

OUTPUT FACT SHEET

Pilot actions (including investment, if applicable)

Version 3

Project index number and acronym	CE1578 CityWaterCircles
Output number and title	O.T2.3.1 Pilot actions testing and demonstrating urban NBS anchored in rainwater harvesting
Investment number and title (if applicable)	I4 Rainwater utilisation via rooftop rainwater harvesting serving rain gardens in Bydgoszcz
Responsible partner (PP name and number)	Bydgoszcz PP7
Project website	https://www.interreg-central.eu/Content.Node/CWC.html
Delivery date	February 2020 - June 2022

Summary description of the pilot action (including investment, if applicable) explaining its experimental nature, demonstration character and transnational added value

The pilot action was realised in two locations:

- ✓ Location 1 - Museum of Waterworks (Palace building),
- ✓ Location 2 - Building A of the City Hall at Grudziądzka Street.

Location 1:

Museum of Waterworks - Demonstration system of rainwater management based on green - blue infrastructure for the building of the Palace of the Museum of Waterworks at Gdańska 242 in Bydgoszcz. The main goal of the project was to create an exemplary, demonstrative management of rainwater from the roof of the Waterworks Museum building in the "Las Gdański" water treatment plant in Bydgoszcz. The assumption is primarily to inspire the city's residents who want to disconnect their property from the municipal rainwater drainage system and manage rainwater within their property.

The design includes rainwater management in a few types of solutions:

- 1) rain garden in sealed container;
- 2) sealed rain garden in the ground;
- 3) infiltration rain garden in natural permeable soil,
- 4) barrels that take over the runoff of rainwater from downpipes connected to the municipal rainwater drainage system.

All three types of rain gardens are connected to each other by a system of surface dry streams / gutters, and the rainwater reserve accumulated in barrels can be used for additional irrigation of local vegetation or rain gardens in the event of a longer rainless period.

To calculate the capacity of individual reservoirs (gardens), the rainfall for Bydgoszcz with a height of 35.5 mm was assumed, which is a heavy rain occurring once in 5 years and lasting 120 minutes. From the roof area of 265 m² we will get over 9 m³ of rainwater of which it can be assumed that about 8 m³ will flow into our solutions.

Materials and technologies of good quality and local origin were used, matching the historic character of the building and the area:

- solid wood barrels - larger barrels are 400l each, and one 200l
- copper drain pipe extensions
- rain garden in a container - reinforced concrete tank finished with brick in the color of the building. The vessel is sealed, filled with drainage layers, and then with vegetation layers - soil mixed with sand, in which wetlands are planted. The container has area of 1.9 m² and a capacity of about 1 m³. An overflow goes by the dry stream to the next rain garden.
- dry streams and rain gardens lined with local river stone The rain garden in the ground has been divided into two parts - a sealed one from the side of the building and an infiltration one where water is released into the ground.

The sealed part has an area of 4 m² and a capacity of 1.2 m³, the infiltration part has an area of 16.5 m² and a capacity of 5 m³.

- Rain gardens have been planted with hydrophytes, which can resist flooding or dry periods. There are 30 species of plants, including ophiuchus knotweed, iris, cattail, comfrey, aquatic mint, semolina, common loin.

Location 2:

Building A of the City Hall is a three-storey building which is almost surrounded by sealed areas. Rainwater from the roof of the building is usually discharged via a system of gutters and downpipes into the stormwater sewer. The total roof surface area which drains into the rain garden is 275 m² discharged via two major downpipes.

The pilot includes:

- ✓ The rain garden - designed in 10 connected containers (pots) made of concrete and mantled with an extruded foundation membrane made of a special high-density polyethylene and placed at a distance of 50 cm from the wall of the building. The rain garden has a total area of approx. 12 m² (12 x 1 x 0.85 m) and an estimated retention capacity of 3.37 m³. More than 170 hydrophytic plants, which purify and retain water, were planted;
- ✓ New piping system;
- ✓ Monitoring system

The pots are supplied via new downpipe sections to a horizontal irrigation pipe located in the pots with perforations for even water flow in the pots.

Excess water is discharged through a grating - overflow screen mounted in the upper part of the pot and two drainage pipes laid on the bottom of the pots. The rainwater from one of them is directed to the rainwater drainage system and the other pipe goes out to the free space - the unpaved area around the pots.

The base for the production of flower pots/containers is exposed polystyrene commonly called polystyrene. The polystyrene frame is reinforced with a plastic finishing mass. This makes the pots light yet strong, resistant to damage, fungi, mould, UV rays and frost. The walls of the pots were protected with PVC foil. Between the walls of the pots and the PVC foil a bucket foil was used to increase the frost resistance of the pots and to limit the freezing of the plants.

The bottom of the box is filled with a layer of expanded clay aggregates up to the height of 30 cm. The aggregate layer is covered with 45 cm of coarse sand with supplements that will help to keep the container moist and purify rainwater. The rest is completed with garden soil, gravel and humus. Flat stones are placed on top. The pots are planted with hydrophytic plants.

The rain garden is monitored using:

- a compact weather station with a built-in solar panel for long-term monitoring of environmental measurements via GSM network,
- two sensors measuring soil moisture, designed to work with a wireless network,
- a rain gauge - a smart, hourglass rainfall level sensor.

The monitoring station described above was launched on April 25, 2022, at 08:05 a.m. and is operating continuously, taking measurements of precipitation [mm] and soil moisture [m3/m3] in two of the ten pots of the rain garden. Measurements are recorded at 5-minute intervals.

The results of the measurements are available to anyone at:

<https://www.hobolink.com/p/9c8ec0581f1357af2b097054e50460f9>

Although Bydgoszcz is known in Poland as a pioneer and experienced city regarding rainwater management, Nature Based Solutions are new in our city. There were no raingardens implemented before the projects started. There was a catalogue of NBS prepared by Municipal Waterworks, however within the CWC project City of Bydgoszcz together with Municipal Waterworks constructed the first ones. As far as we know also developers did not use NBS at that time. We learnt there are not many companies who are desiging and constructing raingardens in our region, which is the message that NBS must be promoted and the message spread.

These demonstrations along with the strategy and action plan is a big step forward circular water management. The new EU financial support for 2022-2027 gives a lot of opportunities to continue CWC work.

We hope that by pilot project showing different way of rainwater use we start to change perception of the rainwater and as a result we return water to the city.

NUTS region(s) concerned by the pilot action (relevant NUTS level)

NUTS 3	Address (Street, house number, postal code, city, country)	GPS coordinates
PL613 Bydgosko_Toruński	Gdańska Street 242, 85-674 Bydgoszcz, Poland	53° 08'54"N 18° 01'38"E
PL613 Bydgosko_Toruński	Grudziądzka Street 9-15, 85-102 Bydgoszcz	53° 07'15"N 17° 59'36"E

Investment costs (EUR), if applicable

Cost type (e.g. planning, construction)	Description of cost (what is included into the contract, what was delivered, etc.)	Real amount (based on contract) EUR
SUM		47 643,10 EUR
Location 1		
Construction	TOTAL	21 364,42 EUR
	Equipment costs	232,75
	Infrastructure & works costs	21 131,67
Location 2		
Construction	TOTAL	26 278,68 EUR
	Equipment costs	1 470,45
	Infrastructure & works costs	24 808,23

Expected impact and benefits of the pilot action for the concerned territory and target groups and leverage of additional funds (if applicable)

For the first time City of Bydgoszcz run international pilot project to reuse rainwater and close the water circle. The rainwater reuse solutions used by the City, Municipal Waterworks as well as other project partners can provide inspiration for the implementation of similar approaches by ordinary residents, private and public institutions

The main advantage of the action and the expected pilot benefit is an educational demonstration value of rainwater management on building roofs for one's own plot. We hope that the pilot action will draw attention to the problems associated with wasting valuable rainwater, if it is discharged for rainwater drainage, and the possibility of using rainfall services for the benefit of the environment (recovery of rainwater for plants, mitigation of urban heat island effect, increasing biodiversity) and economic value (savings on water for irrigation, no fees for draining rainwater to the sewage system).

The city residents will benefit from it, as well as city itself due to reduced load on the rainwater drainage system and less risk of flood during heavy rain.

We expect a significant increase in scale - Municipal Waterworks could introduce similar solutions on its other facilities. The City of Bydgoszcz has included in the development strategy of green and blue solutions the implementation of further pilot projects, we are counting on the implementation by residents in their areas. MWiK, as a company collecting fees for the discharge of rainwater, will collect information from its clients about the implementation of rainwater management on own premises.

In order to take advantage of the potential of the Waterworks Museum and familiarize the youngest residents with the available opportunities for rainwater management, we are currently preparing, in cooperation with the Education Department, an educational campaign aimed at school, kindergarten

Sustainability of the pilot action results and transferability to other territories and stakeholders

Demonstration pilots can effectively contribute to the dissemination and transfer of knowledge on local, decentralized rainwater management solutions using nature-based systems (NBS). The pilot action has a high environmental and educational value that will motivate residents and other stakeholders to adopt similar measures for the onsite management of rainwater.

The pilots were prepared in such a way as to show the residents typical and easy ways to manage rainwater. The solution applied can be used for both single-family and multi-family buildings as well as public utility buildings. All these solutions can be used in many other countries - they are very universal methods of rainwater management.

In case of rain gardens in the ground it is required each time to check the possibility of infiltration of the soil and to calculate the amount of rainwater obtained from the sealed area.

If applicable, contribution to/ compliance with:

- relevant regulatory requirements
- sustainable development - environmental effects. In case of risk of negative effects, mitigation measures introduced
- horizontal principles such as equal opportunities and non-discrimination

The project pilot complies with the directions and the list of actions specified in The Plan for Adaptation of the City of Bydgoszcz to Climate Change by 2030 adopted by Resolution No. XIV/287/19 of the Bydgoszcz City Council of 4 September 2019.

The plan clearly emphasizes the role of blue-green infrastructure for counteracting the effects of climate change, i.e. the occurrence of torrential rains and periods of drought.

Cutting off the water runoff from the rainwater sewage system and development in rain gardens relieves the sewage system and improves soil and water conditions as well as the microclimate of the place and development of biodiversity.

References to relevant deliverables (e.g. pilot action report, studies), investment factsheet and web-links

If applicable, additional documentation, pictures or images to be provided as annex

D.T2.7.1 FINAL SELF-EVALUATION REPORT

D.T2.5.3 JOINT PEER REVIEW REPORT

D.C.5.1 CWC public consultation workshops for targeted citizen groups

D.T2.1.4 Finalized CWC transnational online handbook also including the pilot showcases and their conclusions

D.T2.1.6 Tailored CWC online handbooks translated to national languages

Public pilot description: <https://www.interreg-central.eu/Content.Node/Raingarten-in-Bydgoszcz.html>

Public pilot video: <https://www.youtube.com/watch?v=j2Zkk7J8SCE&feature=youtu.be>

Municipal Waterworks



Building A of the City Hall at Grudziądzka Street

