


Interreg
CENTRAL EUROPE



CWC

European Union
European Regional
Development Fund

TAKING
COOPERATION
FORWARD

-  Peer review meeting, City of Bydgoszcz, 11 April 2022 r.
-  **Rainwater utilisation via rooftop rainwater harvesting serving rain gardens in Bydgoszcz**
Pilot investment - rain garden at City Hall, 9-15 Grudziądzka Street, Bydgoszcz
-  CWC City Water Circles, B. Katarzyna Napierała

ANALYSIS OF POTENTIAL LOCATIONS



ADM



**Bydgoszcz Canal
Museum**



**City Hall
Grudziądzka Street**



NOT



BWA



TPB



**City Hall
Jezuicka Street**

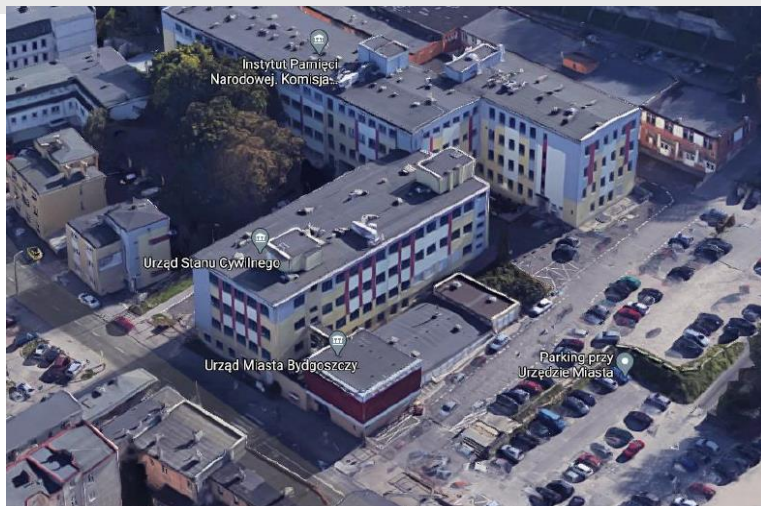


MCK



LOCATION - CITY HALL

9-15 GRUDZIĄDZKA STREET, BUILDING A



Choice of site:

- The very centre of the City
- Location of the building next to the main entrance to the City Hall Offices,
- Accessibility for residents (educational dimension)
- Lack of green areas (low biodiversity)



RAIN WATER BALANCE

Average rainfall intensity and estimated amount of rainwater depending on the duration of rainfall

Average rainfall intensity t=15 min [dm ³ /s*ha]	Average rainfall intensity t=30 min [dm ³ /s*ha]	Average rainfall intensity t=60 min [dm ³ /s*ha]
144,58	91,84	55,83
Average amount of rainfall water in 15 min [m ³ /ha]	Average amount of rainfall water in 30 min [m ³ /ha]	Average amount of rainfall water in 60 min [m ³ /ha]
130,12	165,31	200,98

Rainwater quantities for the chosen location

Location	The surface area of the roof to be drained [m ²]	Run-off coefficient [-]	Water amount [m ³] -15 min rain	Water amount [m ³] - 30 min rain	Water amount [m ³] - 60 min rain
City Hall, 9-15 Grudziądzka Street, building A	275	0,9	3,22	4,09	4,97

Basic parameters of adopted solutions

Description of solution	Total retention capacity of rain garden [m ³]	Rain garden area [m ²]	Total dimensions of rain garden [m]
Rain garden in containers	~ 3,37	12	12,00 x 1,00 x 0,85



RECONSTRUCTION OF RAINWATER SYSTEM

Diagram: location of downpipes, overflow pipes and overflow gratings



LOCATION BUILDING A OF THE CITY HALL, 9-15 GRUDZIĄDZKA STREET

prior the construction



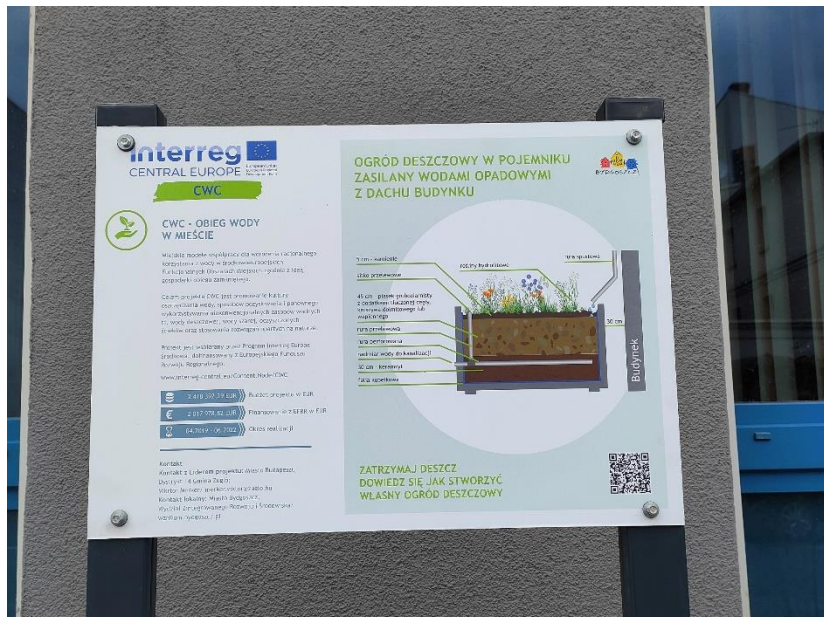
LOCATION BUILDING A OF THE CITY HALL, 9-15 GRUDZIĄDZKA STREET

after construction



LOCATION BUILDING A OF THE CITY HALL, 9-15 GRUDZIĄDZKA STREET

after construction



RAINWATER MANAGEMENT SYSTEM

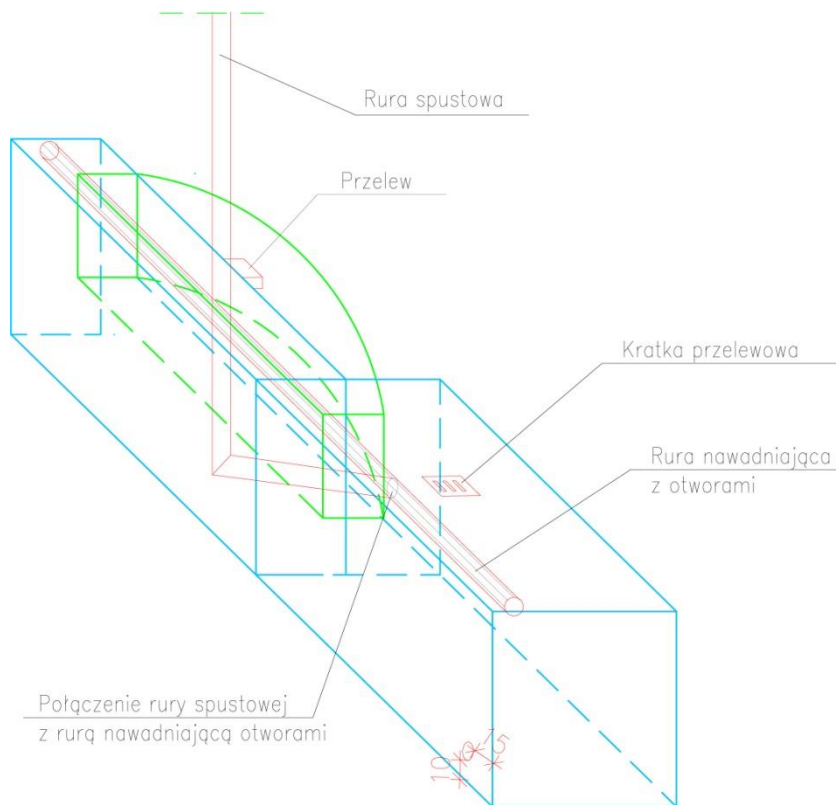


Fig. 1 Watering

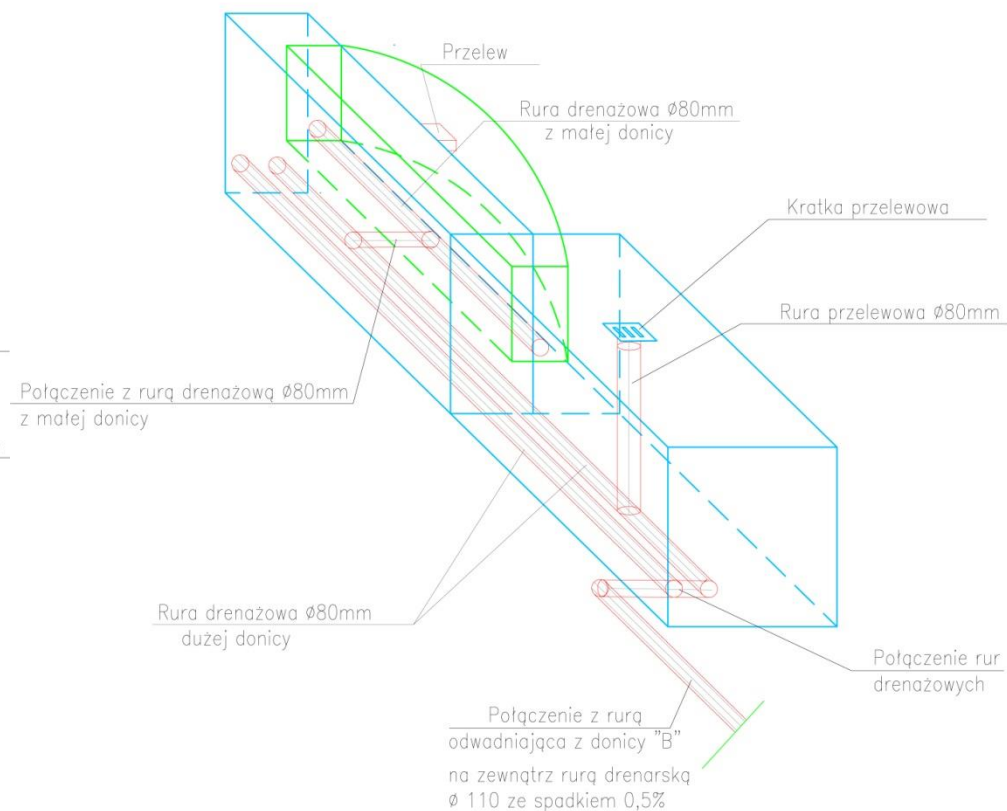


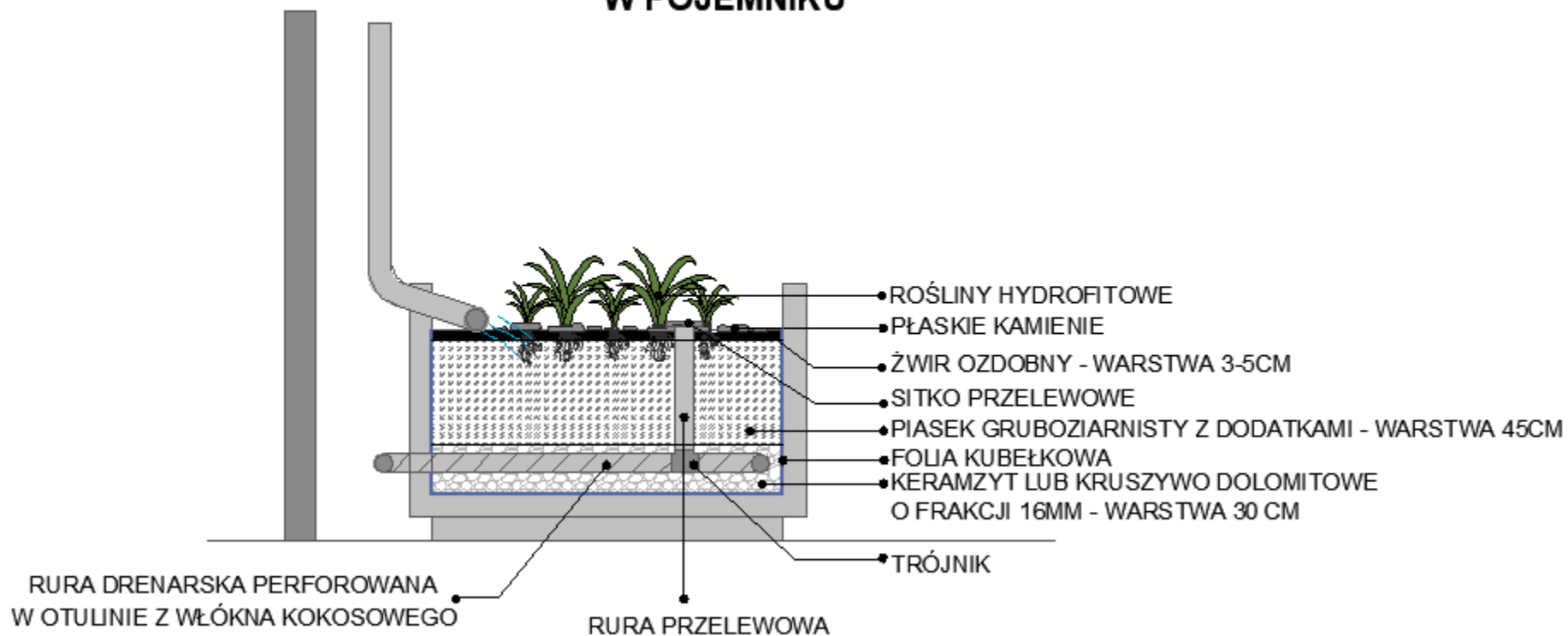
Fig. 2 Drainage



CONSTRUCTION OF RAIN GARDEN

- CROSS-SECTIONAL DRAWING OF A RAIN GARDEN IN A CONTAINER

SCHEMAT PRZEKROJU OGRODU DESZCZOWEGO W POJEMNIKU

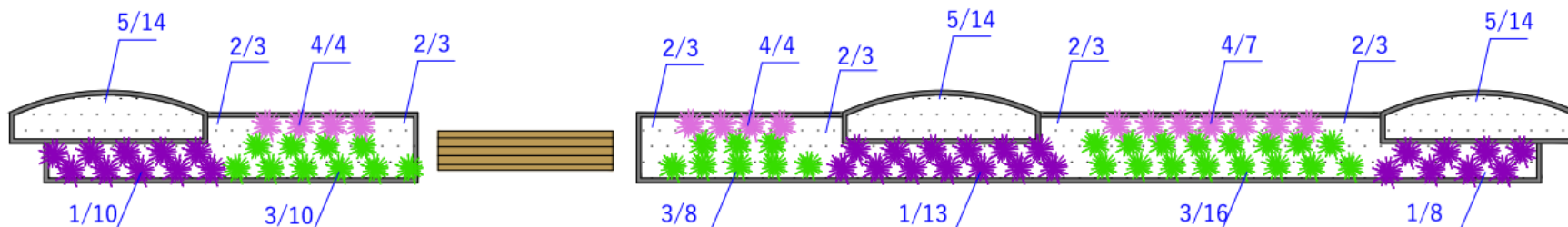


PLANTING



- ❖ Bambus mrozoodporny „Volcano”
Fargesia nidida
- ❖ Turzycza Morrowa ‘Ice Dance’
Carex morrowii
- ❖ Śmiątek darniowy
Deschampsia cespitosa
- ❖ Krwawnica pospolita
Lythrum salicaria
- ❖ Żurawka
‘Fire Chief’, ‘Electra’
Heuchera

Rys. Projekt nasadzeń



- Compact weather station with built-in solar panel for long-term monitoring of environmental measurements via GSM network
- 4 sensors measuring soil moisture, designed to work with a wireless network
- Rain gauge - intelligent hourglass precipitation level sensor
- The meteorological station will be mounted on the wall of City Hall building A.



Activity	PLN	EUR the average Euro exchange rate on 8.04.2022 is 4,6478 PLN
Executive project	8.610,00	1.852,49
Investment works / supervision and approval/information boards, monitoring	123.000,00	26.464,13



PHYSICO-CHEMICAL AND MICROBIOLOGICAL PARAMETERS

: Total Suspended Solids (TSS)

- Biochemical Oxygen Demand (BOD5)
- Oxygen concentration
- pH
- Coliform bacteria, Escherichia Coli
- Faecal Enterococci
- Polycyclic Aromatic Hydrocarbons (PAHs)
- Conductivity
- Dissolved organic carbon



The physico-chemical parameters are within the existing, or no longer valid, norms for bathing water and do not raise any objections to using rainwater for irrigation of rain gardens. However test results indicate exceedances for faecal enterococci (roof contamination with organic matter of animal origin).

The use of rainwater does not present a risk to human health as it will not be used for watering edible plants and will not be sprayed.



We should:

- Check the pipes from time to time (water supply pipe, overflow pipe and drainage pipe outlet) for debris or blockages.
- Remove dry leaves and other plant parts at the end of the growing season.
- Check from time to time a layer of stones and gravel on the surface. Stones and gravel prevents weeds in the rain garden, if this layer is compact it means that plants that do not have the ability to clean water do not overgrow hydrophytic plants; if necessary, missing plantings should be supplemented.
- Check especially after heavy rainfall whether the stones on the surface of the garden have shifted and whether the garden has collapsed. If this is the case, it is necessary to replace the missing filter layers and restore the level of the garden surface.
- The contractor has a one-year guarantee on construction, equipment and planting.
- Maintenance - Department of Greenery and Utilities, Bydgoszcz City Hall



Challenges and constraints:

- The very centre of the city
- Compact built-up area (limited space)
- Limited availability of land
- High degree of site sealing
- Extensive and partly not inventoried underground infrastructure
- Collision with existing technical infrastructure



ARRANGEMENTS REQUIRED, ADDITIONAL DIFFICULTIES

Arrangements required:

- Opinion of the City Visual Designer

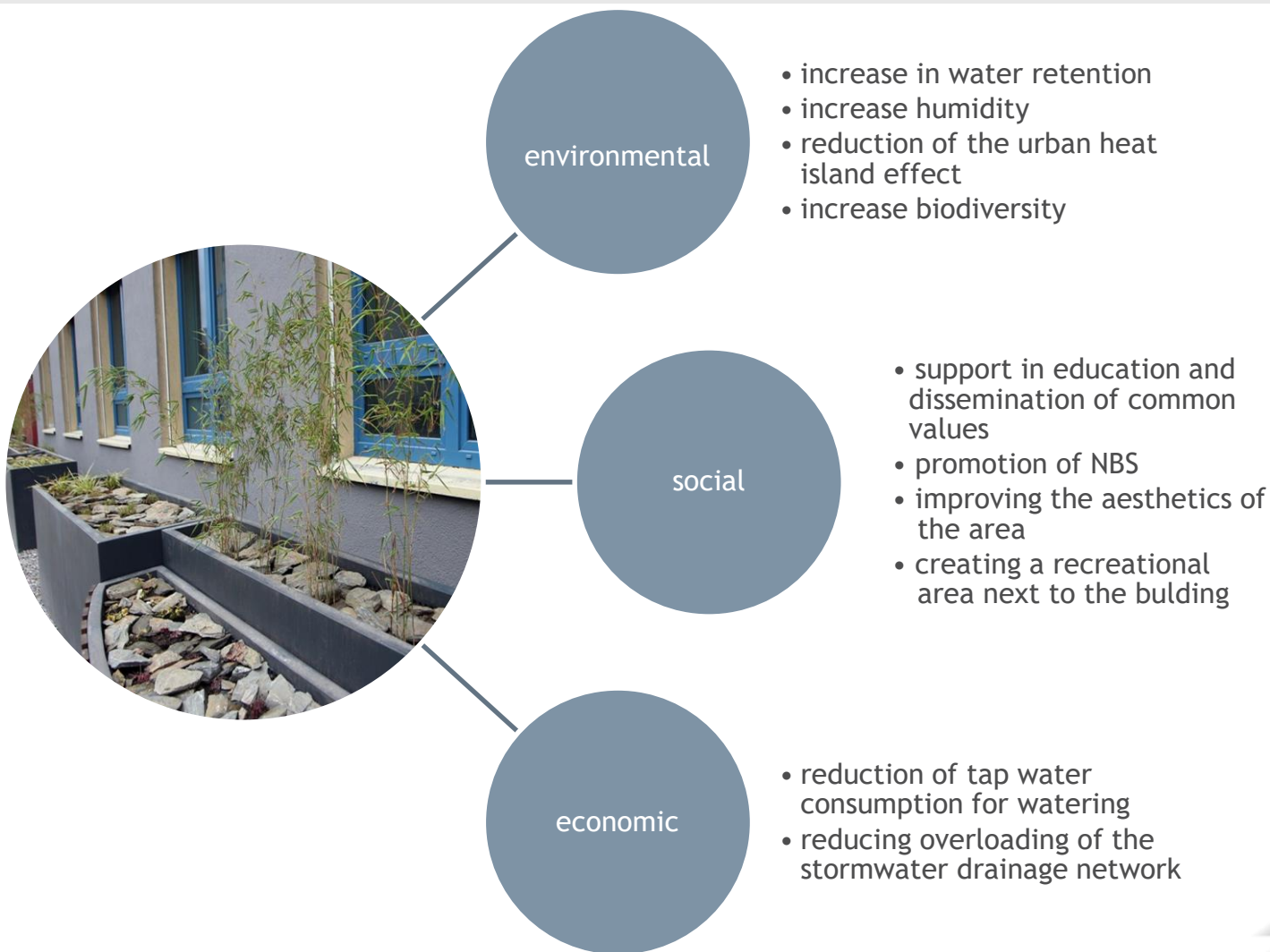
The need to maintain aesthetic coherence with the newly designed Park & Ride facility, located at present nearby



Additional difficulties:

- Limited choice of ready-made products for building a rain garden
- Lack of knowledge and experience of those responsible for the project





DANE KONTAKTOWE



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