SESSION 1

Mitigating Urban Floods with Nature-based Solutions

Green Infrastructure Innovations Making a Difference

IURC
INTERNATIONAL URBAN AND REGIONAL COOPERATION

Funded by the European Union

10th of Sept 2025

10h - 11h EST / 16h - 17h CET

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Department of Environmental Protection
Massachusetts, USA

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City of Tampere, Finland (EU)

Brier Reid

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City of Calgary, Canada

Jacinthe Séguin

Moderator - IURC-NA
Nature-based Solutions and Circular Economy Expert

Agenda

Welcome and Opening_

Stephanie ROSSKOPF, Policy Officer at the EU Delegation to Canada, EEAS Ottawa.

Presentation 1:

Mitigating Urban Floods with Nature-based solutions

Kate ENGLAND

Presentation 2:

Stormwater and Nature-Based solutions in Calgary

Brier REID

Presentation 3:

Testing nature-based solutions in the City Blues Project

Anna VILHULA & Johanna VANNES

Questions & Answers

Moderator: Jacinthe SÉGUIN – IURC NA SUMT Expert.

Mitigating Urban Floods with Nature-based solutions

KATE ENGLAND

Deputy Assistant Commissioner

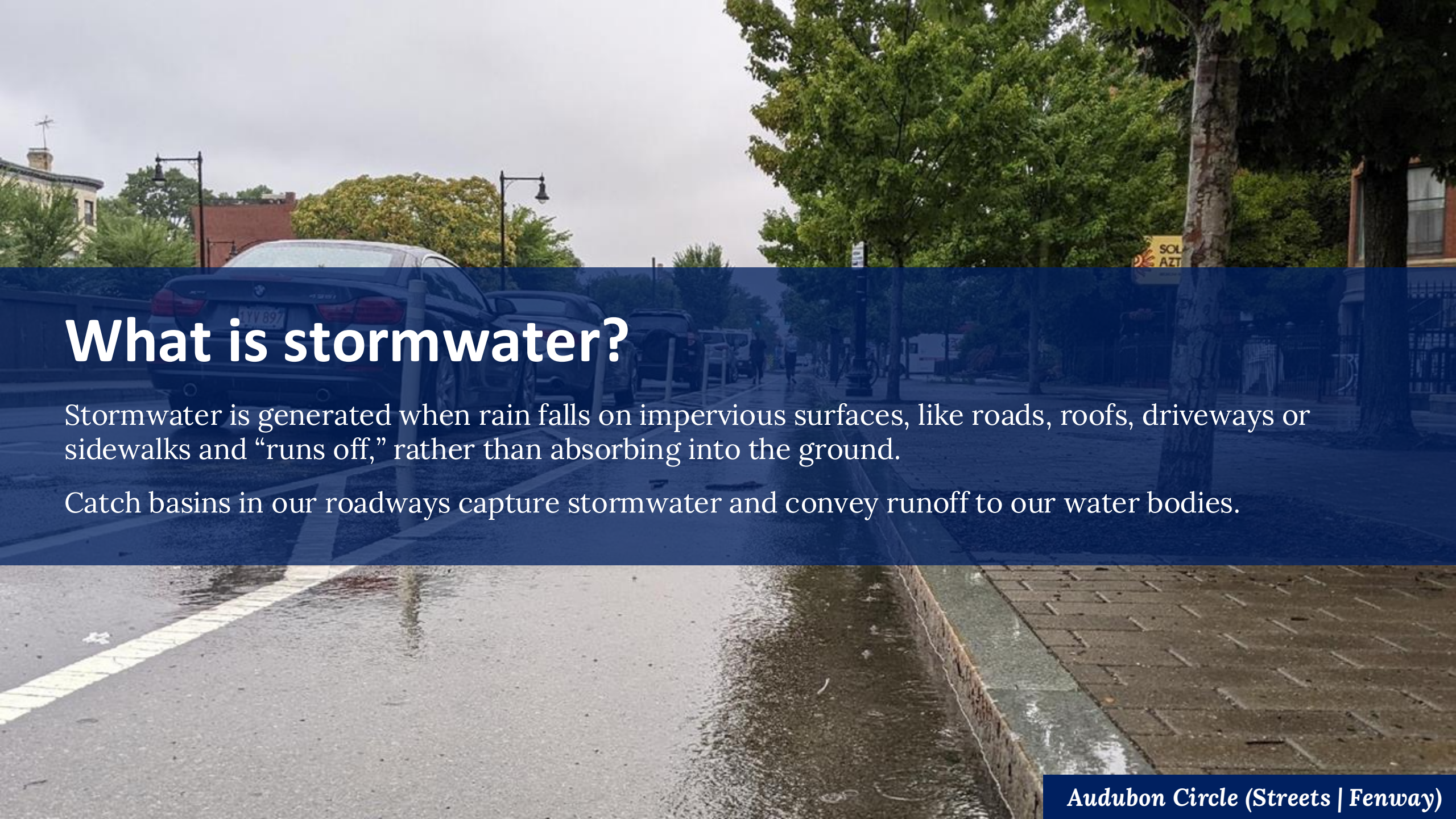
Department of Environmental Protection

Massachusetts, USA

Mitigating Urban Floods with Nature-based Solutions

Kate England, MassDEP Deputy Assistant Commissioner

September 10, 2025



What is stormwater?

Stormwater is generated when rain falls on impervious surfaces, like roads, roofs, driveways or sidewalks and “runs off,” rather than absorbing into the ground.

Catch basins in our roadways capture stormwater and convey runoff to our water bodies.

Audubon Circle (Streets | Fenway)

Stormwater

Quality

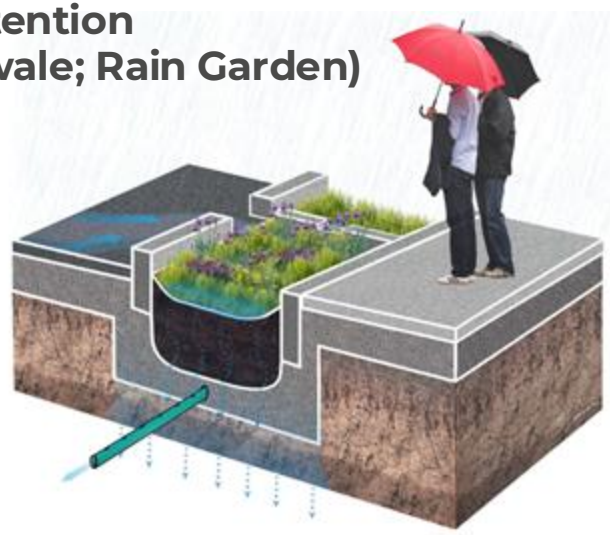
- As stormwater travels along hard, impervious surfaces, it picks up pollutants and litter along the way.
- Storm drains then release pollutant laden stormwater into receiving waters, which creates impaired water bodies, damages ecosystems and closes beaches.

Quantity

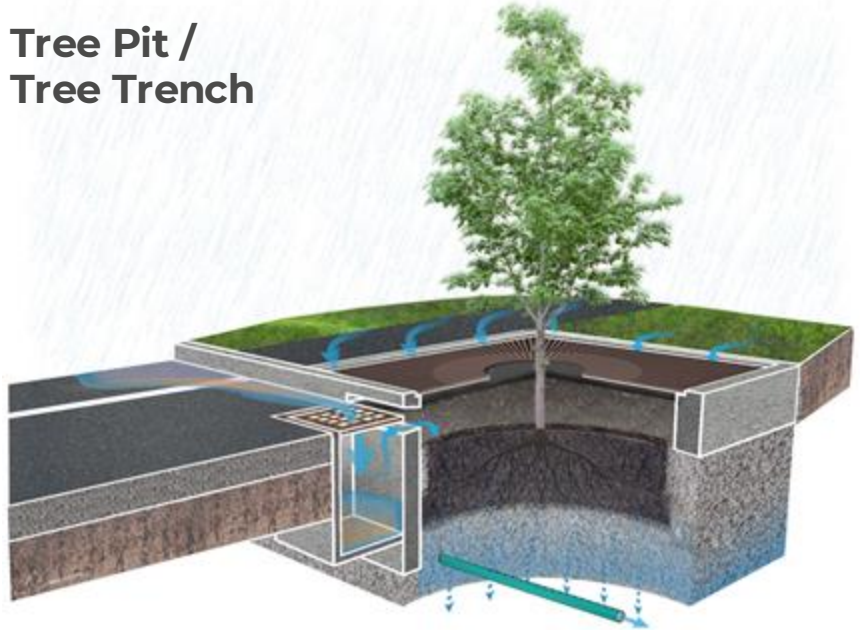
- During “typical” storm events, stormwater is largely captured and conveyed by storm drains.
- During large storm events, the storm drain system can become overwhelmed and outfalls can be blocked by storm surge and higher than normal tides, resulting in stormwater flooding.

Green Infrastructure ("GI") uses plants, soil and other natural materials to mimic or restore the natural water cycle. GI can capture, purify, store and infiltrate stormwater back into the ground.

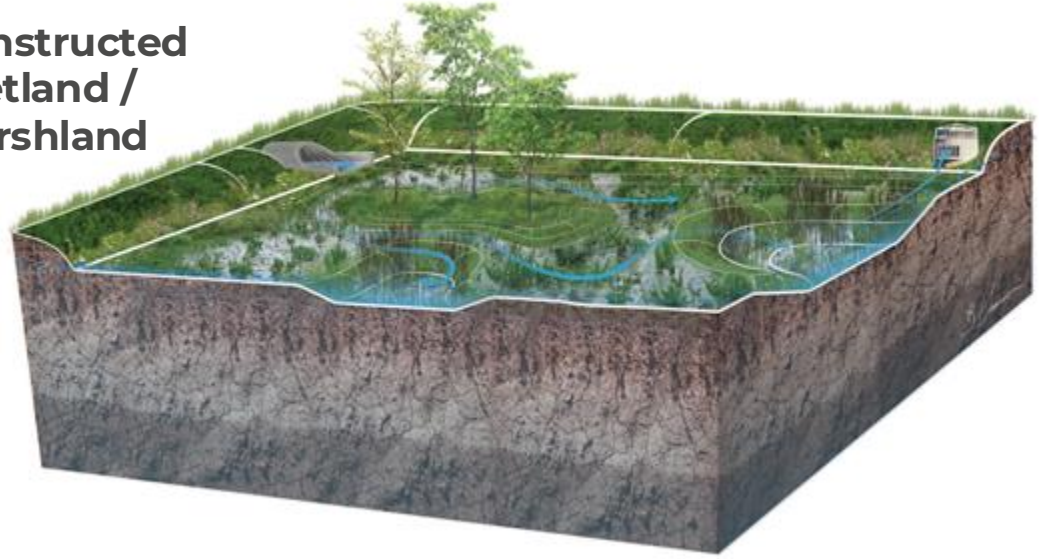
Bioretention (Bioswale; Rain Garden)



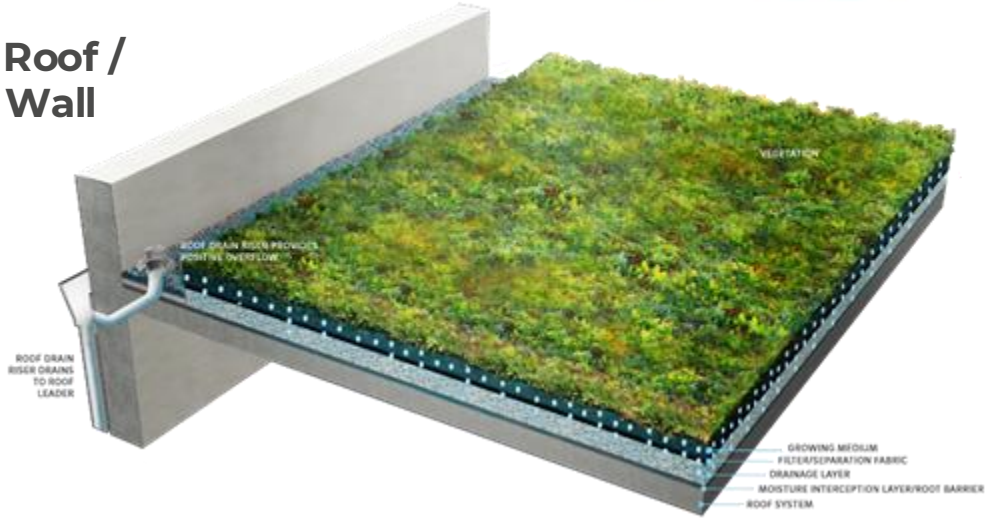
Tree Pit / Tree Trench



Constructed Wetland / Marshland



Green Roof / Living Wall



Policies & Regulations

Bioswale (Nubian Square |

Rafael Hernandez K-8 Dual Language School (BPS | Roxbury)

- **City of Boston Streets GI Policy**
  - All projects that impact “Streets” (e.g. ROW, Parking Lots, etc.) must incorporate GI (sized for design storms)
- **Boston Water and Sewer Commission (BWSC) Site Plan Review Requirements**
  - All projects that must obtain a BWSC permit must infiltrate a volume of runoff equal to 1” of rainfall times the total sqft of impervious surface (1.5" in GCOD)
- **Massachusetts Wetlands Regulations**
  - Projects subject to the state’s wetlands regulations must comply with the Massachusetts Stormwater Handbook

Maintenance

Peabody Square (Streets/Parks | Dorchester)

Maintenance | Contracts

Mary Ellen Welch Greenway (Parks | East Boston)

- Two (2) contracts:
  - Landscape Maintenance
  - Porous Paving Maintenance
- Procure contracts using methods other than standard “low bid” (e.g. Request for Proposal)
- City Certified Businesses (three (3) quotes, $250k)

Maintenance | Thursdays with PowerCorps

- Urban Greening program track participants
- Remove weeds, leaf litter and debris, as well as install vegetation, prune, etc.
- National Green Infrastructure Certification Program (NGICP) Training

Harambee Park (Parks | Dorchester)

Maintenance | Green Infrastructure Volunteer Program (GIVP)

Mary Ellen Welch Greenway (Parks | East Boston)

"The GI Volunteer Program (GIVP) is a City-sponsored program, with City-branded gear, tools and supplies."

Volunteers receive GI maintenance training and resources from the City's Office of Green Infrastructure so that they can perform cleanup and beautification tasks on their own schedule

Engaging Community

Franklin Field (BHA | Dorchester)

East Boston Early Education Center

Early Education Center (Schools | East

Early Education Center (BPS | East Boston)

Stormwater Utilities (Fees)

Audubon Circle (Streets | Fenway)

Why Establish a Stormwater Utility (Fee)?

- Managing stormwater is expensive - Stormwater Utilities create a designated funding source that ensures better stormwater management - and more GI!
- Funds for stormwater management often come from less predictible and equitable sources:
  - *General Fund (taxes)*: very competitive, hard to compete with schools and emergency services
  - *Sewer Fee*: properties that use more water/sewer disproportionately bear the burden
- Stormwater Utilities incentivize GI and increase implementation by employing both a "carrot" and "stick" approach

Elements of Stormwater Utilities

Stormwater Utilities typically have three parts: Stormwater Fees, Credit Programs and Grant Programs

- **Stormwater Fee**
  - Fees, similar to water and sewer fees, that provide revenue for stormwater management
- **Credit Program**
  - Property owners can apply for “credits” to reduce fees
  - Credits can include: green infrastructure feature on site, impervious area reduction, public education, etc.
- **Grant Program**
  - Allows property owners to apply for grant funds to construct GI on their property
  - Then apply for a credit to reduce their fee!

Harambee Park (Parks | Dorchester)

Basis for Stormwater Utility

Depending on your Enabling Legislation, Stormwater Fees can be assessed in several ways:

- **Based on impervious cover *(most common)***
  - Equivalent Residential Unit
  - Fee per square foot
  - Tiered
- **Based on land use type**
  - Uses methodology similar to TMDLs
  - Often used in county or watershed-based utilities
- **Based on volume contribution to a combined sewer**
  - Metered “sewer” flows, less water usage
  - Particularly valuable where CSOs are an issue

Nubian Square (Streets | Roxbury)

What Are Your Goals?

Goals should determine the structure of the utility:

- **Revenue Generation**
  - Ample and defensible rate structure
  - Clearly articulated penalties for non-payment (& buffer)
- **Assistance from the Public**
  - Easily navigated Credit Program
  - Rates high enough to make applying for credits appealing to property owners
- **Municipality-Wide Behavior Change Around GI**
  - Generous Credit and Grant Programs
  - Resources and application support

Seaport Boulevard (Seaport)

Thank You!

Kate England
Deputy Assistant Commissioner
Massachusetts Department of Environmental Protection
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Central Square (Streets & Parks | East Boston)

Stormwater and Nature-Based solutions in Calgary

BRIER REID

Water Resources Engineer

Environmental Analysis – Climate

City of Calgary, Canada

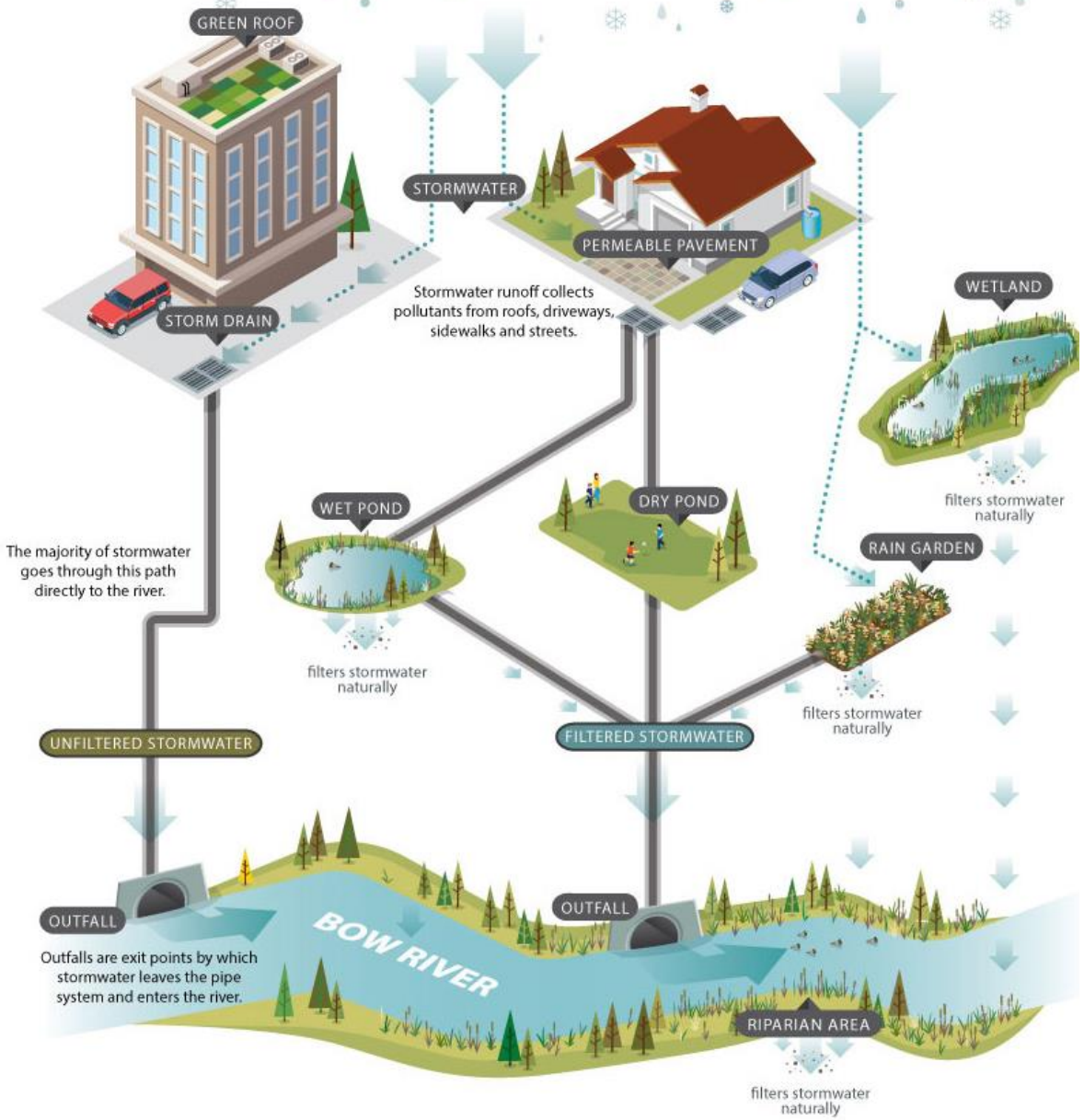
Stormwater and Nature-Based Solutions in Calgary

September 10, 2025

International Urban and Regional Cooperation (IURC)

LAND ACKNOWLEGEMENT

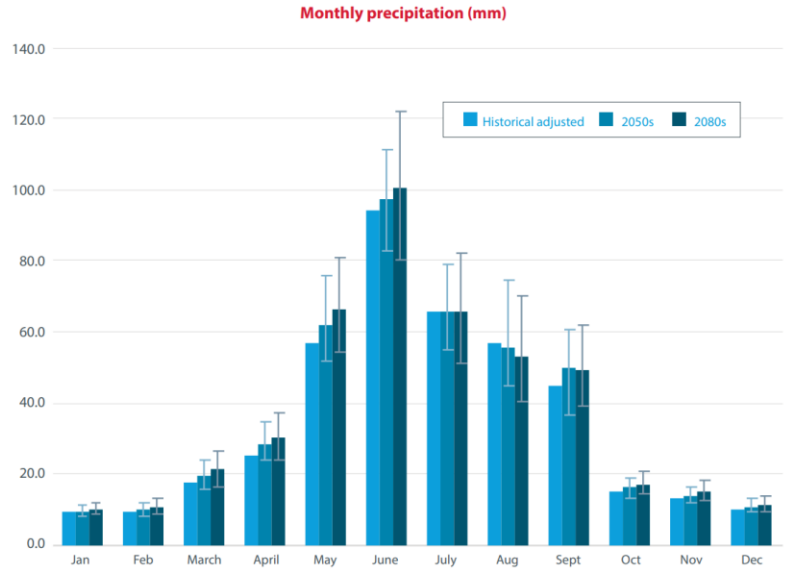
A “Big” City on a Small River

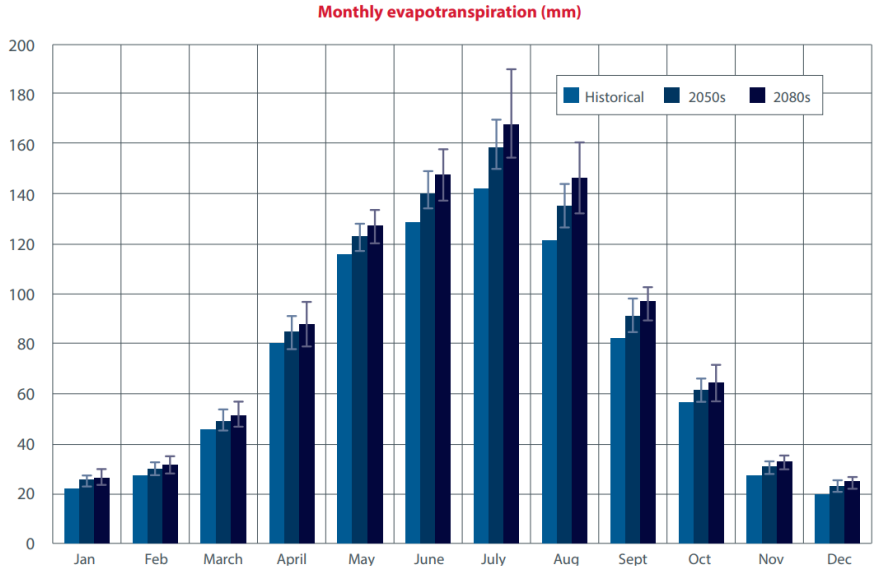


- Confluence of the Bow and Elbow Rivers
- Prairie Pothole Wetlands
- Semi-Arid Climate
- High-intensity short duration summer storms
- Discharges to Rivers and Creek that have sensitive aquatic ecosystems
- Stormwater Strategy
- Green Stormwater Infrastructure

Calgary's Climate and Rainfall Patterns

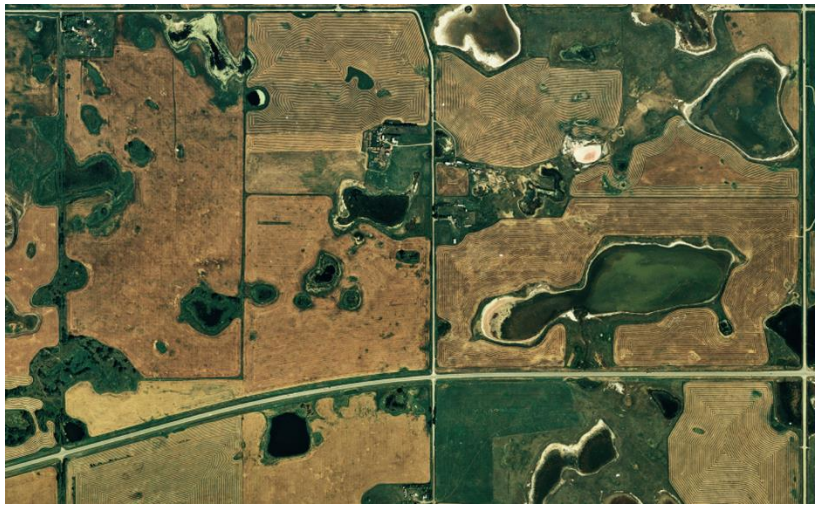
- Semi-arid climate with an evaporative regime. Evaporative losses exceed precipitation.
- Rainfall is concentrated between May and September.
- Evapotranspiration and drought projections increasing with climate change.

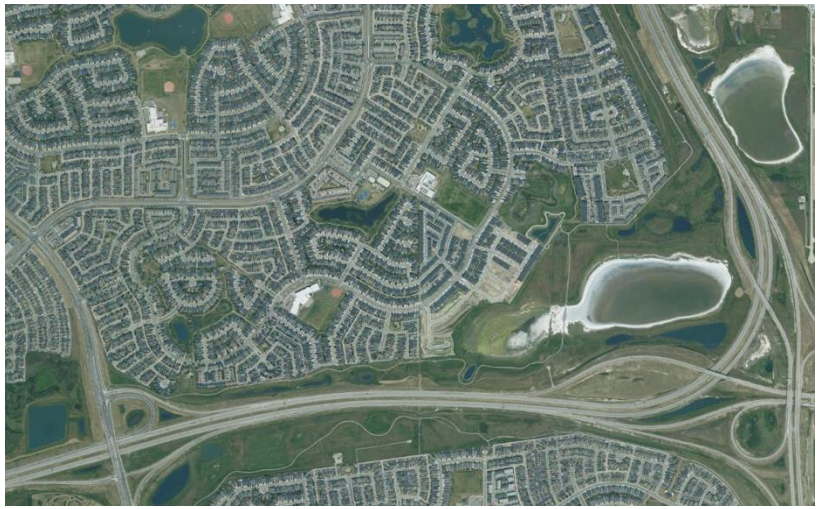




Nature-Based Solutions (NBS)

- Wetlands historically provided natural flood control.
- 90% of Calgary's pre-urbanization wetlands have been lost
- Stormwater systems are designed with a designated "adequate outlet"
- Pre-Development rate and average annual volume





Nature-Based Solutions (NBS)

- naturalized wet ponds,
- constructed wetlands,
- bioretention and
- resilient landscaping.

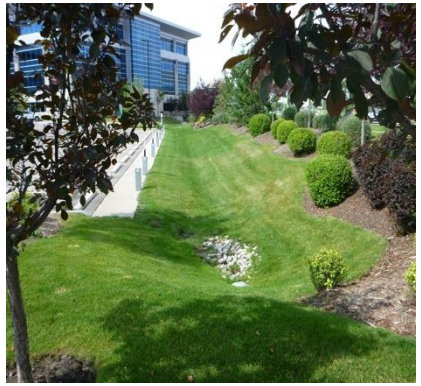
Calgary Stormwater Management Strategy (2023)

- Vision: Healthy, resilient communities and waterbodies.
- Goals: Reduce flooding, improve water quality, and enhance watershed health.

CS1. Making established communities more resilient

CS2. Proactively managing and maintaining our assets

CS3. Improving the toolbox (LID/GSI)



CS4. Setting stormwater performance measures

Case Study – Dale Hodges Park

- Transformation of a gravel pit into a stormwater treatment park.
- Features: Nautilus forebay, stormwater wetlands, multi-use trails.
- Treats 1,800 hectares of Calgary's neighbourhood runoff before it enters the Bow River.
- Integration of art, ecology, and engineering

Testing nature-based solutions in the City Blues project

ANNA VILHULA & JOHANNA VANNES

Project Manager

Baltic Region – City Blues Project

City of Tampere, Finland

Interreg
Baltic Sea Region

Co-funded by
the European Union

SUSTAINABLE WATERS
City Blues

Testing nature-based solutions in the City Blues project

Project Managers Anna Vilhula & Johanna Vannes | 10 September 2025

interreg-baltic.eu/project/city-blues

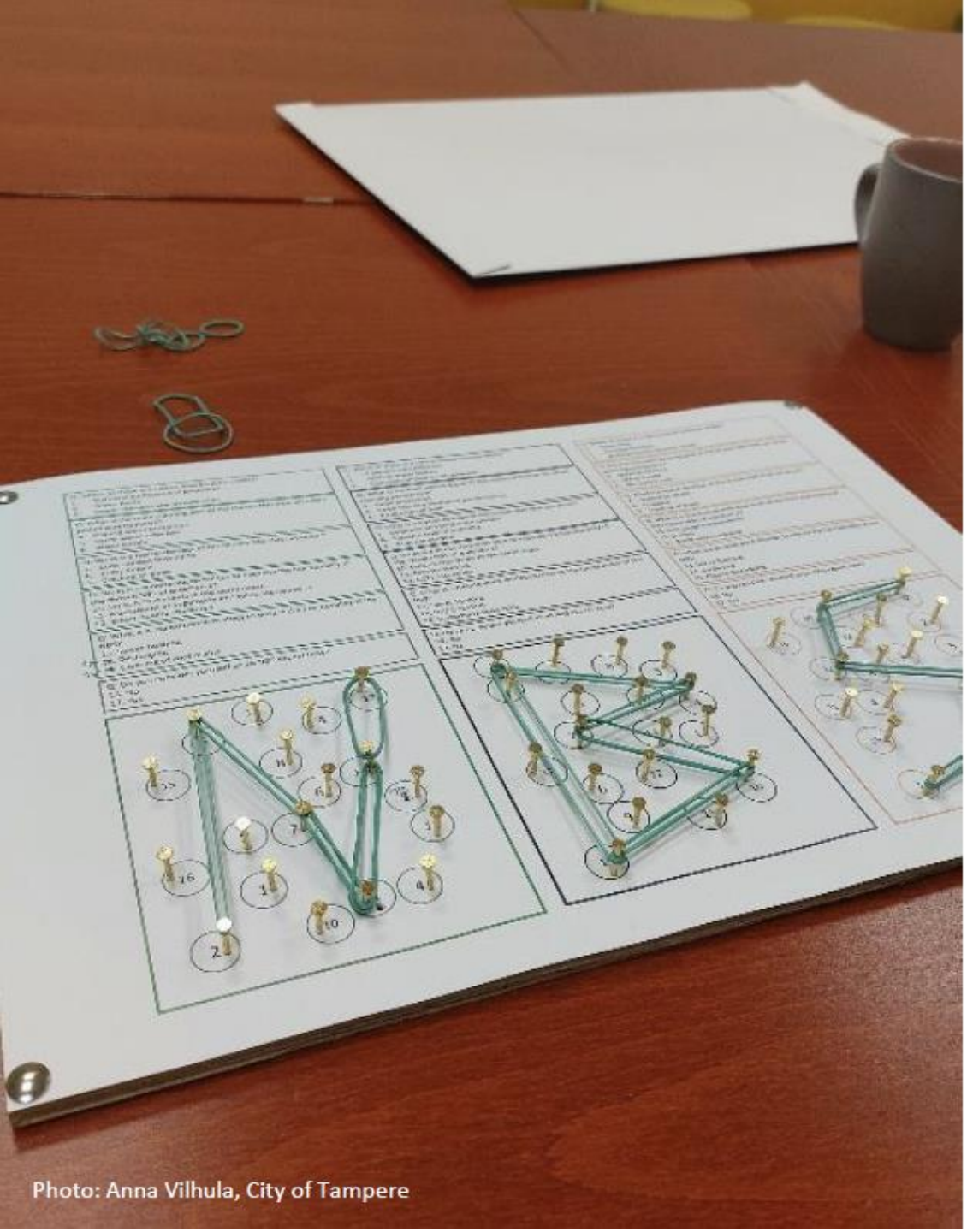


Photo: Anna Vilhula, City of Tampere

Project goals

- **Prevent flooding** and negative effects of climate change.
- Make our cities **more pleasant places** to live in by bringing nature back into the city.
- Develop a **web-based tool for cities** on involving stakeholders and managing stormwater through nature-based solutions (NBS).

NBS model builds a path towards water sensitive cities

- Created through pilots and workshops
- 1st draft published: nbsmodel.eu
- Final version will contain guidelines, recommendations, case descriptions and a self-assessment tool

Pilots

Aarhus (DK) is re-opening and restorating two streams

Malmö (SE) creates a development plan for the catchment of Risberga stream

Tartu (EE) is building flood derivation cascade to support biodiversity with wetlands

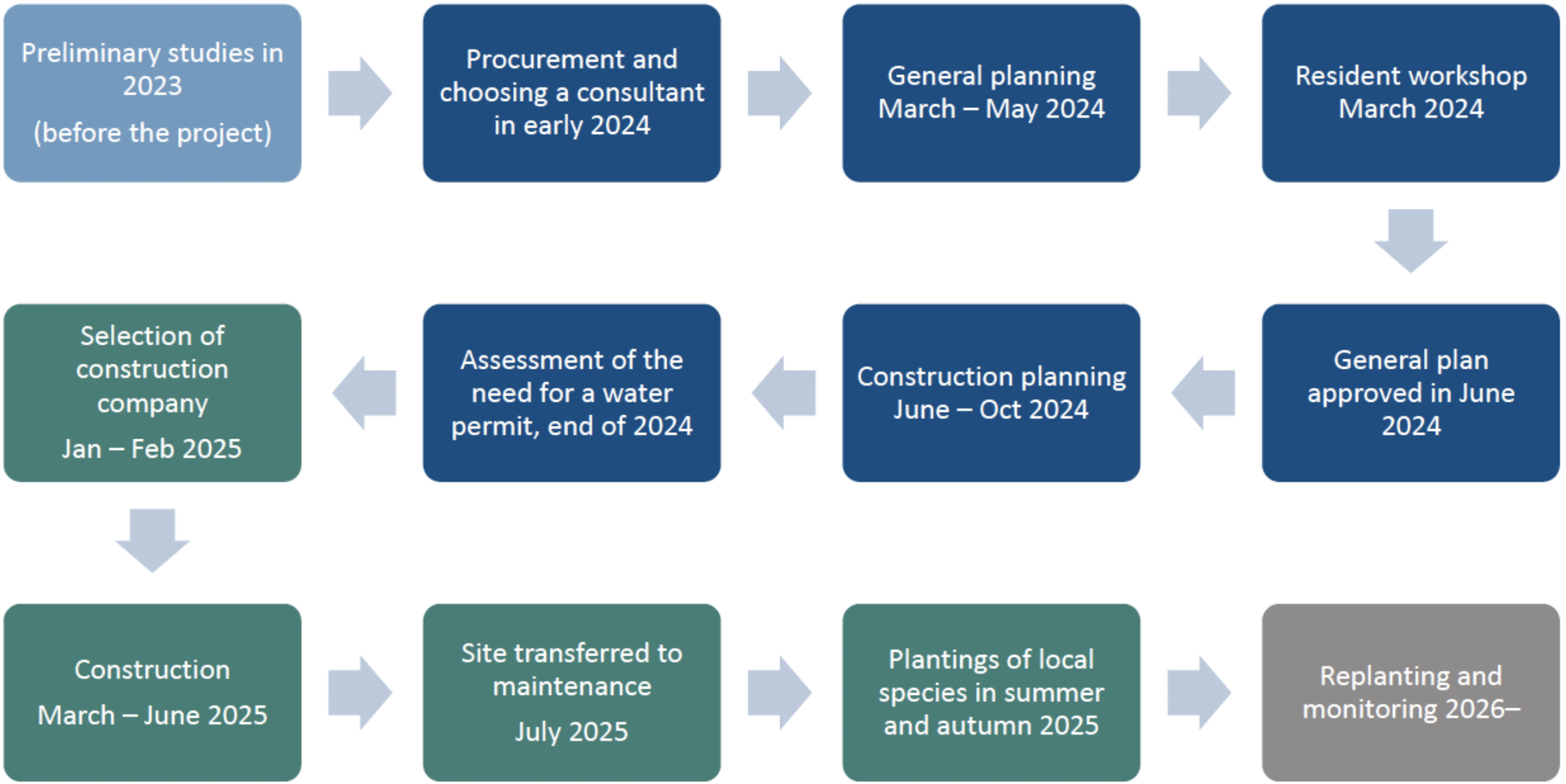
Tampere (FI) creates new alluvial meadows in a park near old residential area

Stavanger (NO) is renovating urban square and managing stormwater through rain beds

Goals of the Tampere pilot

- Less flooding near Lake Iides
- Increased biodiversity
- Less invasive alien species
- Enabling natural reproduction of highly endangered brown trout
- Improved recreational value

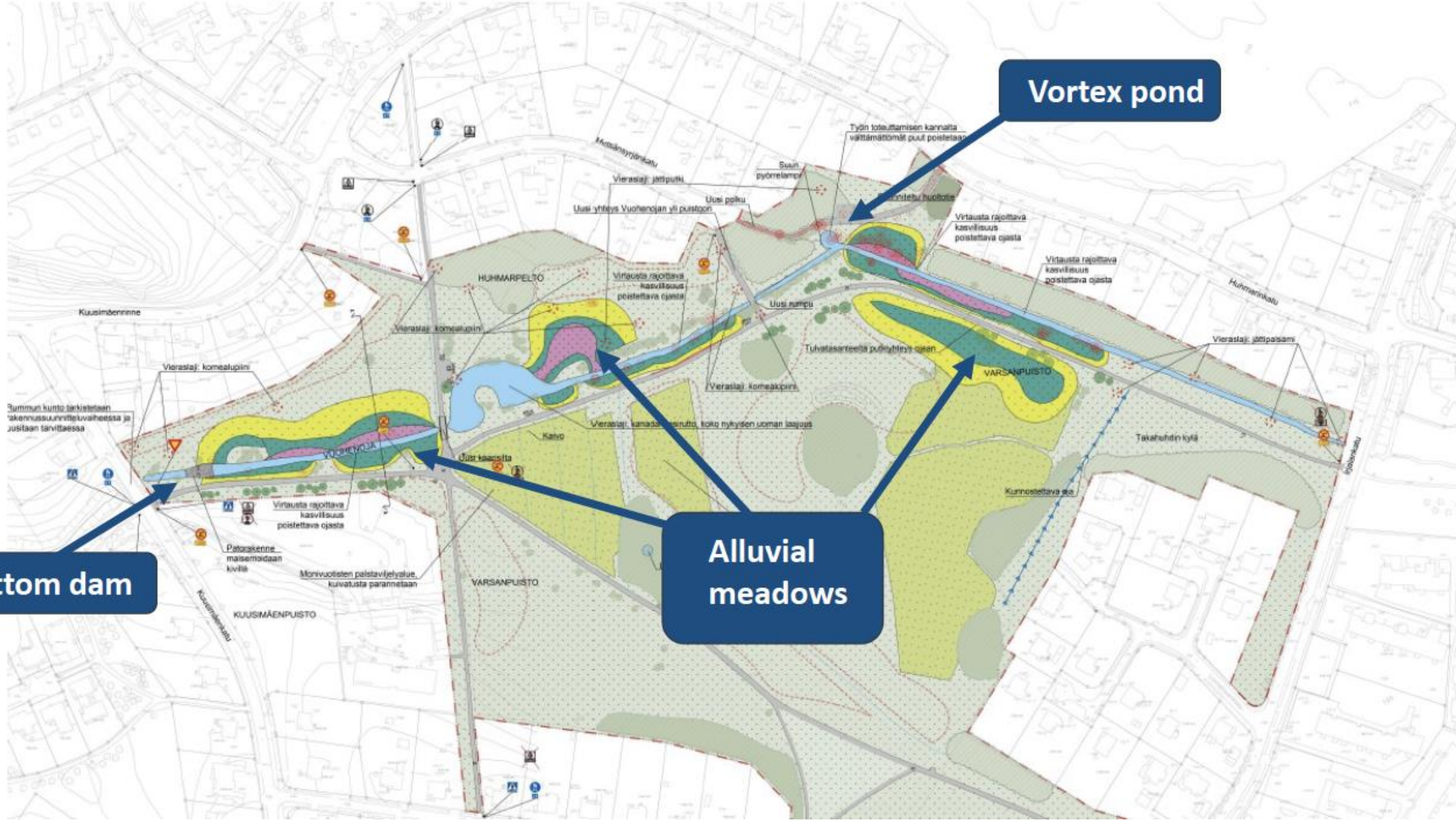
Pilot implementation



Specific features of the Tampere pilot

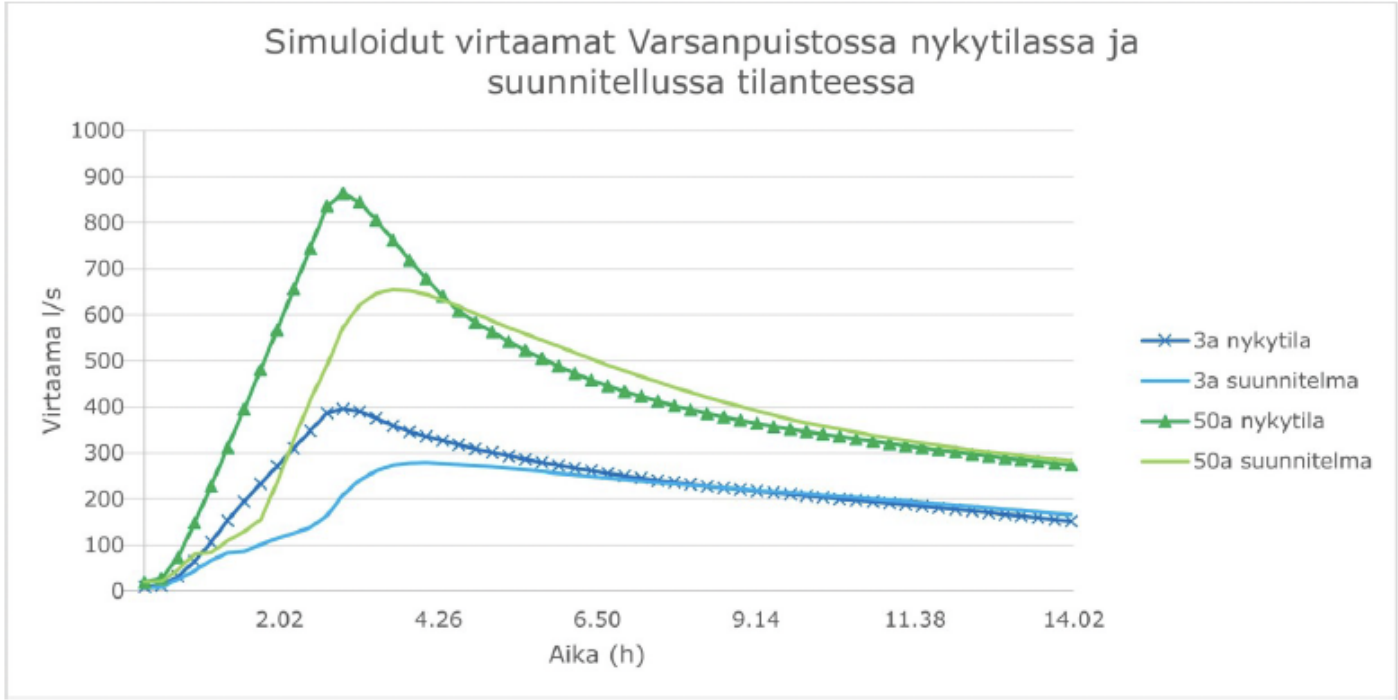
- **Modelling** during planning phase
- Use of **local species** in collaboration with the Finnish NGO *Wild Zone*
- **Voluntary events** for the residents
  - planting of seedlings
  - construction of spawning beds for brown trout
- **Use of foreign trees** as part of the city's tree species experiment

General plan



Modelling was used to study the impact of the solution

With alluvial meadows flow peaks can be cut by about 120 l/s (30%) in the 1/3a situation and 200 l/s (24%) in the 1/50a situation.



The simulated flow rates of pilot site

Flood map

The picture shows the flood areas according to the modelling made based on the plan, in areas colored from light to dark blue, with flows recurring once every 3, 50 and 100 years.

Situation before (February and June 2024)

Situation after (2025)

Vortex pond retains and purifies water

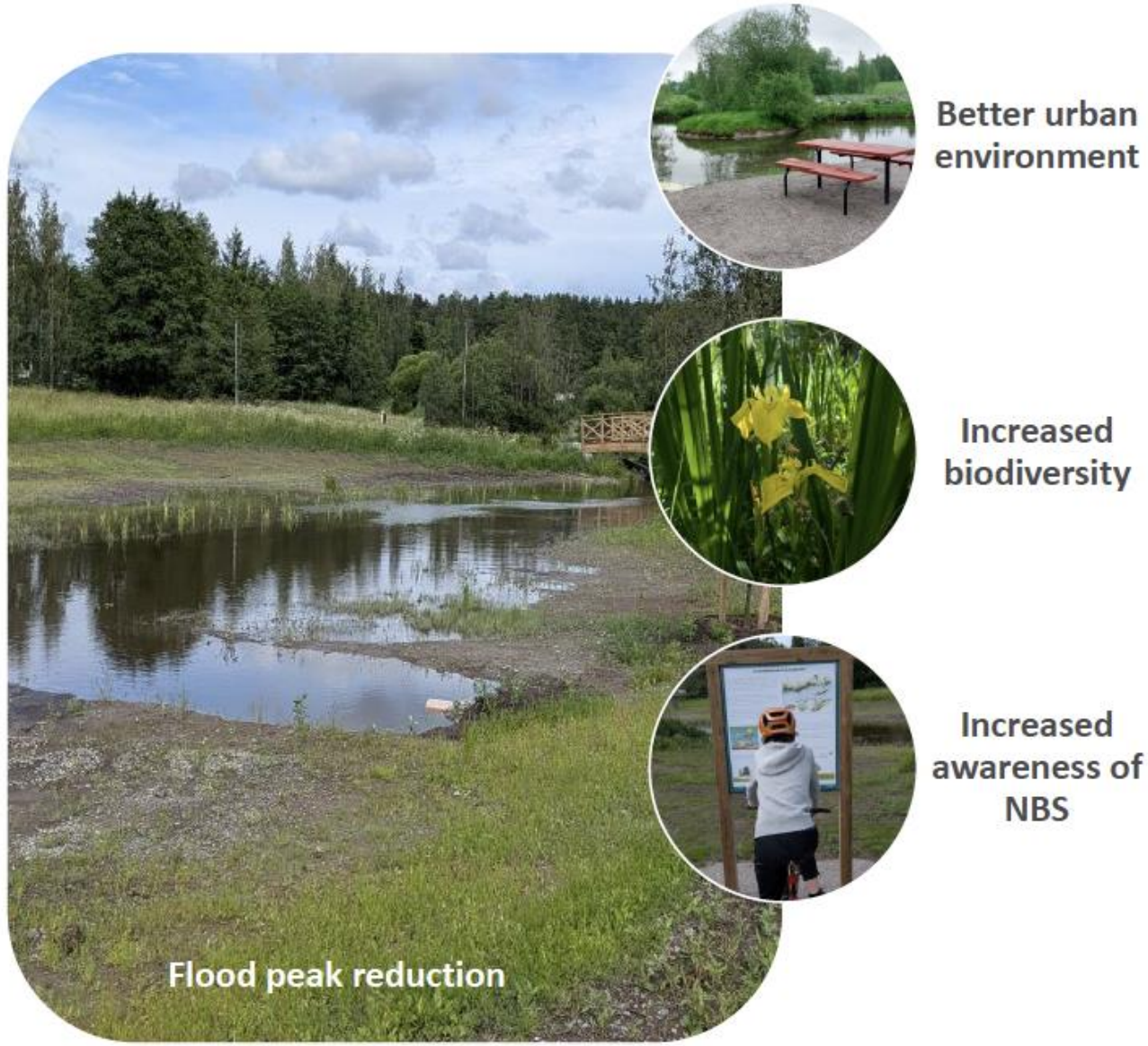
Alluvial meadows and the new bridge

Bottom dam raises the water level in a controlled manner to the floodplains

Solutions in action (July 2025)

Nature-based solutions are site-specific.

Why alluvial meadows?



Better urban environment

Increased biodiversity

Increased awareness of NBS

“There was plenty of space in the park, and with this solution we were able to achieve an impactful solution that brings multiple benefits.”

Lessons learned

Stakeholder involvement

1. A resident workshop at the beginning of the general planning process provides useful information for designers.
2. Marketing is needed. Associations spread information effectively.
3. The construction of NBS sites is viewed positively, provided that it does not compromise services, for example.

Lessons learned

Planning

1. The more diverse the group of experts involved in the work, the better the end result.
2. Design requires high-quality data.
3. It is advisable to leave room for surprises in the planning schedule.

Lessons learned

Construction

1. It is important that supervisors are on site every day to resolve any issues so that work on the site does not slow down.
2. All machinery and equipment must be suitable for the site.
3. It is beneficial if the construction company has previous experience of similar work.


Nallenpuisto NBS site
in Tampere

Interreg Baltic Sea Region

Co-funded by the European Union

SUSTAINABLE WATERS City Blues

More information

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interreg-baltic.eu/project/city-blues
nbsmodel.eu

Project has received funding from the EU's Interreg Baltic Sea Region programme.

Questions & Answers

Thank you for participating in our Nature Based Solution Webinar

Mitigating Urban Floods: Green infrastructure innovations making a difference

organized by the IURC-NA programme.

Please fill in the survey sent through the chat!