, Denmark and Norway to pilot different NBS that prevent flooding and make cities more liveable by bringing back nature into the city. The project's results and lessons are well documented and available on the [project's website](#) under the Solutions tab. They will be integrated into a web-based tool to assist cities in engaging stakeholders and managing stormwater through NBS.

The Tampere (Finland) project aimed to reduce flooding near Lake Iides, increase biodiversity and reduce invasive species, enable reproduction of the endangered brown trout, and create recreational value for residents. The project relied on studies and modelling to assess the impact of the proposed design, collaboration with the Finnish Wild Zone group, and voluntary events

Figure 5. Alluvial Meadow in Anna Vilhula's presentation from the IURC NA webinar, *Mitigating Urban Floods with Nature-based Solutions*.

to assist with the planting of seedlings and the construction of spawning beds. A combination of a vortex pond, a dam, and alluvial meadows was selected for the site. Adequate space was available to construct an alluvial meadow offering multiple benefits.

Key Lessons:

- Nature-based Solutions are **site-specific**.
- **Stakeholder involvement is necessary**, requiring involvement at the beginning of the planning process to inform designers and do outreach through community associations.
- **Plans** benefit from diverse expertise, high-quality data, and flexibility.
- While the previous experience of contractors is desirable, **construction** requires daily on-site presence and suitable and well-adapted equipment for the site.

► Takeaways from the innovations and best practices presented:

1. **Integration into policy and regulations:** NBS are no longer pilots but institutionalised through policies (Boston's green infrastructure policy, Calgary's stormwater strategy, Tampere's procurement framework).
2. **Community engagement as a driver of success:** Across all cases, **citizen participation** — from design to maintenance — ensures legitimacy, ownership, and long-term effectiveness.
3. **Financing mechanisms:** Dedicated stormwater fees, credit programs, and city-grants are crucial for scaling NBS and incentivizing private participation.
4. **Circularity and maintenance:** NBS are framed as **living systems**, requiring cycles of care, sediment removal, and vegetation renewal. Circular practices guarantee infrastructure durability.
5. **Equity and inclusion:** Whether through contracting with minority-owned businesses (Boston), Indigenous recognition (Calgary), or citizen co-decision processes (Tampere), NBS are used as tools for **justice and inclusion**.
6. **Innovation and transferability:** Modelling tools, apps, and metrics highlight the role of **data-driven innovation** in making NBS replicable across various contexts.

This factsheet was based on the webinar Mitigating Urban Flooding through Nature-based Solutions featuring **Kate England**, Massachusetts Department of Environment (USA); **Brier Reid**, Climate and Environment Department, City of Calgary (Canada); and **Anna Vilhula**, City Blues Project and City of Tampere, (Finland).



'This factsheet was produced with the financial support of the European Union. Its contents are the sole responsibility of ICF S.A. and do not necessarily reflect the views of the European Union'

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