D1.3.2 Local strategy and action plan for urban stream restoration in Poznań

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A. Introduction and Local Context

Piaśnica is a small stream in the city of Poznań, Poland. It flows into the Cybina, which is a tributary of the Warta, which in turn flows into the Oder. Only the upper, 840-m section of the Piaśnica flows in an open channel; the rest (approximately 5 km), starting from Bolesława Krzywoustego Street, runs through a culvert. The Piaśnica was channeled during the construction of housing estates and infrastructure in the 1970s. The Piaśnica flows through areas of dense residential development (apartment blocks). The upper reaches are dominated by commercial areas, such as a large cinema complex. In accordance with the Water Framework Directive (WFD), it is classified as a heavily modified water body (HMWB) because it has been significantly altered hydromorphologically by human activity. The Piaśnica catchment area is dominated by urban development, with the exception of agricultural land adjacent to the open stretch. The Piaśnica is not covered by the National Environmental Monitoring Scheme (PMŚ) as it is too small and no separate surface water body (SWF) has been designated for it. The ecological potential of the Cybina has been assessed as poor, and its chemical status as unsatisfactory.

The Piaśnica is a sandy lowland stream with a catchment area of approximately 15 km^2. As part of the ReBioClim project, a 250-metre pilot section – which flows through an underground culvert within the Lecha housing estate – was subjected to a detailed analysis. Opening up this section, whilst taking people's needs into account, could significantly improve the condition of the river along the pilot section. Piaśnica thus represents an opportunity for urban stream restoration that can simultaneously enhance ecological quality and strengthen the role of blue-green infrastructure in the city. The city is currently in the initial phase of the revitalisation process, which includes the preparation of a concept for the restoration and development of the adjacent area in the Lecha housing estate, along with visualization. This document is intended to support the city in the successful implementation of nature-based solutions for urban stream restoration in the study area. The Local Strategy and Action Plan (SAP) for the study area includes concrete and applicable actions developed by local partner based on the results of project deliverables, applying a multiperspective approach. The SAP will be adopted by local authorities and documented through letters of commitment.

Figure 1. Piaśnica stream in Poznań (underground) in Lecha housing estate

B. Summary of Specific Perspectives

This chapter shortly describes the main results of the five perspectives derived from the work package 1 deliverables for the pilot site Piaśnica in Poznań.

Institutional and Stakeholder Framework

Most important stakeholders

Figure 2. 140 stakeholders in total, representing 6 of 9 target groups

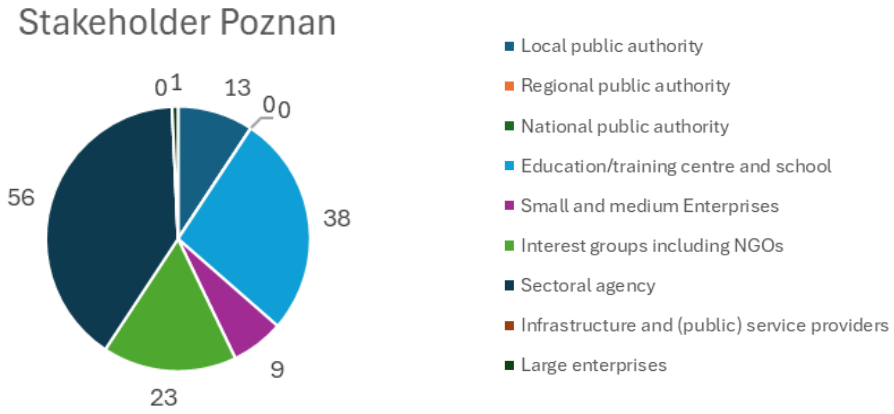


Table 1. Stakeholder role matrix

Type of stakeholder	Area of interest	Actor roles						
		Initiating	Steering and coordination	Implementing	Mediating	Financially contributing	Specialist support	Land owner
Sectoral agencies	Local	no	yes	yes	no	no	yes	no
Interest groups, NGOs	Local	yes	no	yes	yes	no	yes	no
Sectoral agencies	Local	no	yes	yes	no	no	yes	no
Individuals, general public	Local	yes	no	no	yes	no	yes	no
Interest groups, NGOs	Regional	no	no	no	yes	no	no	no
Sectoral agency	Regional	no	yes	no	no	no	no	no
Public authorities	Local	no	no	no	no	no	no	no
Local public authority	Local	no	no	no	no	no	no	no
Interest groups / NGOs	Local	no	yes	yes	yes	yes	no	yes
Interest groups / NGOs	Local	yes	no	no	no	yes	yes	no

Governance and implementation setting

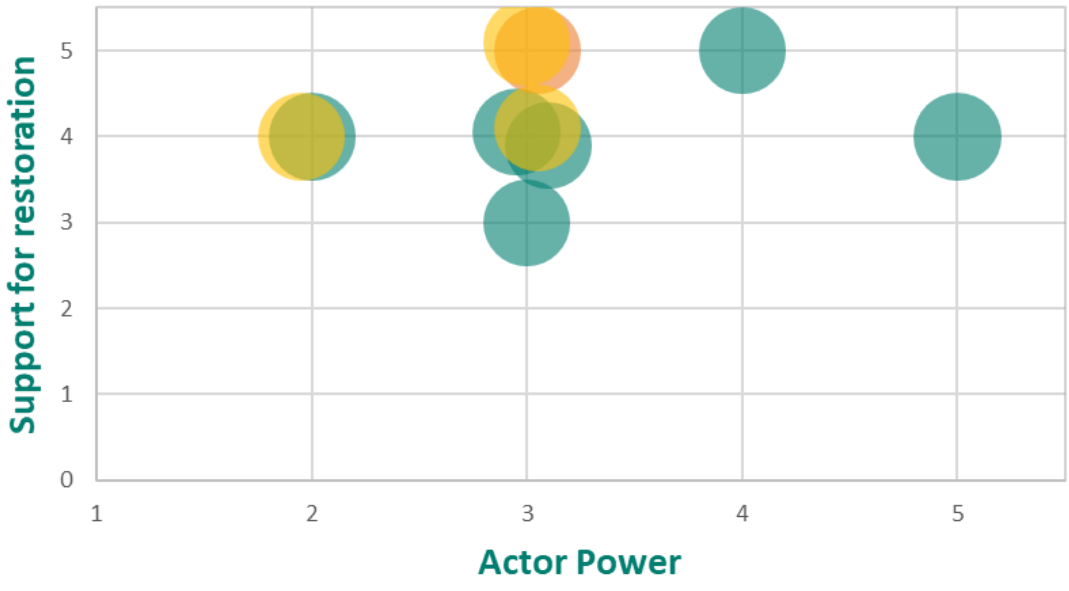
Urban stream revitalisation in Poznań is implemented within a multi-level governance environment involving regional water authorities, municipal institutions, infrastructure and service providers, NGOs and local community actors. The governance structure is characterised by a relatively strong role of regional and sectoral institutions responsible for water management, permitting procedures and technical infrastructure.

Regional authorities and municipal service providers hold the strongest influence over planning, investment and implementation processes. These actors are responsible for strategic coordination, technical preparation and infrastructure management, while balancing ecological restoration objectives with hydrological safety, maintenance requirements and urban-development priorities. Their support for revitalisation is generally strong, particularly where nature-based solutions contribute to flood prevention, climate adaptation and urban liveability.

NGOs, expert institutions and community-based actors contribute environmental expertise, participatory activities and advocacy supporting public acceptance of revitalisation measures. Although their formal decision-making influence remains limited, they play an important role in strengthening ecological awareness, local legitimacy and communication between institutions and local communities. Housing cooperatives and local landholders also influence implementation feasibility through their role in land management and mediation of residents' interests.

Overall, the governance environment in Poznań can be characterised as cooperative and supportive, although implementation processes remain dependent on effective coordination between multiple institutional levels and sectoral actors. The distribution of stakeholder influence and support is illustrated in Figure 3.

Figure 3. Stakeholder power and support distribution indicating a cooperative multi-level governance environment in Poznań. Regional authorities and municipal service providers (green bubbles) hold the strongest influence over decision-making processes, while NGOs, expert actors and community stakeholders (yellow bubbles) contribute primarily through advisory, participatory and advocacy-oriented support.



Key institutional barriers and enabling conditions

The main institutional barriers identified in Poznań and the corresponding enabling conditions are summarised in Table 2.

Table 2. Key institutional barriers and enabling conditions

INSTITUTIONAL BARRIER	ENABLING CONDITION
Complex multi-level governance and fragmented institutional responsibilities complicate coordination and implementation	Strong cooperation between municipal actors, service providers and environmental stakeholders
Dependence on regional authorities and permitting procedures may slow implementation processes	High institutional support for nature-based solutions linked to flood prevention and climate adaptation
Technical and maintenance requirements related to urban infrastructure constrain ecological restoration measures	Growing recognition of multifunctional benefits of urban stream revitalisation
Land-management constraints and competing urban-development priorities influence implementation feasibility	Active involvement of NGOs, community actors and expert institutions supporting public acceptance
Limited direct influence of local community actors on formal decision-making processes	Strong participatory and advocacy activities strengthening communication and local legitimacy

More information can be found in deliverable Project Communication Strategy and deliverable Cross-national comparative analysis of institutions and stakeholders.

Ecological Conditions

The section in Piaśnica aimed to be restored is 250 meters long and located close to the city centre. The site was scored with urban morphology index 5 “Completely anthropogenically impaired” as it is fully piped. Nevertheless, there are several socio-cultural characteristics like a park with urban greenery, a playground, walking paths and public housing, that increase the urban value of the site.

The first section of Piaśnica is formed as a trapezoid profile with linear course and grass embankment with solitary trees. The major part of the stream is piped, the urban stream morphology is therefore bad. Due to lack of light and habitats it can be assumed that the biology is in bad ecological condition. There is one ecologically more valuable site “Traszki Ratajskie” with small ponds and surrounding riparian vegetation. Unfortunately, the Piaśnica is not connected to the area as it is canalized below Lecha housing estate.

The results of biological monitoring indicated a severely disturbed stream environment which a lack of sensitive species.

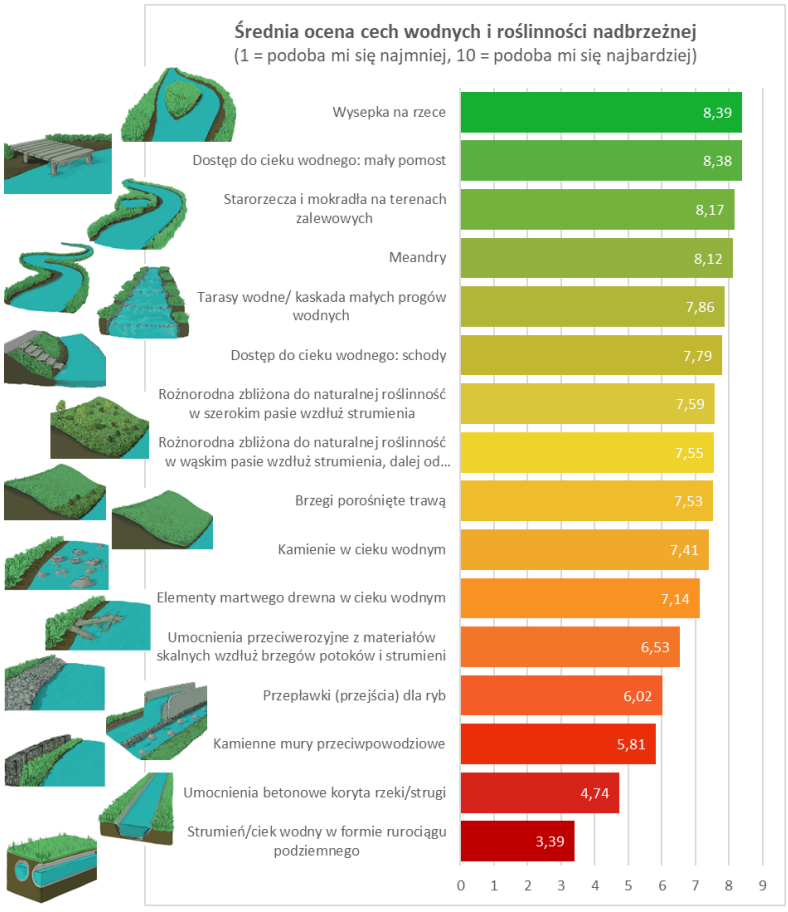
More detailed results can be found in deliverable: Ecological Goals and the respective site reports.

Social Perspective

The face-to-face survey conducted in Poznań in summer 2025 focused on identifying residents' preferences for the urban stream restoration. A total of 249 valid face-to-face interviews were collected in the pilot area of the Piaśnica stream. Most respondents lived close to the study area, with the majority residing within a 15-minute distance from the stream corridor. The sample consisted of 57% women and 43% men, with an average age of 39 years and a high proportion of respondents with university education. Results show that the area is regularly used by local residents, with half of respondents visiting daily or several times per week, most commonly on foot or by public transport. The main reasons for visiting included **relaxation and enjoying peace**, **passing through the area**, **experiencing nature**, and **physical activity**. This highlights the importance of the stream corridor as both a recreational and functional urban space. Regarding ecosystem services, respondents considered **improved air quality, habitats for plants and animals, better water quality, and improved microclimate** as the most important benefits of stream restoration.

In terms of preferences for restoration measures, respondents clearly favoured natural river features such as **river islands**, **small piers**, **wetlands**, **meanders**, and **water terraces.** Strongly engineered solutions, including **streams enclosed in pipes, concrete channels, and stone flood walls**, were evaluated most negatively. The choice experiment further confirmed a general preference for nature-based and multifunctional stream corridors, with respondents particularly preferring **meandering streams and access to water via piers**. Concrete channels were consistently rejected. Most respondents also preferred **wider riparian vegetation**, although part of the population (25 %) favoured more open or managed riverbanks. In terms of surrounding land use, respondents showed the strongest preference for an **urban park environment**, while semi-natural park arrangements were less supported.

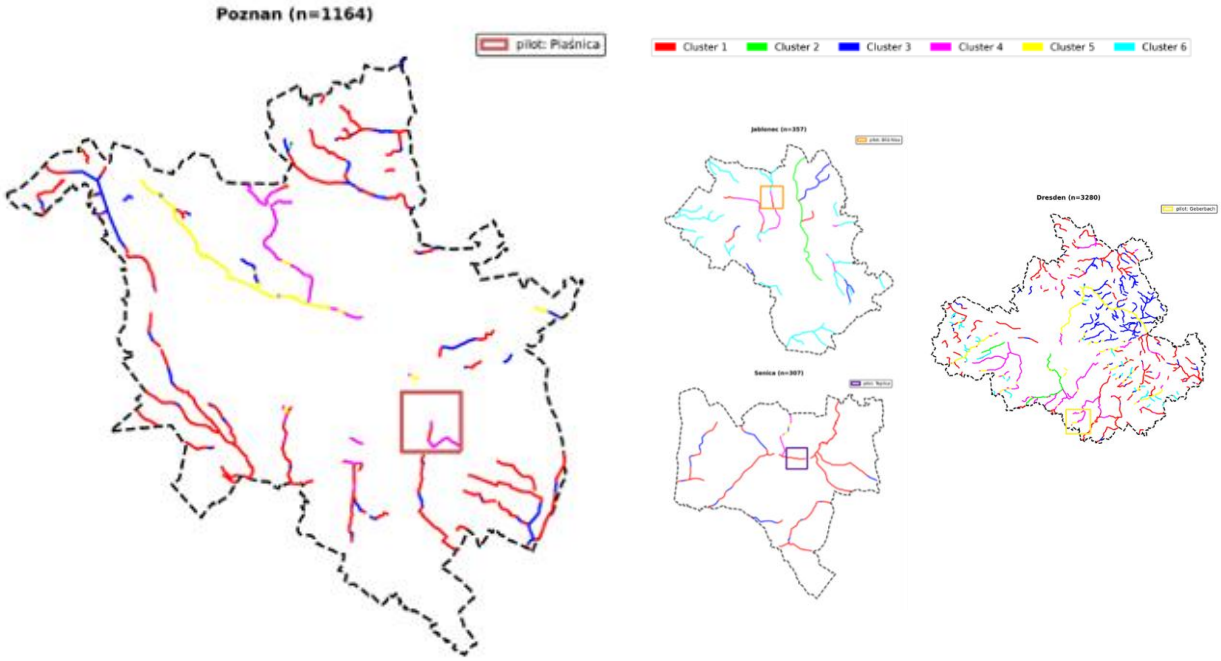
Figure 4. Average ratings of individual water features in the urban environment



Spatial Composition

All streams of the four cities were clustered into six types, based on the performance of spatial-related variables, including impervious cover, canopy cover, green land cover richness, green land cover Shannon diversity, land surface temperature, sinuosity, absolute slope, total crossings, valley depth, poi accessibility index, transport accessibility index, visibility ratio.

Figure 5. KMeans Cluster Distribution by city (k=6, 12 variables)



Regarding the characteristics of each cluster:

1 (n=2,021): High green diversity/richness, low canopy

2 (n=173): High access/crossing

3 (n=1,181): High canopy, high visibility, low diversity/richness

4 (n=716): High impervious, low visibility, high crossings, transport access, high temperature.

5 (n=302): High POI access, high sinuosity, high canopy, many crossings

6 (n=421): High valley depth, steep slope, high canopy, narrow valley

In Poznań, Cluster 1 is present in both the city centre and suburban areas, associated with heterogeneous green land cover. Poznań accounts for 19.7% of all Cluster 4 segments in the study and 21.9% of all Cluster 5 segments. Cluster 4 is characterised by high impervious cover, low visibility, high total crossings, high transport access, and high land surface temperature. Cluster 5 combines high POI accessibility, high sinuosity, high canopy cover, and many crossings. Green land-cover richness is generally the highest across the stream network, while most segments still contain three types of green cover. Mean Shannon diversity of green land cover is among the highest, indicating heterogeneous riparian composition. Absolute slope and valley depth are gentler and shallower than in Dresden or Jablonec. Crossing density is moderate. Mean land surface temperature and POI accessibility are relatively low across all cities.

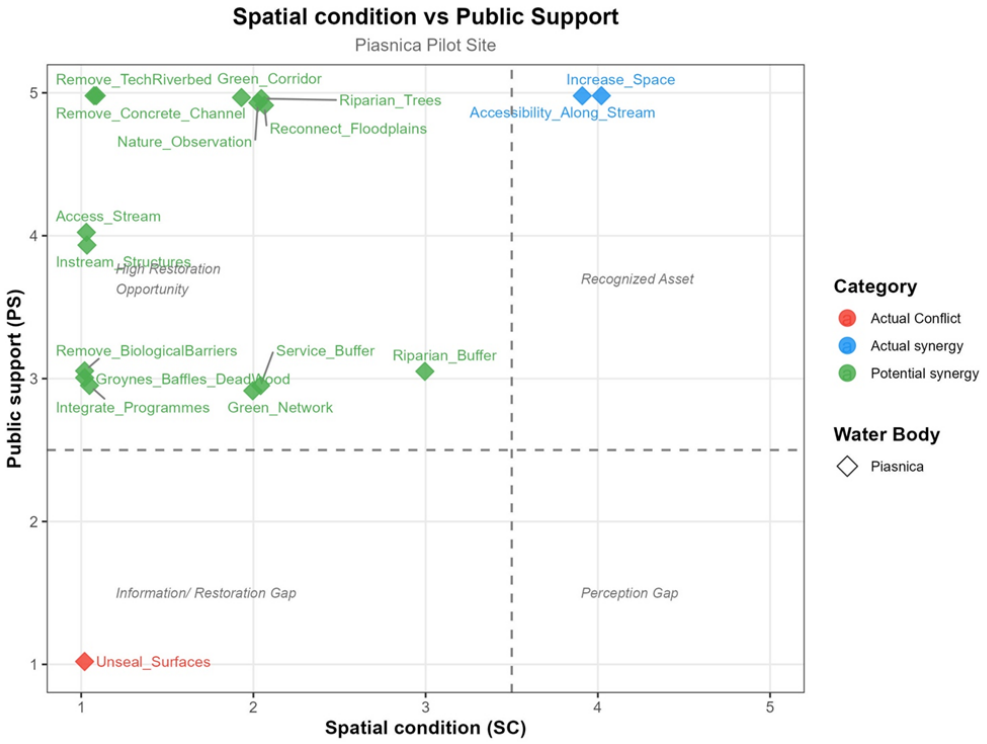
For the pilot stream in Poznań, the pilot site is dominated by Cluster 4 segments with high impervious cover, low visibility, high total crossings, high transport access, and high land surface temperature, as in Dresden and Jablonec nad Nisou. The high impervious cover can be attributed to the surrounding parking lot and the road infrastructures.

Compared with the other cities, Poznań stands out for high green land-cover richness and Shannon diversity together with gentler slopes, shallower valleys, moderate crossing density, and relatively low transport accessibility (0.06). Its role in Cluster 4 and Cluster 5 is secondary to Dresden but substantial (19.7% and 21.9% of those typologies study-wide).

Synergies and Conflicts

Based on the results from Synergies and conflicts analysis, there is a great but relatively challenging opportunity to implement nature-based measures to restore the urban stream Piaśnica and its surrounding. The spatial status of most measures (82% of all classified measures) is assessed as poor, mostly because of the underground section of the pilot stream. However, 14 out of 17 restoration measures were classified as a potential synergy, which represents high restoration opportunity as those measures are needed and likely to be accepted by the public. This category includes for example **removal of biological barriers, introduction of a leisure program, riparian trees, removal of technical structures in the riverbed and channel, and stream access**. The actual conflict between ecological perspective and the other two perspectives (spatial and social) occurs for **unseal surfaces**, where both spatial condition and public support are rated the lowest. From a spatial perspective, the high level of impervious surface coverage is primarily attributed to the surrounding main and internal road networks, as well as the presence of a large parking area. From the public perspective, removing impervious surfaces is not as high a priority as other measures. Already existing synergies exist for the **accessibility along the stream** and an **increased space for the stream and floodplain**. Given that the stream runs underground in a culvert, the latter one represents the spatial potential following the stream's reopening.

Figure 6. Distribution of restoration measures based on spatial condition and public support values



C. Suggestions for NBS Implementation

This chapter describes the general recommendations for nature-based urban stream restoration measures implementation based on the specific perspectives on urban restoration and synergies and conflicts analysis, and also specific and applicable actions developed by the project partners from the city Poznań for future uptake.

General recommendations

- Remove the technical riverbed modifications and support restoration of more natural stream morphology and ecological functions.
- Identify alternative solutions for parking areas near residential buildings in order to reduce potential conflicts with local residents.
- Prepare a comprehensive Restoration Master Plan guiding long-term revitalisation and implementation phases.
- Address water-quality problems in the upper parts of catchment areas, including pollution originating from agriculture, industry and urban runoff.
- Implement water-retention measures around the Piaśnica river and strengthen rainwater collection and retention capacities.
- Improve access to long-term financial support for urban stream restoration through integration into broader climate-adaptation and urban-development programmes.
- Strengthen cooperation between regional authorities, municipal institutions and local stakeholders throughout planning and implementation processes.
- Replace unnecessary paved or compacted surfaces near the stream with permeable materials, rain gardens, vegetated buffer strips, or shaded resting areas to reduce runoff and local heat stress.

Specific actions

- Development of a programmatic and spatial concept for the canalized section of the Piaśnica stream in the Lecha housing estate
- Integrated Water Management Plan Piaśnica

Action n. 1	**Action name**	**Development of a programmatic and spatial concept for the canalized section of the Piaśnica stream in the Lecha housing estate**
	Implementation phase	planning
WHAT	**Action definition**	During the preliminary planning phase, in collaboration with other project partners, actions were identified to restore the natural form of the canalized Piaśnica stream in the Lecha Housing Estate, including increasing the stream's ecological value and introducing recreational features to the area. The document will include actions that were not implemented during the ReBioClim project but should be implemented in the future, including: Review of ownership conditions regarding the potential acquisition or lease of land in the Lecha Housing Estate by the City of Poznań for the purpose of stream restoration and the creation of recreational spaces; Introduction of Nature Best Solution/ blue-green infrastructure solutions; Introduction of new vegetation; Introduction of recreational facilities (benches, platforms, and walkways).
	Scope	General ☐ Local ☑
	Typology	☐ active intervention ☐ regulation ☐ promotion ☐ monitoring and/or research program ☐ educational program ☑ other: programmatic and spatial concept
	Perspective	Spatial ☑ Public ☑ Institutional ☑ Ecological ☑
WHY	**Current status**	Not started
	Connected restoration goal	Goals for climate adaptation and biological diversity: - increasing the retention capacity of the Piaśnica valley and catchment; - establish natural discharges; - reduce heat island effect; - improve flood protection; - reduce heat stress.
WHO HOW	**Competent stakeholders**	Poznań University of Life Sciences, Poznań City Hall (municipality),Aquanet Retencja Sp. z o.o., local NGOs (e.g. Grupa Traszka), local Housing cooperatives (eg. Spółdzielnia Młodych)
	Funding options	Rainwater management plan for the city of Poznań for project documentation and construction works; Regional Fund for Environmental Protection and Water Management
WHO	**Time and cost estimation**	18 months/ 60,000 €
WHERE and WHEN	**Planned year and location (if relevant)**	2028
	Indicators for monitoring	• Concept document is jointly developed by key stakeholders
Identified RISKS	1. Lack of funding 2. Land ownership – not all the land required to carry out the project belongs to the local authority 3. Dispute over the use of the car park site	Risk mitigation measures: 1.Exploring funding opportunities under EU projects, e.g. Interreg CE, Life 2. Involving all property owners in the co-design process 3. Offering residents alternative parking options and educating them on the benefits of restoration

Action n. 2	**Action name**	**Integrated Water Management Plan Piaśnica**		
	Implementation phase	planning		
WHAT	**Action definition**	An integrated water management plan is to be drawn up for the Piaśnica to identify appropriate measures for achieving the ecological enhancement of the watercourse and its role in the natural ecosystem (local recreation, species and biotope conservation, biotope connectivity, flood protection, climate regulation functions, etc.). The management plan is also intended to take into account the various usage requirements for the watercourse and incorporate them into the desired near-natural development. It will be important to designate micro-catchments and identify possible phased implementation of restoration activities and accompanying investments. Water retention and runoff slowing are of particular importance, as are local recreation and the creation of habitats for various species of fauna and flora, as well as climate regulation. Priority should be given to sections near residential areas, while ensuring adequate water quantity and quality.		
	Scope	General ☐ Local ☑		
	Typology	☐ active intervention ☐ regulation ☐ promotion ☐ monitoring and/or research program ☐ educational program ☑ other: management plan		
	Perspective	Spatial ☑ Public ☑ Institutional ☑ Ecological ☑		
WHY	**Current status**	Not started		
	Connected restoration goal	Goals for climate adaptation and biological diversity: - increasing the retention capacity of the Piaśnica valley and catchment; - reach good chemical water quality; - reconnect fragmented ecosystems; - increase ecological connectivity; - promote dynamic stream processes; - establish natural discharges; - reduce urban heat island effect; - improve flood protection; - reduce heat stress.		
WHO	**Competent stakeholders**	Poznań University of Life Sciences, Poznań City Hall (municipality), Aquanet Retencja Sp. z o.o., local NGOs (e.g. Grupa Traszka), local Housing cooperatives (eg. Spółdzielnia Młodych)		
HOW	**Funding options**	Regional Fund for Environmental Protection and Water Management		
	Time and cost estimation	24 months/ no estimated costs		
WHERE and WHEN	**Planned year and location**	2028		
	Indicators for monitoring	• The integrated water management plan is formally adopted into city spatial planning		
Identified RISKS	1. Lack of funding 2. Lack of interest on the part of landowners within the catchment area 3. Lack of interest in the subject due to the scale and diversity of the problems and the low likelihood of implementation	Risk mitigation measures	1. Seeking funding opportunities under EU projects, e.g. Interreg CE, Life 2. Organizing promotional and educational events, and engaging the public and local businesses 3. Organizing workshops and promotional events, and highlighting the potential for phased action within the micro-catchment area	