

City Blues pilot in Tartu

D 2.1 Reports on the implemented watershed pilots

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Summary

This report provides an overview of the City Blues pilot project in Tartu, Estonia, which focuses on the redevelopment of the historical Sadamaraudtee (Port Railway) corridor. The project aims to transform the former railway into a green infrastructure corridor that delivers multiple ecosystem services, including flood mitigation, urban cooling, biodiversity enhancement, and recreational value.

The pilot represents a model for implementing urban nature-based solutions (NBS) in Tartu. It seeks not only to address local environmental challenges but also to contribute to international learning and knowledge exchange among participating cities. By integrating nature-based solutions into the planning and design principles of urban infrastructure, the project contributes to strengthening Tartu's resilience to the impacts of climate change. In particular the efforts aim to address the increasing frequency and intensity of rainfall events and the associated risks of surface flooding. At the same time, the implementation of nature-based measures supports improved ecological connectivity across the city, enhances biodiversity, and promotes more sustainable and adaptive urban water management practices.

The Sadamaraudtee pilot is part of Tartu's broader strategic transition from traditional grey infrastructure toward adaptive, nature-based urban planning. Its key purpose is to demonstrate how nature-based stormwater management systems can be incorporated within urban redevelopment, while simultaneously enhancing public space and ecological value.

The corridor is designed as a multi-functional landscape that combines technical stormwater management with green-blue infrastructure. By linking mobility routes, biodiversity areas, and recreational spaces, the project illustrates a holistic approach to urban resilience and livability.

The implementation process has faced several operational and technical challenges, including:

- Project management continuity issues, caused by multiple changes in project leadership.
- Polluted soil conditions discovered in the pilot area, requiring remediation and adjustments to the design.
- Procurement difficulties that delayed certain phases of implementation.
- Differences in perspective between the city and the local water utility, requiring continuous efforts on building the bridge to come to

Despite these obstacles, the pilot has provided valuable lessons on the complexities of integrating nature-based and technical systems, highlighting the need for flexible planning, cross-sector collaboration, and long-term commitment to adaptive design.

The City Blues pilot in Tartu exemplifies how cities can repurpose obsolete industrial infrastructure into living, multifunctional green corridors that deliver both environmental and social value. Through its use of nature-based solutions, the project contributes to Tartu's long-term climate resilience strategy, enhances urban biodiversity, and improves the quality of life for residents.

1. Planning of the pilot



Figure: Riga junction before the investment (left). Inundation in Karlova district – the catchment through which the current system is directed (right).

1.1 General planning

Out of the areas in Tartu historically exposed to pluvial flood risk, the junction of Riga street and Tallinn-Luhamaa railroad was the most vulnerable, as floods which occurred there disrupted public services (ie availability of rescue services, disconnecting public transport etc).

To solve the problem, a new drain collector was planned to be installed from Kesk-Kaar along the left bank of Sadamaraudtee all the way to Tähe street where it will connect to existing rainwater system. These two flows will join at Tähe – Sadamaraudtee crossroad causing potential flood with flowrate of $1.6 \text{ m}^3/\text{s}$, duration 30 minutes and depth 70 cm. As Tähe street is a lively transportation corridor in Tartu, this situation will cause potential major disturbances. The Tartu Water Utility has foreseen that a third connecting stormwater collector will be built in the Sadamaraudtee green corridor which will transport stormwater to the river.

While the first two collectors were needed due to elevation (flooded area being located in a lowpoint) then downward from Tähe street was initially seen possible to have an open channel that would have other amenities in the green corridor.

Following extensive discussions with various municipal departments, Tartu Waterworks, and a comprehensive analysis of site conditions, hydrological modelling results, and budgetary constraints, it became evident that constructing an open channel extending all the way to the river would not be feasible. The high construction costs, combined with the limited hydraulic efficiency under current development conditions, made this option impractical within the project scope.

In collaboration with Tartu Waterworks, an initial pilot location was identified between Võru and Tähe streets, with the aim of alleviating local flood risks and improving stormwater management. However, further technical assessment indicated that this section would remain predominantly dry. This was primarily because the hydrological data model used in the analysis reflected future urban developments that are projected to occur only in the coming decades, resulting in limited current runoff generation in the area.

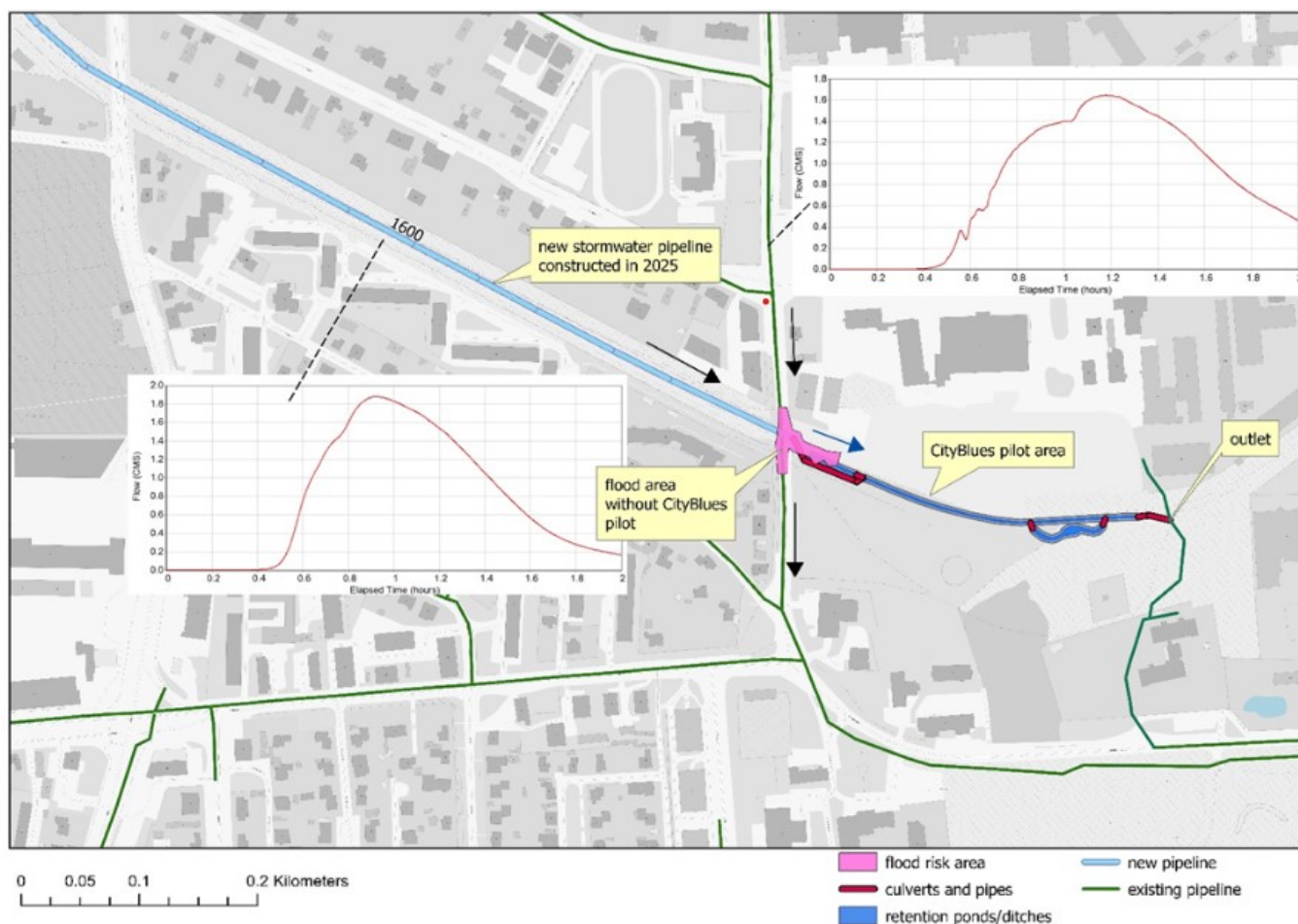


Figure: preliminary sketch from August 2024

Consequently, the pilot location was re-evaluated, and during discussions held in August 2024, it was decided to relocate the pilot site downstream of Tāhe Street. This new location provides a more suitable setting for testing the proposed nature-based solution with an aim to address the flood risk.

The main objective of the City Blues pilot site is to mitigate potential flooding by creating additional retention capacity to capture and temporarily store excess stormwater during heavy rainfall events. The design aims to reduce peak flow rates, promote infiltration and evaporation, and gradually return the remaining water to the stormwater pipeline network.

An important lesson learned from this process is the need for a thorough mapping and assessment of potential flood-prone areas before selecting the location for a nature-based solution. Identifying and analyzing these problematic spots at an early stage allows for more informed decision-making and ensures that the chosen intervention effectively addresses the key flooding challenges. This approach also helps optimize resources and enhances the long-term sustainability and functionality of the implemented solution.

1.2 Detailed planning / Construction design

During the reporting period, the project experienced some delays due to changes in project management. The transition period, including a short phase without an appointed manager, temporarily affected the continuity of activities as new team members familiarized themselves with the project background and progress to date. Addition to that there were several other challenges met on the way for designing of the solution. These will be described in more detail below.

In 2024, there was an opportunity to align the design of the City Blues pilot site with the Tartu Waterworks pipe design process to ensure better technical integration. However, this collaboration could not be realized as initially planned. Following this, the City of Tartu launched two procurement processes in the first half of 2025 to commission the design of the pilot solution.

The first procurement was unsuccessful, as no offers were received. Upon inquiry, one potential bidder indicated that the proposed water flow volumes for the nature-based solution were perceived as unrealistically large—comparable to the capacity of the Emajõgi River—which discouraged participation. Although these flow parameters had not been finalized, this misunderstanding appeared to create uncertainty among potential tenderers.

Considering the feedback received from potential tenders, the project team, in cooperation with TalTech, reviewed and refined the technical specifications and procurement documents. As a result, the second procurement attempt was successful, leading to the signing of a contract for the design of the City Blues solution.

During contract preparation with the design company, it was also discovered that the construction tender for the Tartu Waterworks stormwater collector (Sadamaraudtee collector) exceeded the allocated budget, resulting in a reduction of the project scope. As a result of this scaled-down solution, the pipeline end that was intended to convey water to the City Blues pilot site on the opposite side of Tähe Street was shortened. In the original plan, the pipeline would have extended beneath Tähe Street. Consequently, it remained unclear at this stage how stormwater can be effectively directed to the pilot site. Therefore, it was essential for City Blues to design and construct the connecting pipelines as part of the pilot project.

In the spring of 2025, Tartu Waterworks commenced construction of the stormwater pipeline up to Tähe Street. Considering this ongoing work, it was stipulated that the design contractor for the City Blues nature-based solution would also be responsible for designing the connecting pipelines. The design of these connections was required to be completed within the first two weeks following the signatures of the design contract. This approach was essential to enable the construction of the connecting pipelines concurrently with the excavation of the soil and street, thereby minimizing disruption and optimizing construction efficiency.

Fortunately, the design of the connecting pipelines was completed on time, allowing the construction of the City Blues pipes to be coordinated with the ongoing works of Tartu Waterworks.

For nature-based component of the design, the original deadline for finalization was set for the end of September 2025. However, an unforeseen challenge emerged during this period. It was discovered that the pilot site contains contaminated soil due to the area's industrial history. Although this information came to light around the time of contract signing, an additional pollution study procurement was initiated in parallel to assess the pilot area in more detail as the study results received at the beginning of September, indicated significant contamination.

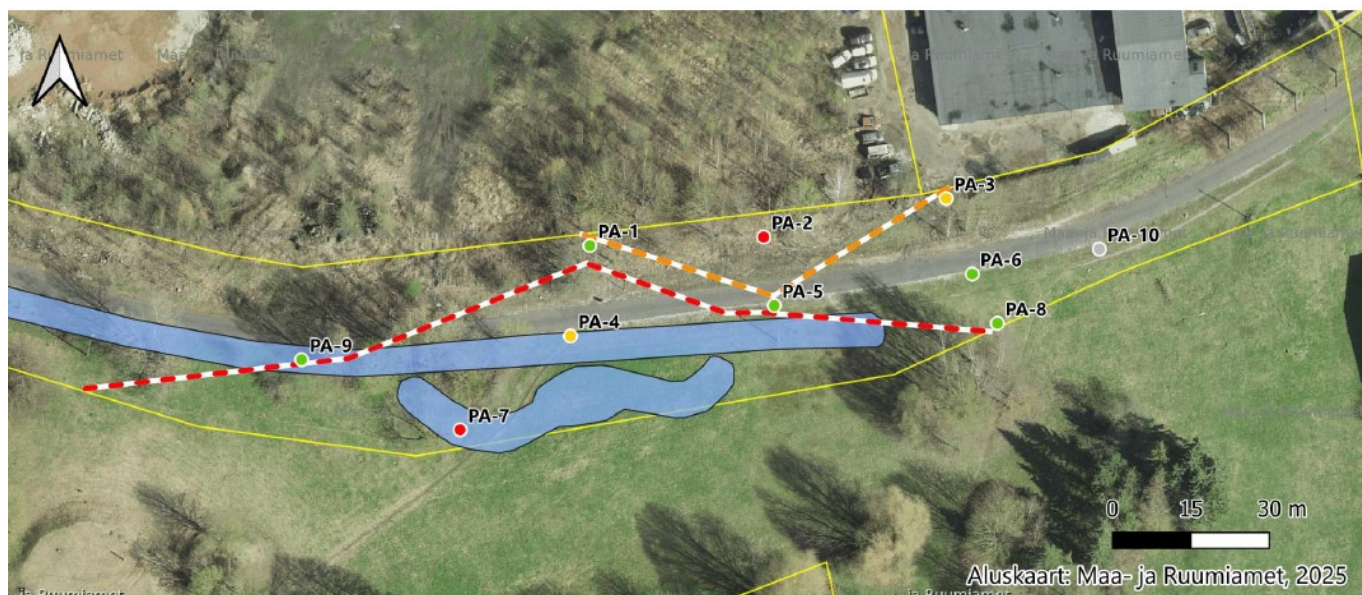


Figure: First pollution study on the pilot site (Maves, 2025)

The removal of the contaminated soil in the first study was evaluated to cost around 1 million euros. With no funds allocated to remove this contamination, the project team, in collaboration with the design partner and TalTech, developed an interim solution. The plan involves shortening the open nature-based solution and redirecting flows through pipes to bypass the contaminated zones. However, to ensure adequate capacity for the nature-based solution, a more comprehensive pollution study covering the wider area was required. This study aims to define the precise boundaries of contamination and identify where and how the solution can be safely constructed with the necessary hydraulic capacity. The comprehensive pollution assessment is expected to be finalized by the end of November 2025. As a result, the detailed design of the pilot site is temporarily on hold until the completion of this study.

This period has highlighted the importance of early stakeholder coordination, clear communication of technical parameters, and comprehensive site assessments in mitigating risks and avoiding delays. The challenges faced underscore the need for integrating environmental studies, construction planning, and design processes from the outset. Moving forward, the project will focus on completing the comprehensive pollution study and finalizing the detailed design based on its results while preparing for the construction procurement. These measures will help to maintain the challenging timelines, optimize resource use, and ensure that the City Blues pilot site achieves its objectives for flood mitigation and sustainable urban water management.

2. Construction phase

The construction of the nature-based component of the City Blues project has not yet commenced. However, the investment for the connecting pipelines has been secured, and the pipelines have been constructed in coordination with Tartu Waterworks.

In Tartu, the standard procedure for stormwater projects of this nature is for the City to conduct the construction procurement and subsequently sign an agreement with Tartu Waterworks. Based on the approved design and received offers, Tartu Waterworks then signs a contract with the construction company and manages the execution of the works. Under this arrangement, the City reimburses Tartu Waterworks according to the agreed offer, while Tartu Waterworks is responsible for overseeing the construction activities in accordance with the contract. Upon completion, the pipelines are formally owned by Tartu Waterworks, which also assumes responsibility for their ongoing operation and maintenance.



Tartu City has procured a detailed design for the connecting pipelines and obtained a construction price offer. A contract has been signed with Tartu Waterworks, who subsequently formalized the agreement with the construction company and is overseeing the construction process. This approach ensures that the pipelines are constructed efficiently, in alignment with Tartu Waterworks' operational standards, and fully integrated into the existing stormwater network.

3. Citizen and stakeholder engagement

The City Blues project continues to actively address the differences in perspectives regarding the role of nature-based solutions (NBS) in urban planning among various municipal departments and Tartu Waterworks. Bridging these gaps is critical for ensuring that NBS approaches are effectively integrated into the city's stormwater management strategies, long-term planning frameworks and practices.

Tartu Waterworks operates as an independent organization, and its engagement is essential for the successful implementation and maintenance of NBS infrastructure. To foster greater understanding and collaboration, the project team is planning a knowledge exchange visit to Tampere, involving key representatives of Tartu Waterworks, including the key actors from the organization. The objective of this visit is to observe and learn from operational NBS implementations under cold climate conditions comparable to Tartu, including considerations such as winter weather, temperature fluctuations, ground freezing, and other climate-related constraints.

This initiative aims to address and overcome the skepticism sometimes expressed by the Water Utility regarding the feasibility and effectiveness of NBS for stormwater management. By providing direct exposure to functioning NBS systems in similar environmental conditions, the visit is expected to facilitate an informed dialogue based on practical evidence and operational learnings. Ultimately, this experience may help shift perceptions, reduce institutional barriers, and create a more supportive framework for integrating NBS into Tartu's stormwater management practices.

Engaging stakeholders in this manner not only strengthens interdepartmental collaboration but also builds institutional capacity and confidence in nature-based approaches, contributing to the broader goals of climate resilience, sustainable urban water management, and innovative infrastructure planning in the city.

4. Risk management

During the implementation of the City Blues pilot, a formal risk management plan was not in place at the outset. As a result, several unforeseen challenges and risks materialized throughout the project, ranging from technical and environmental issues to procurement and coordination delays. While these unexpected events posed challenges to project timelines and resource allocation, they have also provided valuable learning opportunities.

Reflecting on these experiences, it has become evident that systematically identifying, assessing, and documenting potential risks at an early stage is critical for the successful planning and execution of similar projects in the future. Mapping potential risks—including technical, financial, environmental, and stakeholder-related risks—will allow for the development of proactive mitigation strategies, more accurate budgeting, and informed decision-making.

The insights gained from addressing these challenges in real time will serve as a foundation for improving project management practices and risk preparedness in subsequent nature-based solution initiatives in Tartu. By incorporating structured risk management into future projects, the city can enhance resilience, reduce uncertainties, and ensure more predictable and efficient project outcomes.

5. Maintenance, monitoring, and retirement plans

Maintenance and its cost are one of key issues, particularly among the municipal departments responsible for managing green areas. Tartu Waterworks has indicated that their responsibility is limited to grey infrastructure, and they will not assume maintenance of the nature-based systems. Given the lack of prior experience with such systems, both the anticipated maintenance requirements and associated costs remain uncertain, which complicates discussions and decision-making within municipal departments.

To address this, maintenance requirements have been explicitly included as a key aspect to be clarified during the project design phase. This will help define responsibilities, estimate costs, and inform long-term operational planning for the nature-based solution.

Monitoring activities are designed to ensure that the nature-based solution functions as intended by providing data on water flow, retention, and overall system performance, which will inform operational adjustments and long-term planning. Monitoring is planned to be coordinated in collaboration with KWB through citizen science surveys, fostering community engagement and participatory data collection. As the City Blues pilot is expected to be completed before these monitoring surveys can be fully tested on-site, the monitoring methodology will first be trialed on an existing nature-based solution to validate the approach and ensure reliable data collection once the pilot is operational.

6. Pilot investments

During the course of developing and implementing the pilot, some adjustments were made to the project budget. It became clear that, due to limited capacity and existing management structures—including defining responsibilities, timelines, and procedures for data monitoring—it was not feasible to install the sensors initially planned. The technical solution for sensor installation remains viable and could be implemented in the future when both the capacity and the need for the data are established.

Addressing the capacity and readiness to effectively utilize sensor data is a matter that will need to be pursued beyond the scope of the current project. Meanwhile, the pilot benefits from reallocating the budget initially intended for sensors to support the construction of the nature-based solution. This reallocation enhances the implementation of the pilot and provides clear value, justifying the budget adjustment.