

# Water Recycling Toolbox

## Rain garden for the greening of a public car park

Braniewo Municipality

Gdańsk University of Technology

Real-world pilot replication blueprint



Introduction to the pilot measure  
**Rain garden for the greening  
of a public car park**  
Braniewo Municipality  
Gdańsk University of Technology

15 March 2023





**GDAŃSK UNIVERSITY  
OF TECHNOLOGY**

**WaterMan Kick-off meeting  
Kalmar & Västervik, Sweden (14-16/03/2023)**



**Braniewo Municipality (PP5) &GUT (PP7)**

**Presented by Magdalena Gajewska**





WP- 2 PILOTING

WaterMan pilot actions in Braniewo (Poland)

- 2.2 Pilot measure / recirculation of retained water: **Urban raingarden at public swimming pool**
- 2.3 Pilot measure / reuse of treated water: **Reuse of public swimming pool water**
- 2.4 Local model strategy: **Municipal water re-use strategy**

Responsible Project Partner:

**Braniewo Municipality (PP 5)**



**Gdansk University of Technology (PP7),**  
Faculty of Civil and Environmental Engineering





## Municipal Sports Center „Zatoka”

↳ Recreation & Rehabilitation Complex „Healthy Braniewo”

### Infrastructure:

- **Indoor pool complex:**

- sport swimming pool
- leisure pool with wading pool
- SPA bath

- **Wellness facilities:**

- sauna rooms (x2)
- gym
- massage parlour
- rest zone
- tanning beds



[Source: geoportal.gov.pl]

### Location:

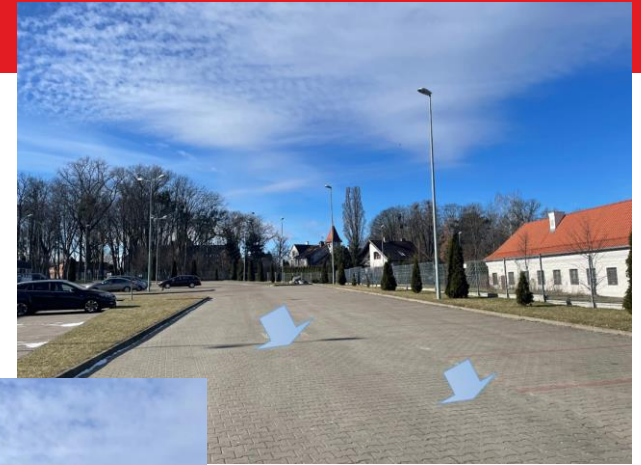
Łąkowa 1 Street, **Braniewo**, Poland



[Source: mos.braniewo.pl]



## 2.2 Pilot measure / recirculation of retained water: Urban rain garden at public swimming pool





2.2 Pilot measure / recirculation of retained water: Urban raingarden at public swimming pool

5 PLACE FOR  
RAINGARDEN

Retention flowerbed





2.2 Pilot measure / recirculation of retained water: Urban raingarden at public swimming pool

5 PLACE FOR  
RAINGARDEN





2.2 Pilot measure / recirculation of retained water: Urban raingarden at public swimming pool





## 2.2 Pilot measure / recirculation of retained water: Urban rain garden at public swimming pool

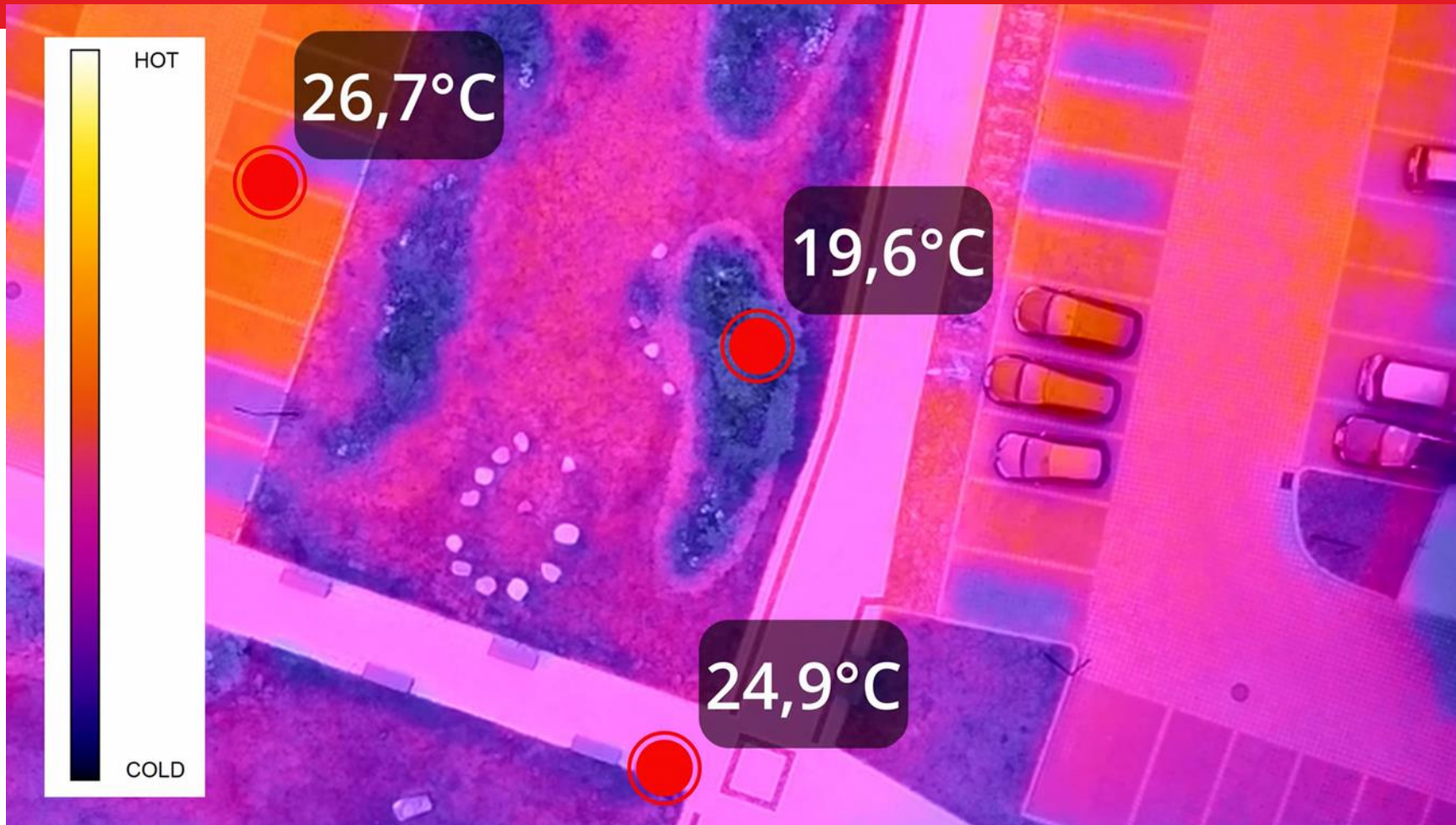


JAGGED CURBS





## 2.2 Pilot measure / recirculation of retained water: Urban rain garden at public swimming pool





## 2.2 Pilot measure / recirculation of retained water: Urban rain garden at public swimming pool



GUTTER



## 1st Peer-review session

# Rain garden for the greening of a public car park

Braniewo Municipality

Gdańsk University of Technology

5 Sept 2023





**GDAŃSK UNIVERSITY  
OF TECHNOLOGY**

**WaterMan Partner meeting & on-site visit  
Ringsted & Kalundborg / DK  
5-6 Sept 2023**



**Braniewo Municipality (PP5) &GUT (PP7)**

**Presented by Magdalena Gajewska**





WP- 2 PILOTING

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**Recirculation of retained water: Urban raingarden at public swimming pool**

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## issues and challenges

### ISSUES

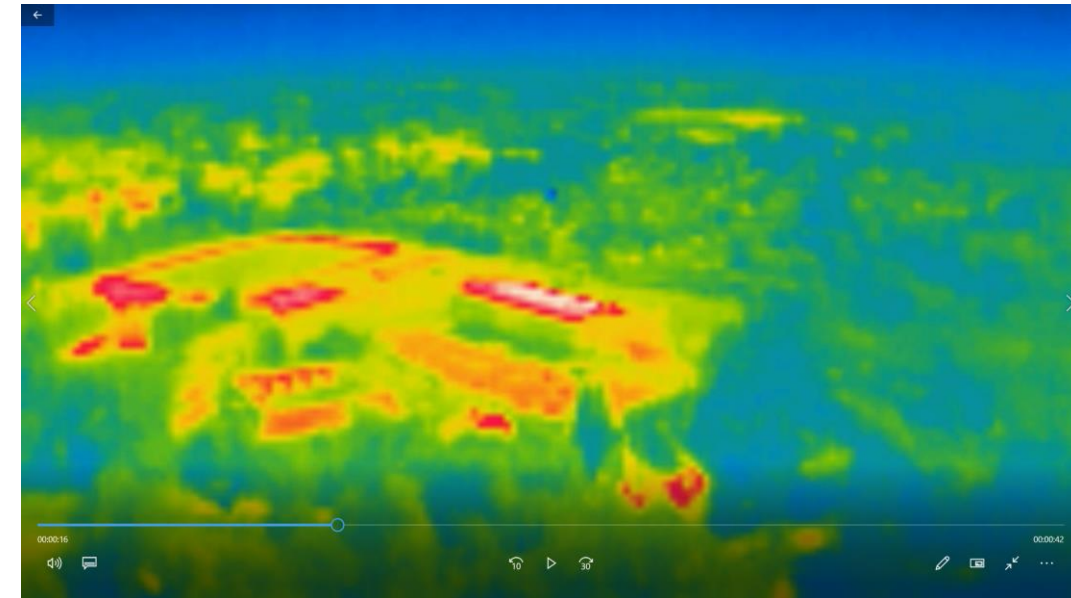
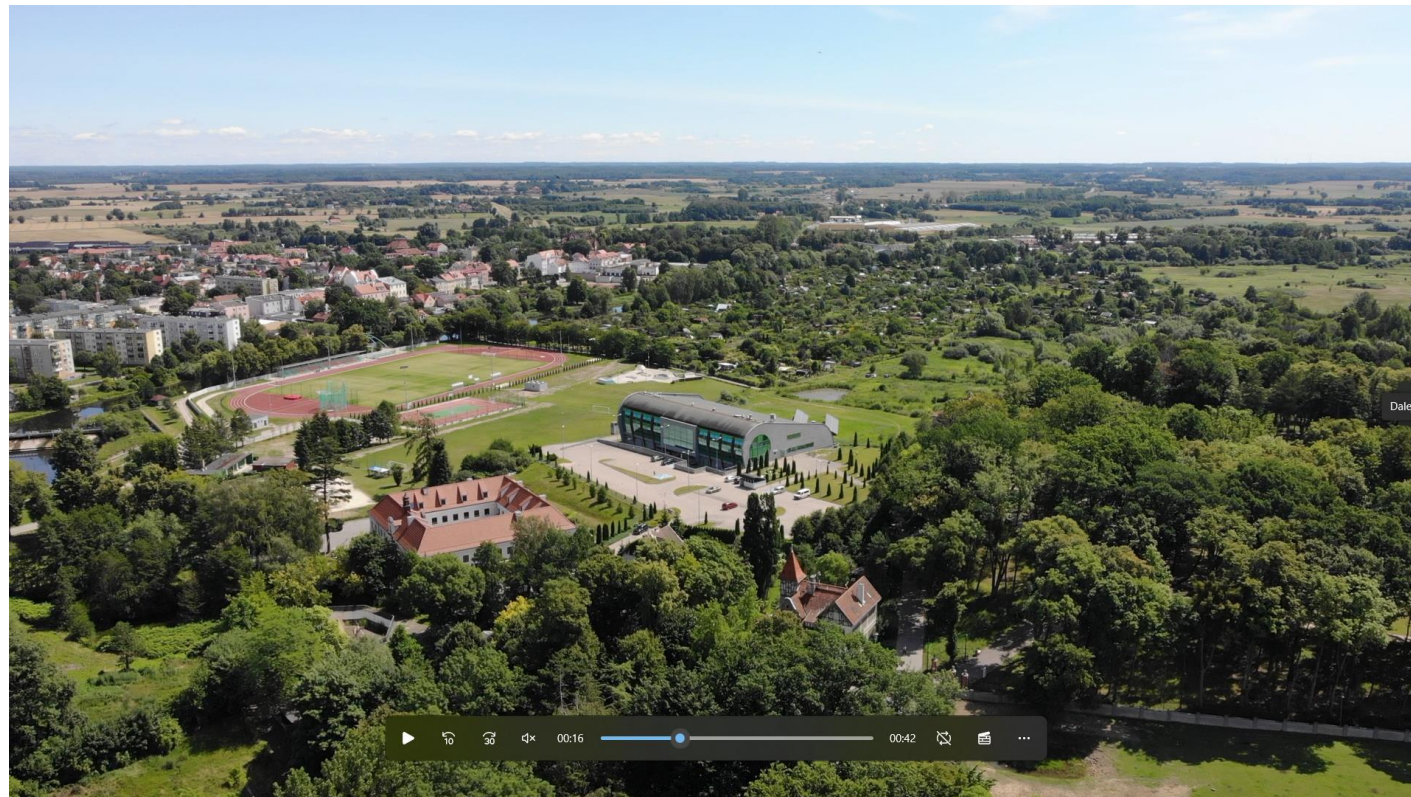
- **concreted area around the swimming pool building - parking lot and surroundings:**
  - **heats up (urban heat island effect)**
  - **generates a large surface runoff during precipitation**
  - **rainwater drained to the rainwater drainage system**
  - **a small amount of urban greenery - mainly grass - dries up or is watered with tap water**

### CHALLENGES :

- **transformation of urban greenery into functional greenery**
- **retain rainwater at the point of origin**

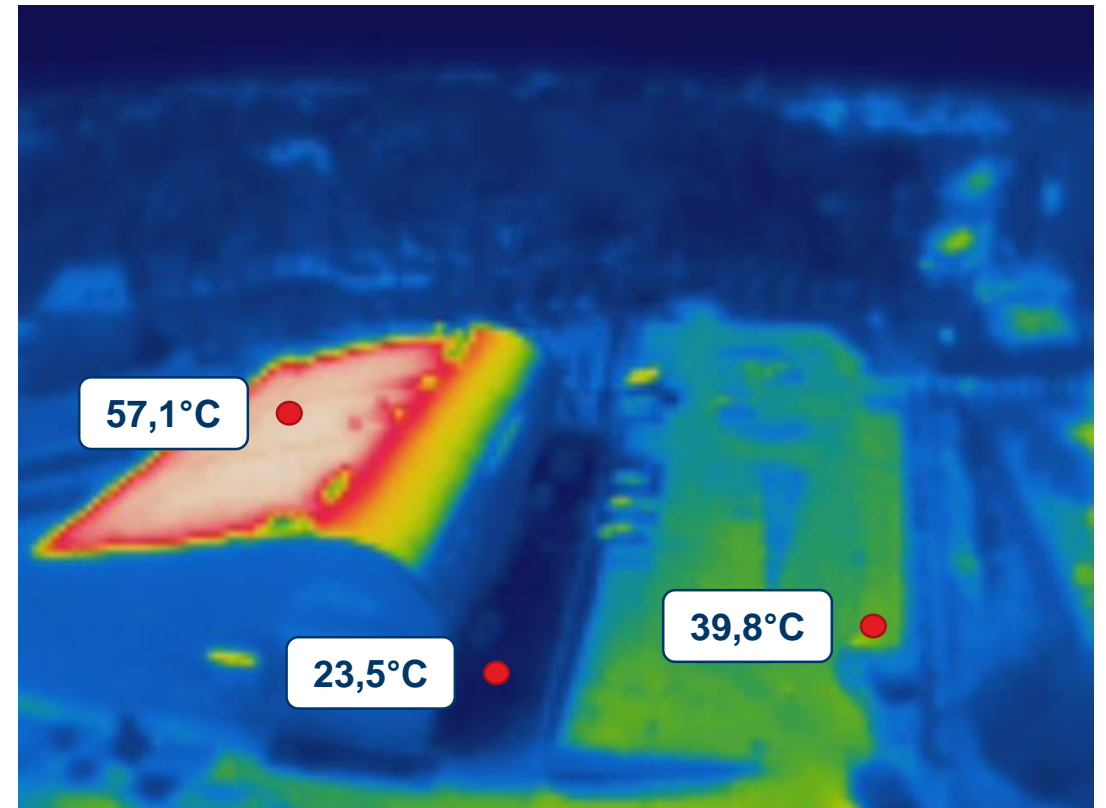


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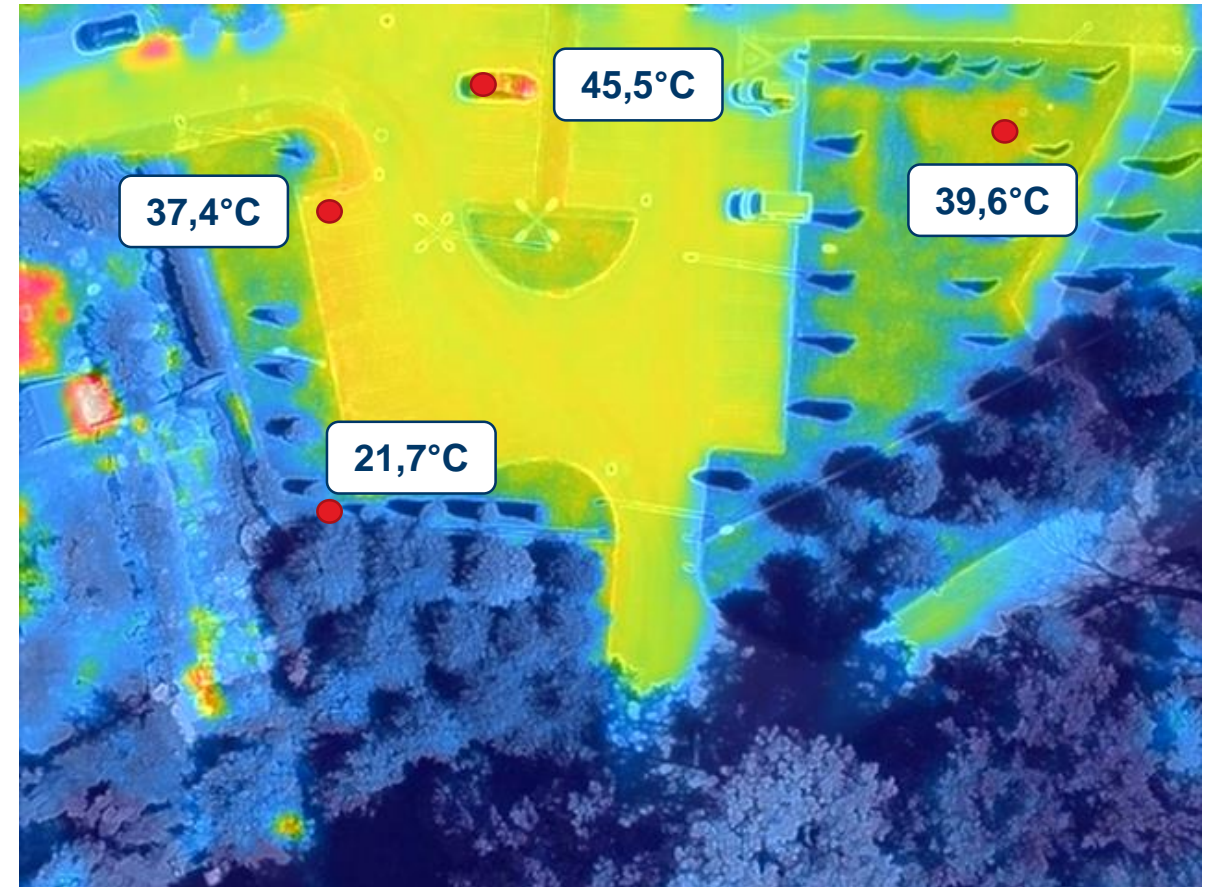


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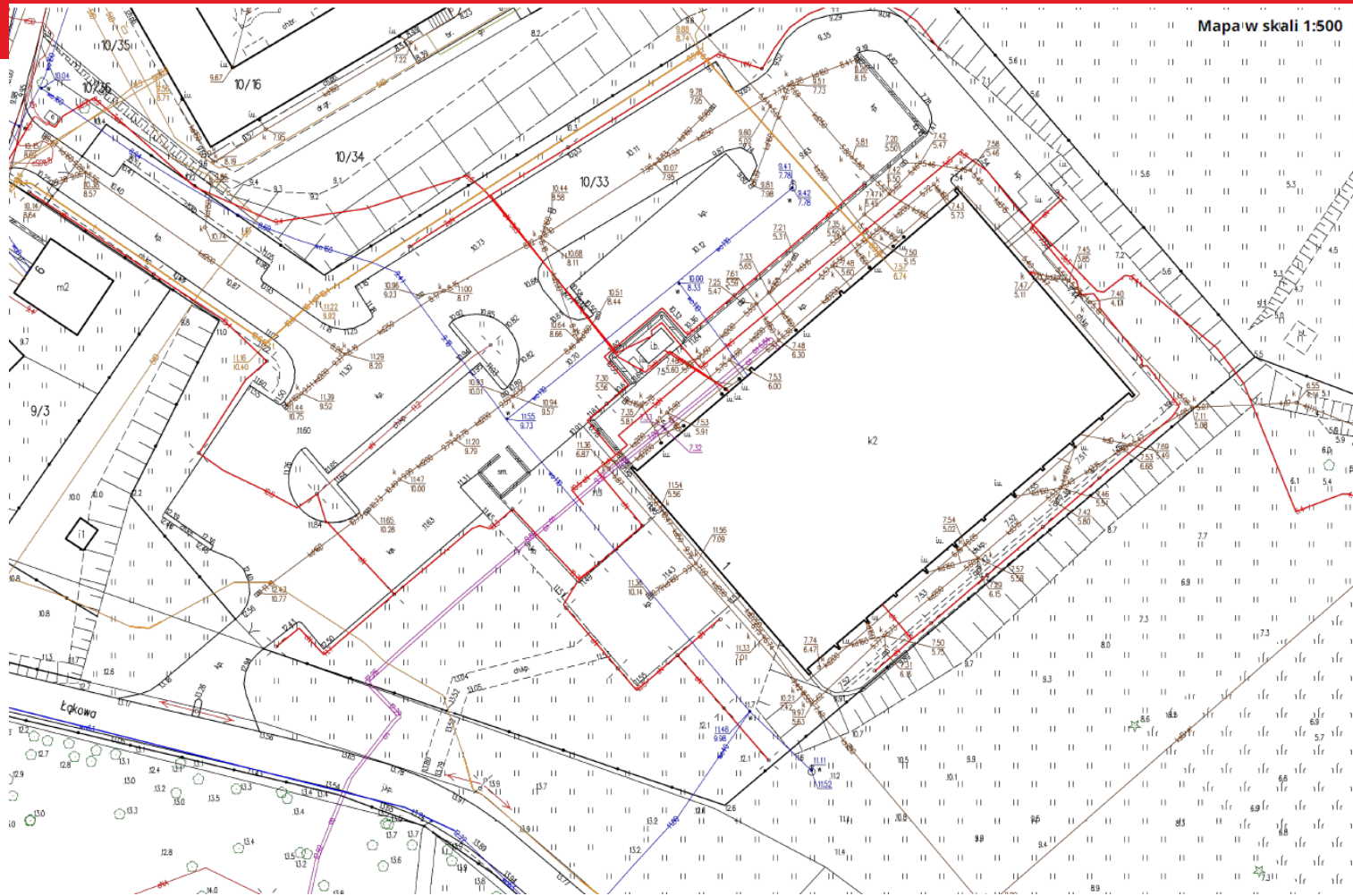


## 2.2 Pilot measure / recirculation of retained water: Urban rain garden at public swimming pool





## 2.2 Pilot measure / recirculation of retained water: Urban raingarden at public swimming pool



Catchment area:  
~ 10 000 m<sup>2</sup>

Main assumption - precipitation to manage:  
30 mm from each m<sup>2</sup> of impermeable pavement

Roof area:  
~ 2 000 m<sup>2</sup>



Rain water volume:  
~ 65 m<sup>3</sup>

Parking area:  
~ 3 500 m<sup>2</sup>

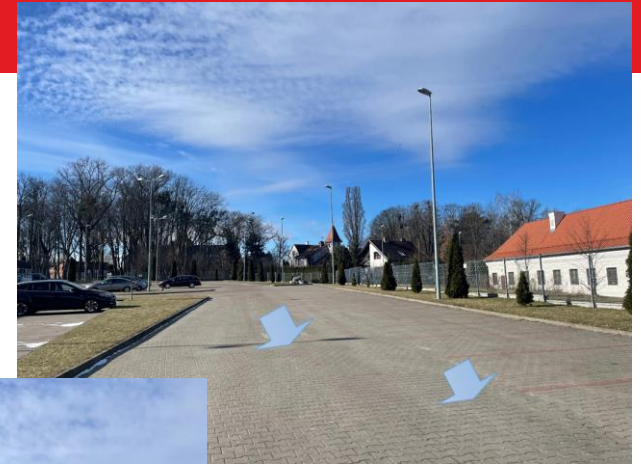


Rain water volume:  
~ 125 m<sup>3</sup>

Street area:  
~ 800 m<sup>2</sup>



## 2.2 Pilot measure / recirculation of retained water: Urban rain garden at public swimming pool





## 2.2 Pilot measure / recirculation of retained water: Urban raingarden at public swimming pool

### 5 PLACE FOR RAINGARDEN

Retention flowerbed





2.2 Pilot measure / recirculation of retained water: Urban raingarden at public swimming pool

5 PLACE FOR  
RAINGARDEN





2.2 Pilot measure / recirculation of retained water: Urban raingarden at public swimming pool





## 2.2 Pilot measure / recirculation of retained water: Urban rain garden at public swimming pool



JAGGED CURBS





## 2.2 Pilot measure / recirculation of retained water: Urban rain garden at public swimming pool



GUTTER





## BENEFITS

- 1. no discharges or limiting the amount of rainwater discharged into the stormwater sewage system and its use for maintaining greenery- economic benefit**
- 2. limiting the need to water the greenery with tap water on the premises - economic benefit- reuse of rainwater ( CE)**
- 3. lowering the ambient temperature - reducing the urban heat Island – ecosystem service benefit (human well being)**
- 4. increasing biodiversity- ecosystem service benefit**
- 5. improving the aesthetics of the place and creating a place of rest – ecosystem service (human well being)**

# 1<sup>st</sup> Peer & expert review session: Recommendations & conclusions

- Retention tank for rainwater: Consider “nature embedded” / green design (e.g. with vegetation on the top), in order to avoid creating another steel construction. Otherwise, the tank may counteract the ambitions to make the swimming pool surroundings greener and to decrease the temperature.
- The swimming pool roof may be a better place for the photovoltaics (solar panels), than placing it on top of the retention tank. Maybe in this way the panels could even generate the energy for the whole process?
- Keep an eye on salinity (important for watering the grass). Do you need to lower salt concentrations in times of low precipitation and if yes, how can they be ensured (not mixing with rainwater)?
- Reconsider monitoring of bacteria, if e.g. the storage time of water in the tank is long. Question: Will mixing rainwater & pool water be enough to keep the water disinfected with the help of the residual chlorine?).
- Put “water reuse” on the local agenda in parallel to the planning & implementation. Start the stakeholder involvement as soon as possible. Inform the public about the plans early.

## Absorption report

# Rain garden for the greening of a public car park

Braniewo Municipality

Gdańsk University of Technology

07 November 2023





**GDAŃSK UNIVERSITY  
OF TECHNOLOGY**

## Absorption report: Pilot measures in Braniewo / PL

Uptake of recommendations & adjustments of the concept after the 1st  
peer & expert review session

**Braniewo Municipality (PP5) & GUT (PP7)**

**Presented by Magdalena Gajewska**

Ronne 07-11-2023





WP- 2 PILOTING

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## 4 of 9

- 4. Retention tank for rainwater & swimming pool water : Consider “nature embedded” / green design (e.g. with vegetation on the top), in order to avoid creating another steel construction. Otherwise, the tank may counteract the ambitions to make the swimming pool surroundings greener and to decrease the temperature.**
- **Initial assumptions envisioned the construction of an underground tank, with photovoltaic panels installed on the pool ceiling**
  - **We recommend the construction of an open tank with a vegetation area, which will contribute to the renaturalization of the water discharged from the pilot.**



## 5 of 9

- 5. The swimming pool roof may be a better place for the photovoltaics (solar panels), than placing it on top of the retention tank. Maybe in this way the panels could even generate the energy for the whole process**
  - **The issue of photovoltaic panels is not the subject of the WaterMan project.**
  - **There is a need to change the initially proposed location if the open retention tank option is accepted.**
  - **Placing panels on the roof would require a construction expertise.**



## 6 of 9

- 6. Keep an eye on salinity (important for watering the grass). Do you need to lower salt concentrations in times of low precipitation and if yes, how can they be ensured (not mixing with rainwater)?**
- **We are aware of the problem caused by excessive saltwater irrigation of the grass, and field studies are planned on a section of the field.**
  - **The technology for purifying pool water in the pilot facility will be focused not only on achieving the required quality parameters but also on limiting further increases in water salinity.**
  - **The only realistic method to reduce salinity is the use of membrane methods (reverse osmosis), and we are prepared to conduct such studies.**
  - **An effective method that reduces the negative environmental impact is precisely the mixing of pool water with rainwater.**



- 7. Reconsider monitoring of bacteria, if e.g. the storage time of water in the tank is long. Question: Will mixing rainwater and pool water be enough to keep the water disinfected with the help of the residual chlorine?**
- **Water intended for watering lawns does not need to be devoid of bacteria; however, it cannot contain indicator bacteria (E.coli and Legionella if aerosols are formed). Such bacteria may be present in used pool water. Chlorination is an effective method for their elimination, thus preventing their secondary proliferation in the retention tank.**



- 9. Put “water reuse” on the local agenda in parallel to the planning and implementation. Start the stakeholder involvement as soon as possible. Inform the public about the plans early.**
- Appropriate information activities regarding the local water reuse strategy are carried out in the Braniewo commune. Further dedicated actions are also planned.**

## 2nd Peer-review session

# Rain garden for the greening of a public car park

Braniewo Municipality

Gdańsk University of Technology

7 November 2024





# **WaterMan All-partner Meeting**

**Berlin 4-7 November 2024**

**Braniewo (PP5) & GUT (PP7)**



## Municipal Sports Center „Zatoka”

↳ Recreation & Rehabilitation Complex „Healthy Braniewo”

### Infrastructure:

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  - leisure pool with wading pool
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- **Wellness facilities:**
  - sauna rooms (x2)
  - gym
  - massage parlour
  - rest zone
  - tanning beds



[Source: geoportal.gov.pl]

### Location:

Łąkowa 1 Street, Braniewo, Poland



[Source: mos.braniewo.pl]



**Braniewo / PL:**

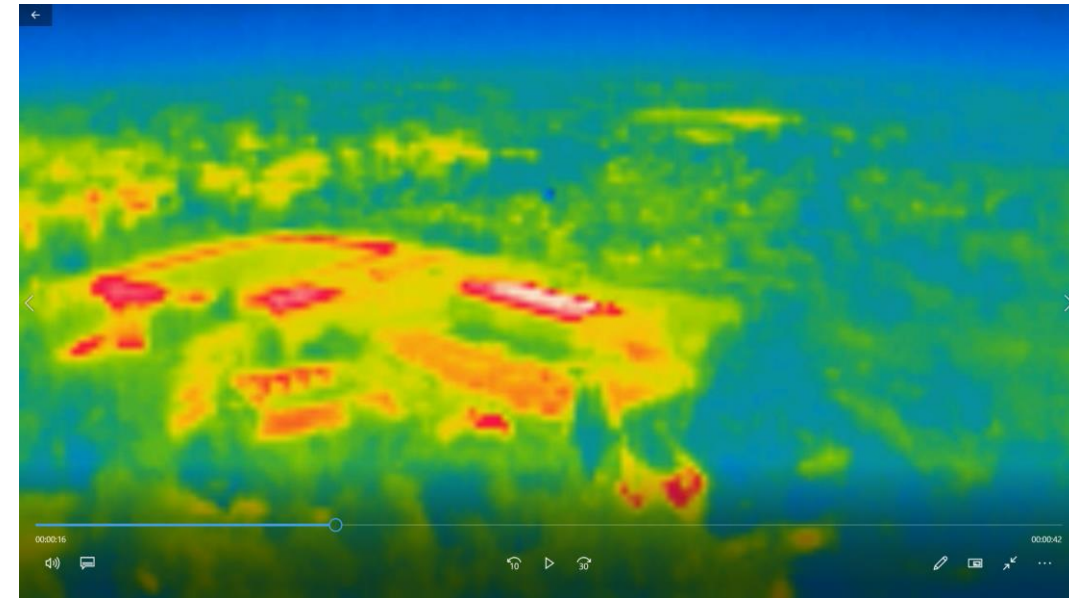
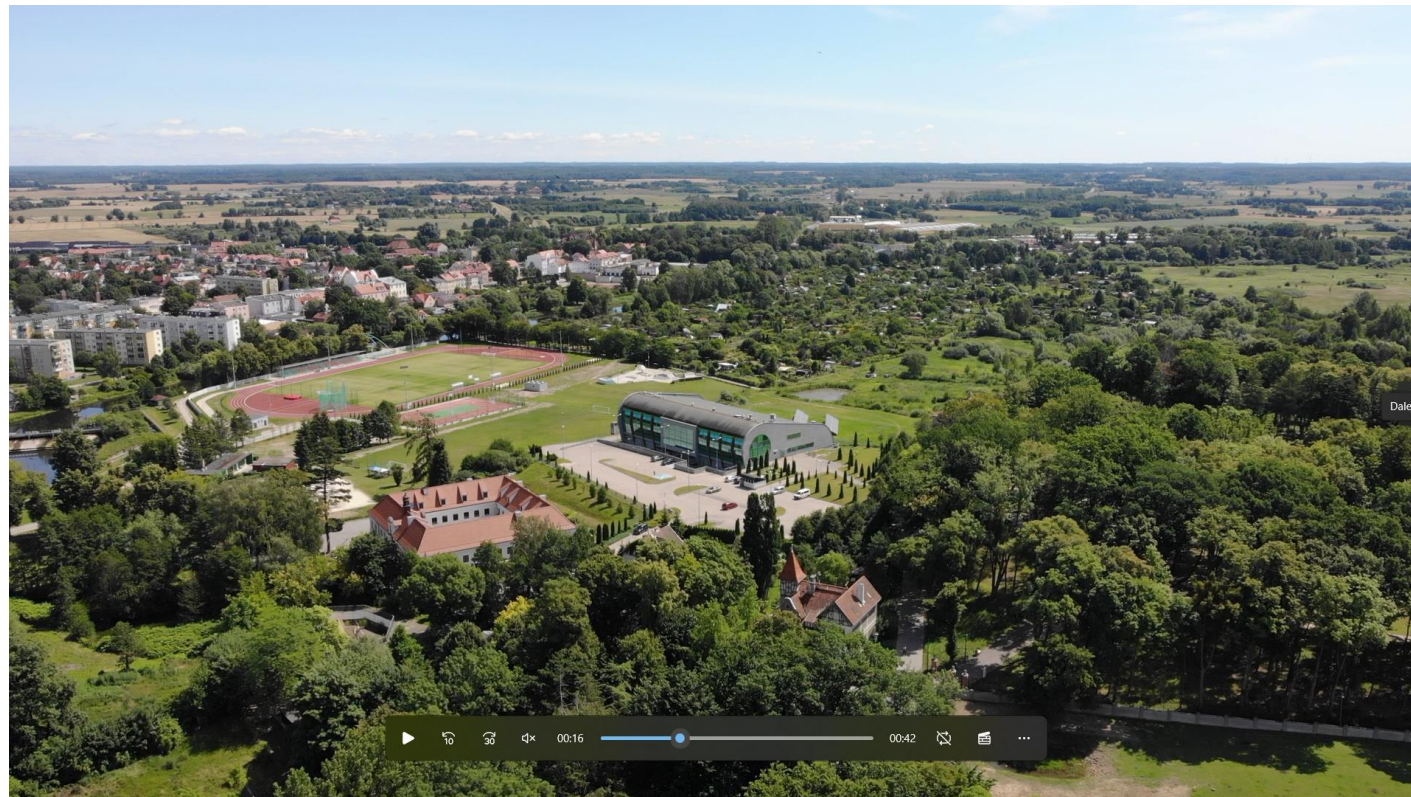
**Reusing swimming pool water for irrigation of  
football fields**

**&**

**Creating urban rain gardens in the Municipal  
Sports Centre**

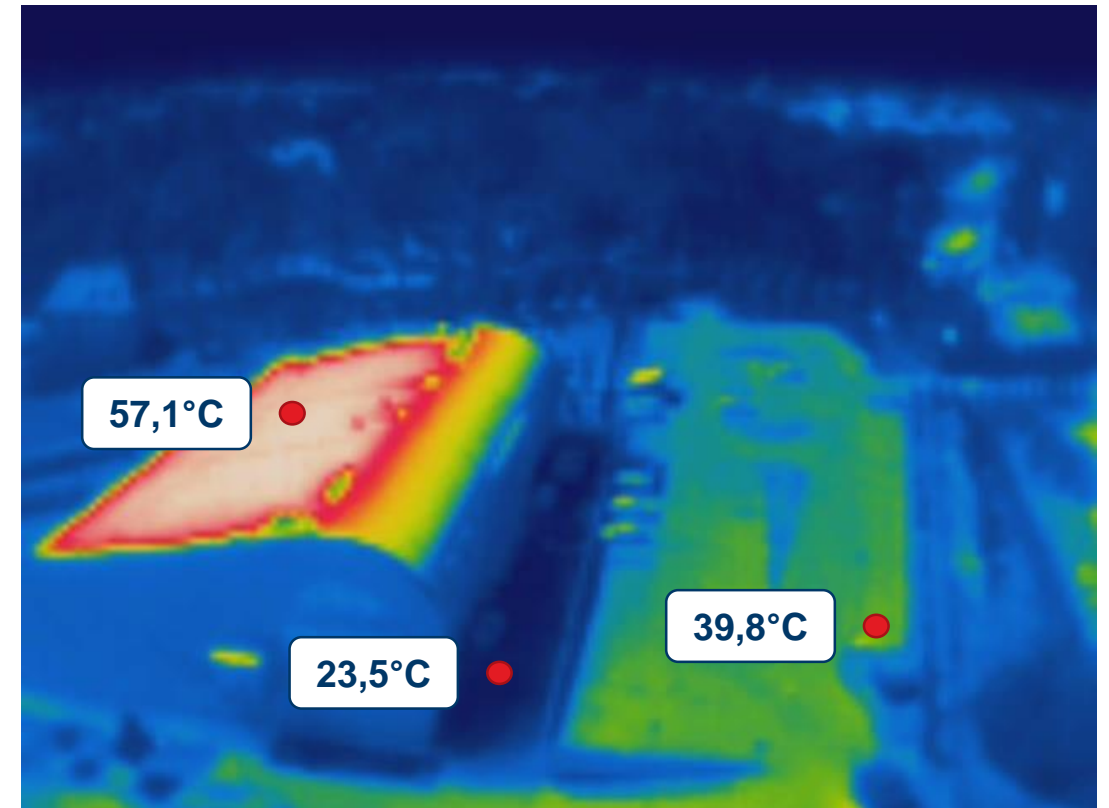


# Creating urban rain gardens in the Municipal Sports Centre



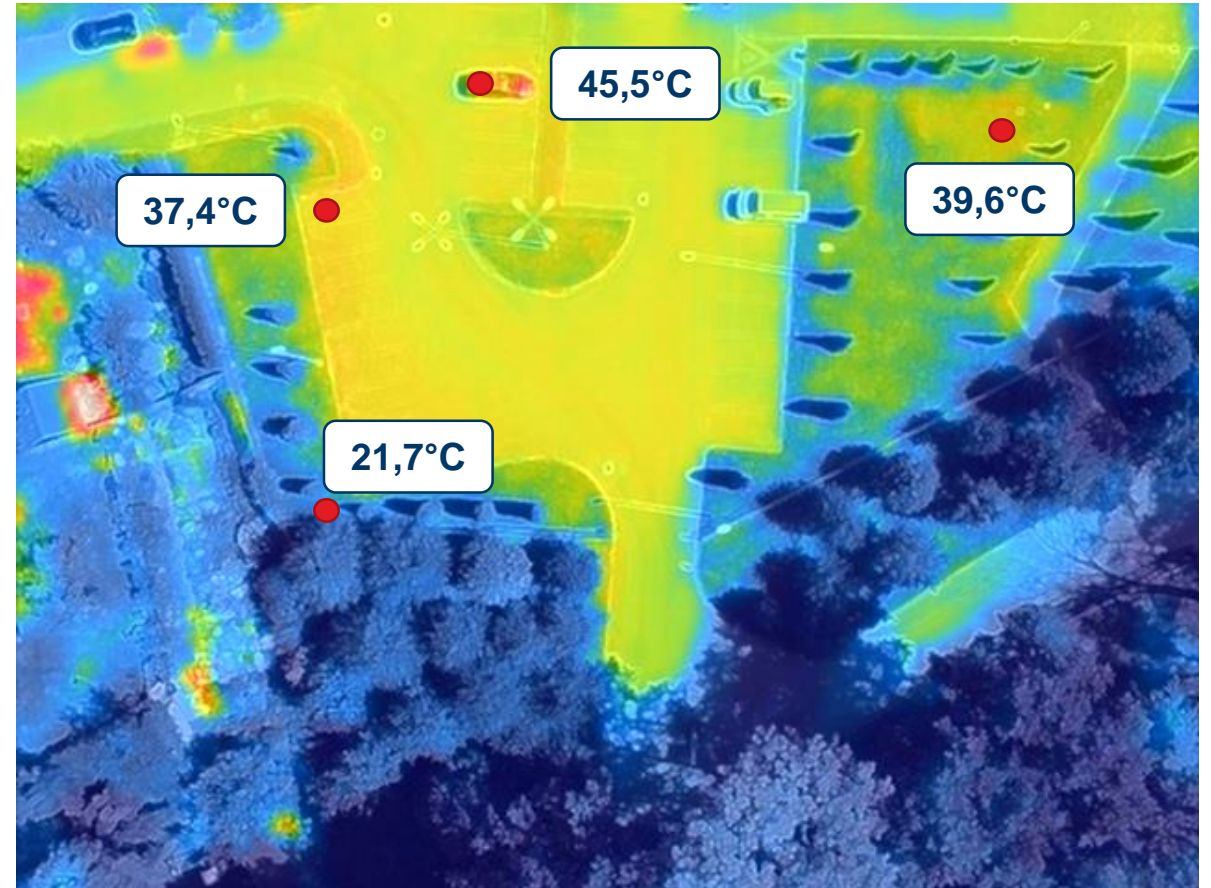


## Creating urban rain gardens in the Municipal Sports Centre

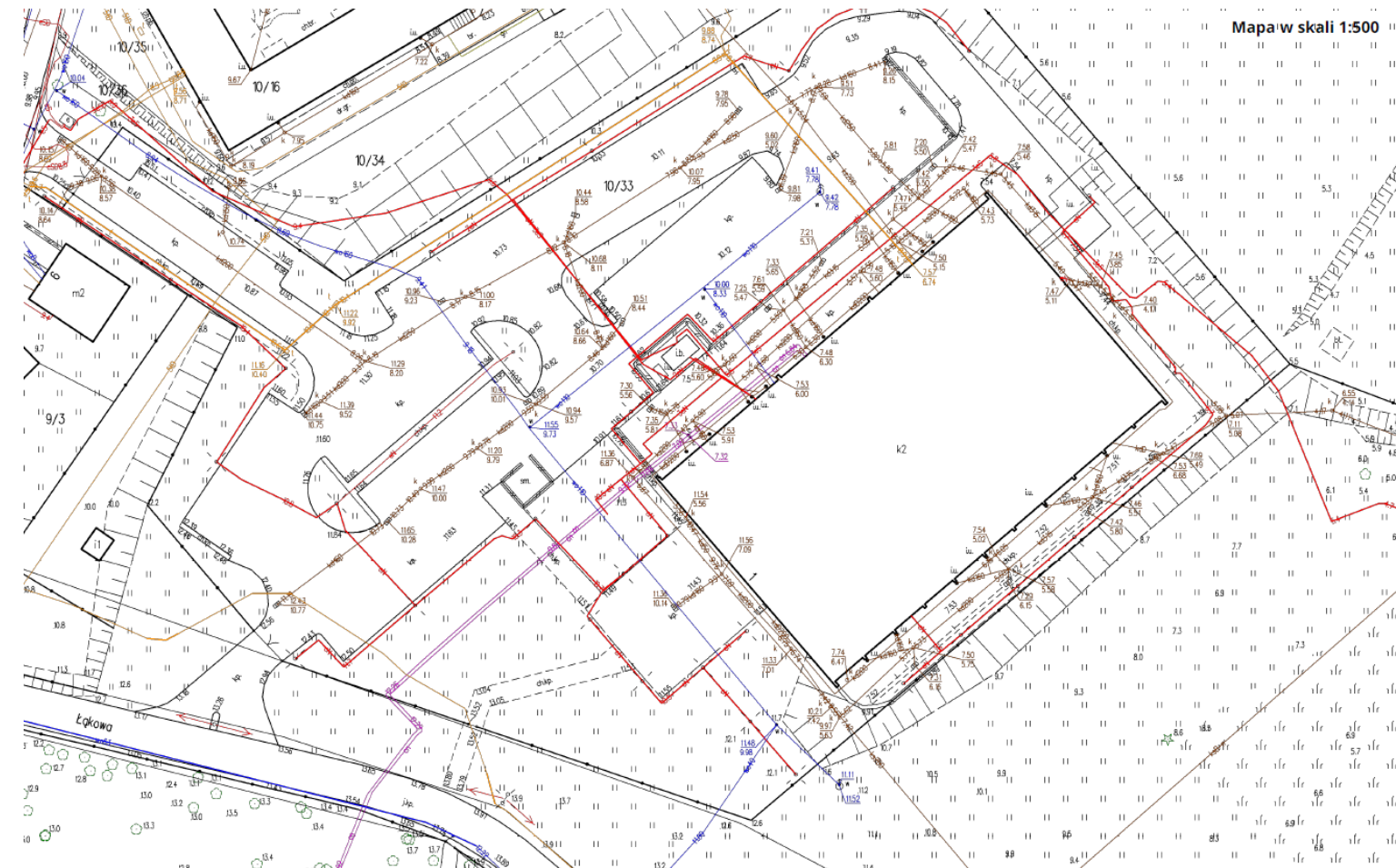




## Creating urban rain gardens in the Municipal Sports Centre



## Creating urban rain gardens in the Municipal Sports Centre



Catchment area:  
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Main assumption - precipitation to manage:  
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Roof area:  
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Rain water volume:  
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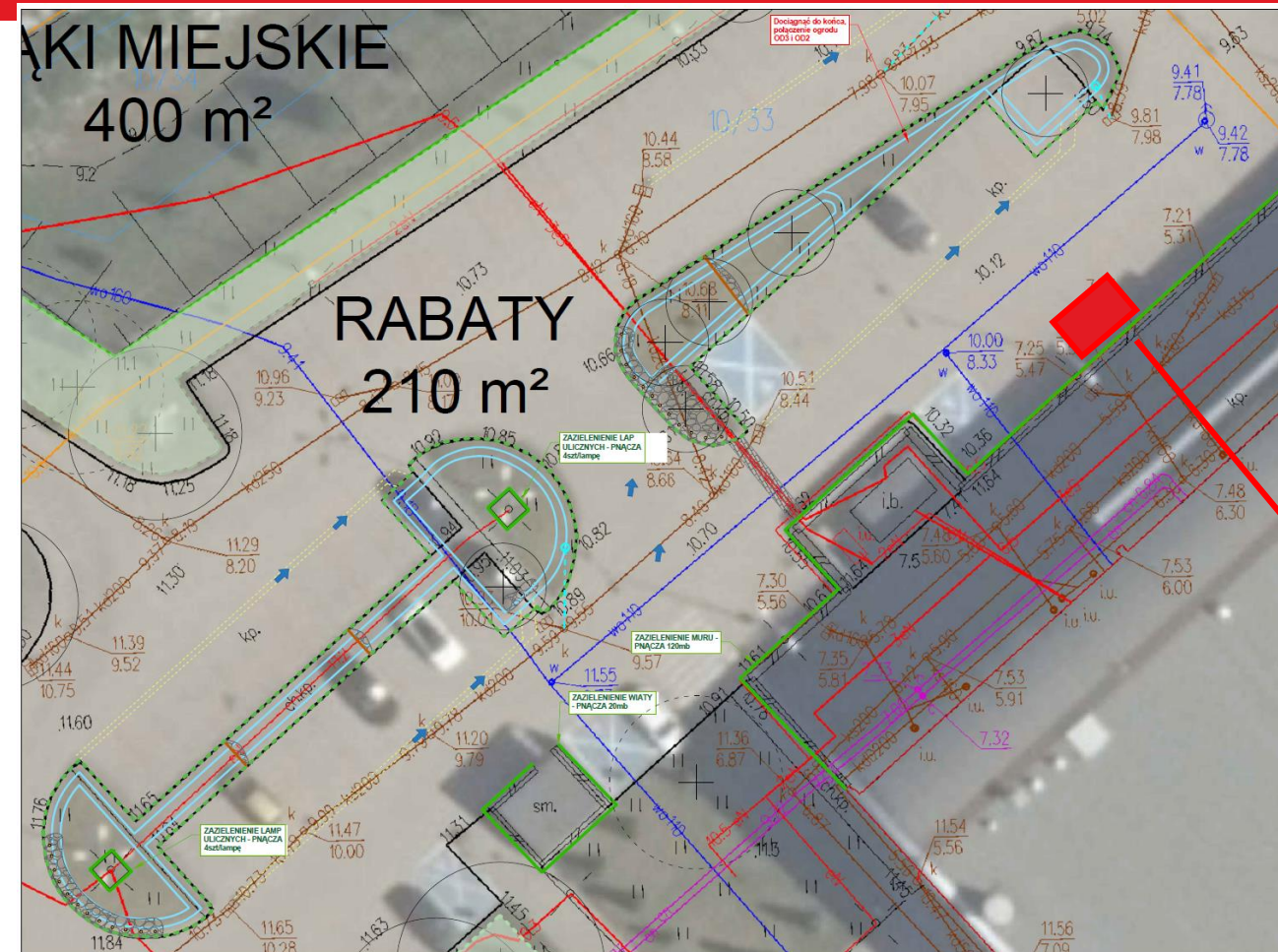


## Creating urban rain gardens in the Municipal Sports Centre





## Creating urban rain gardens in the Municipal Sports Centre



1. Flower meadow – 400 m<sup>2</sup>
2. Retention flowerbed – 210 m<sup>2</sup>
3. 2 parking places taken for greenery
4. Greening of street lamps - climbing plants
5. Greening of rubbish sheds - climbing plants
6. Greening the retaining wall - climbing plants

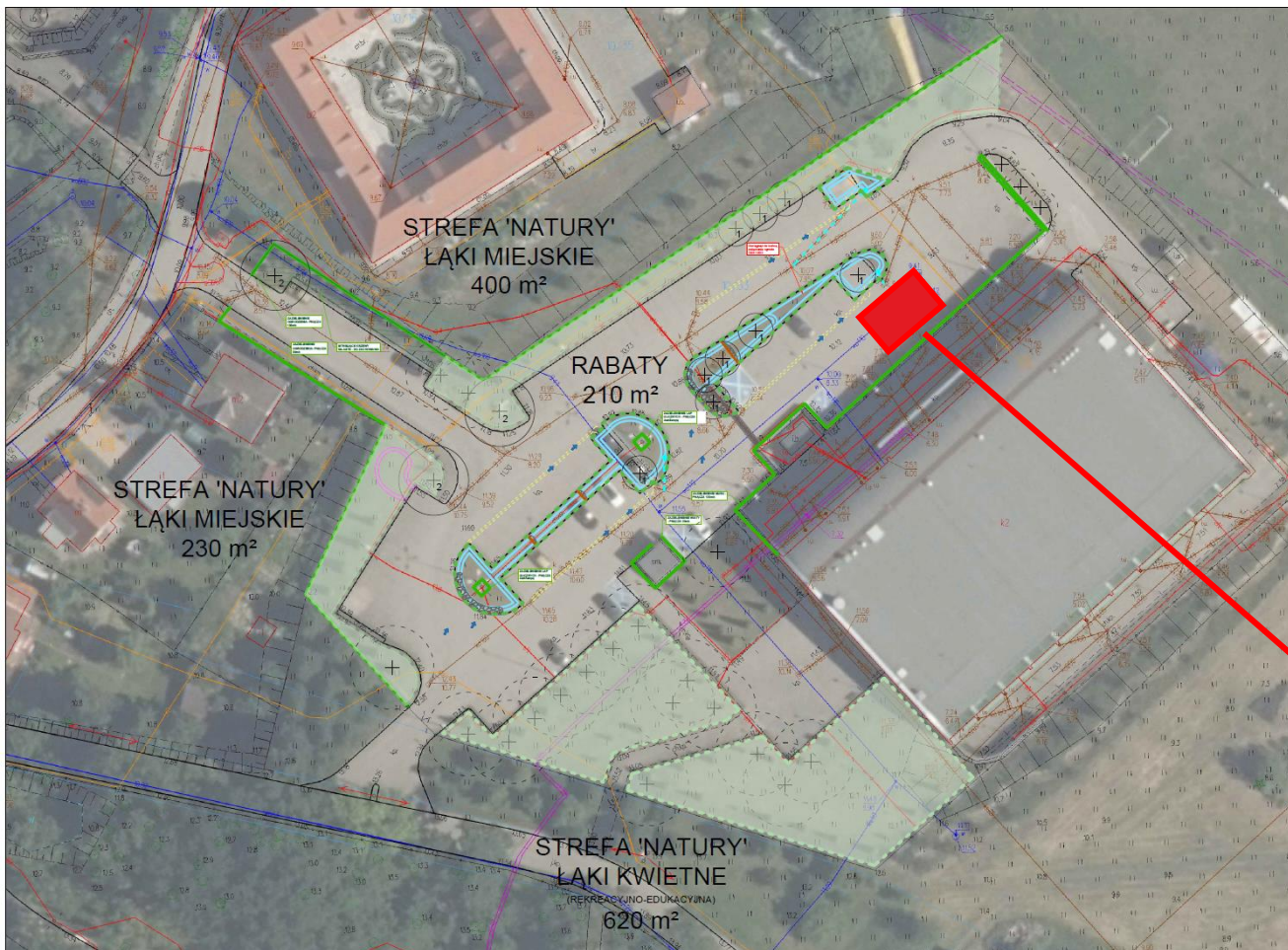
**Estir Closed retention tank (in the parking)** and care instructions:

Option 1: 280,000 PLN net. (approx. EUR 63,500 net)

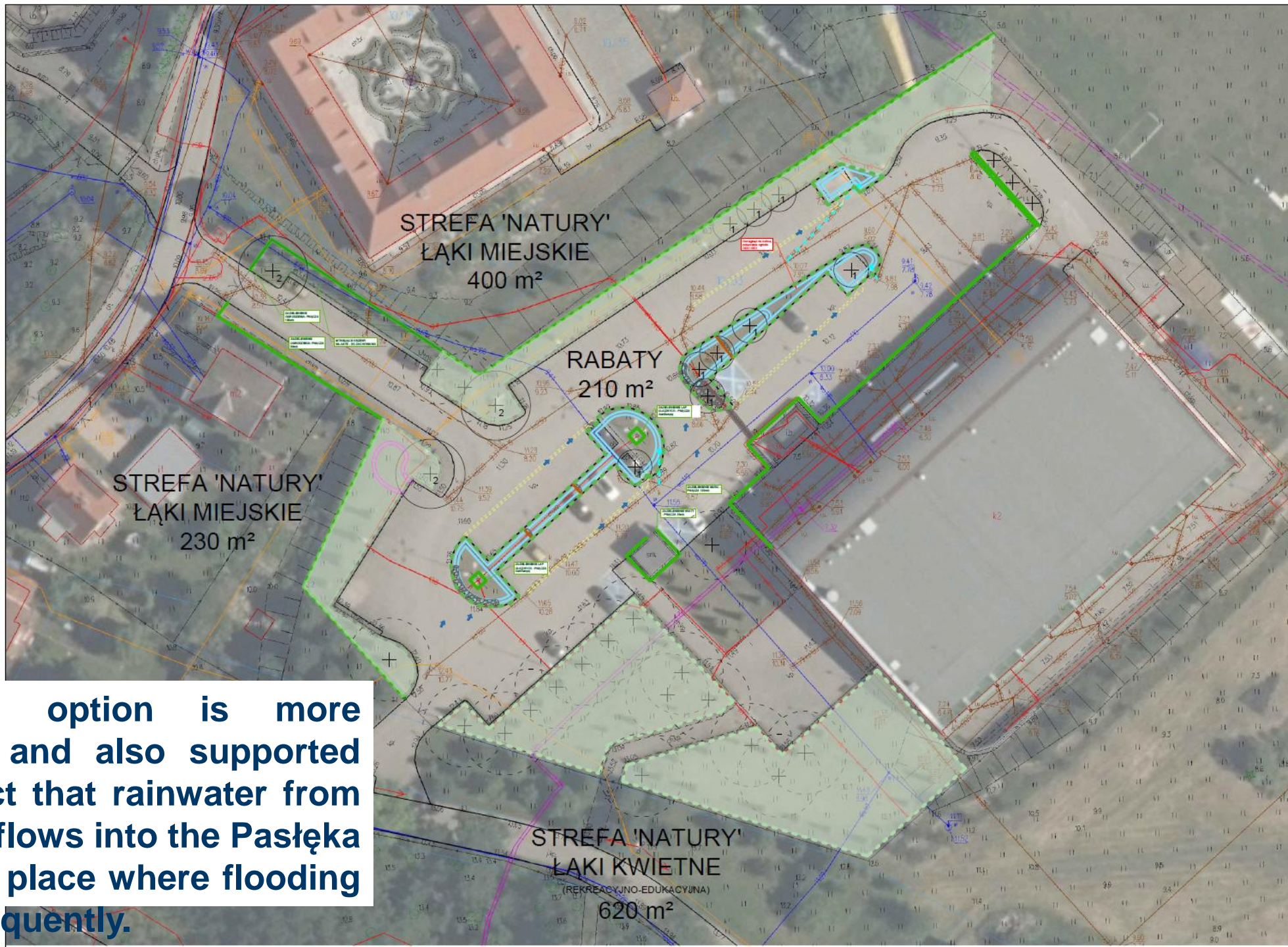




## Creating urban rain gardens in the Municipal Sports Centre



1. Flower meadows – 400 m<sup>2</sup> + 230 m<sup>2</sup>
2. Flower meadow including educational and recreational pathways – 670 m<sup>2</sup>
3. Retention flowerbed – 210 m<sup>2</sup>
4. 2 parking places taken for greenery
5. Greening of street lamps - climbing plants
6. Greening of rubbish sheds - climbing plants
7. Greening the retaining wall - climbing plants
- ... **Closed retention tank (in the parking)**



The 2nd option is more favorable and also supported by the fact that rainwater from the basin flows into the Pasłęka River in a place where flooding occurs frequently.



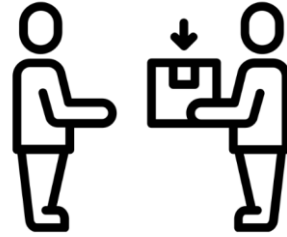
## Creating urban rain gardens in the Municipal Sports Centre

- 1. reducing the urban heat island effect**
- 2. improved drainage of the car park area and use of rainwater, which has so far been discharged into the drainage system to irrigate greenery and increase soil moisture - mitigating thermal conditions**
- 3. improvement of the local microclimate (air circulation, air purification from pollutants (dust, etc.),**
- 4. aesthetics of the space and increasing its attractiveness for visitors to the MSC (small architecture, camouflage greenery)**
- 5. economical approach to greenery maintenance**
- 6. increasing the awareness of the inhabitants of Braniewo regarding climate change and the operation of green infrastructure.**

# Involvement of Stakeholders

## By Association of Polish Communes Euroregion Baltic

# Recipients



- External stakeholders (external environment)
- Recipients/ local stakeholders - consumers of treated water
- Municipal employees representing the City Hall, budgetary entities and entities with a municipal budget share (other municipal workers from the nearest municipalities)
- Young people (school children, ecological youth clubs supported by teachers and school administration, parents' councils)
- General public

# Ways to engage them in the pilot programme and motivate them to use recycled water

## Possible actions:

- "Civic and Urban Engagement Days"
- A series of workshops titled "Water-Sensitive Cities"
- Conferences with dedicated training sessions for local government authorities, employees, and organizational units
- Awareness-Raising Events
- An Educational and Informational Campaign
- Contest for kids and youth



# Working with external stakeholders (external environment)

## Engaging and informing the invitation of various stakeholders:

### Central:

- Gospodarstwo Wody Polskie (National Water Agency)
- Ministry of Environment
- General Directorate for Environmental Protection (GDOŚ)
- Chief Inspectorate for Environmental Protection (GIOŚ)

### Regional level:

- Voivodeship Departments (Department of Environment and Agriculture);
- Regional Water Management Boards
- Regional Inspectorates for Environmental Protection carry out monitoring of water quality
- Voivodeship Fund for Environmental Protection and Water Management in Olsztyn

### County level:

- Counties (poviats):  
Poviat Environmental Protection and Water Management Fund (PFOŚiGW);  
District Sanitary and Epidemiological Station in Elbląg
- County Office (Poviat Starosty in Braniewo)

## AIMS:

- gain political and strategic support
- to strengthen the impact of project activity and impact area
- interest of external audiences and transferability of solutions
- better publicity and building up local government expertise in this area



**How to do it?** Individual invitations, bilateral meetings, participation in open events (project and external), invitation and study trip during event in Braniewo

# 2<sup>nd</sup> Peer & expert review session: Recommendations & conclusions

## Further info from the presentation:

- An option: underground reservoir – for private and for public use.
- New use case for autumn and winter (part of strategy, not part of the pilot): discharge the water to the ditches (to increase water table in the melioration ditches and ensure that the neighbouring soil benefits from the water in early spring). > Braniewo suffers mostly from the droughts in springtime – vegetation is suffering.

## Comments from the peer & expert review:

- Prioritize / organise users according to their needs & re-use demand. Perhaps also in relation to conditions (e.g. wet weather, dry weather – who will be allowed to use). This is very important.
- You have a lot of potential users. Select one user with which you will go to with “real testing”, evaluation, etc. We recommend here to have a very concrete, detailed plans for the last months of evaluation. Plan it now.

## Status updates

# Rain garden for the greening of a public car park

Braniewo Municipality

Gdańsk University of Technology

Date of updates



## Final review

# Rain garden for the greening of a public car park

Braniewo Municipality

Gdańsk University of Technology

24 September 2025





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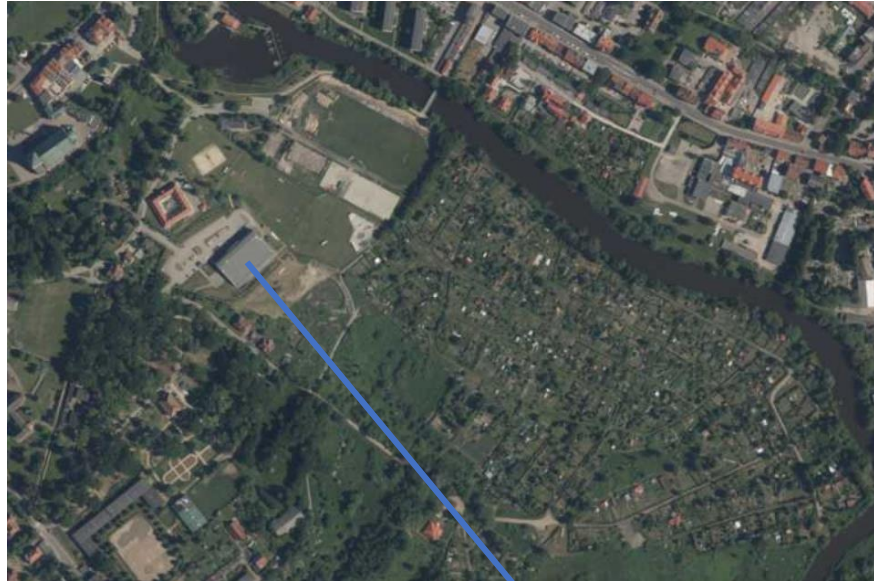
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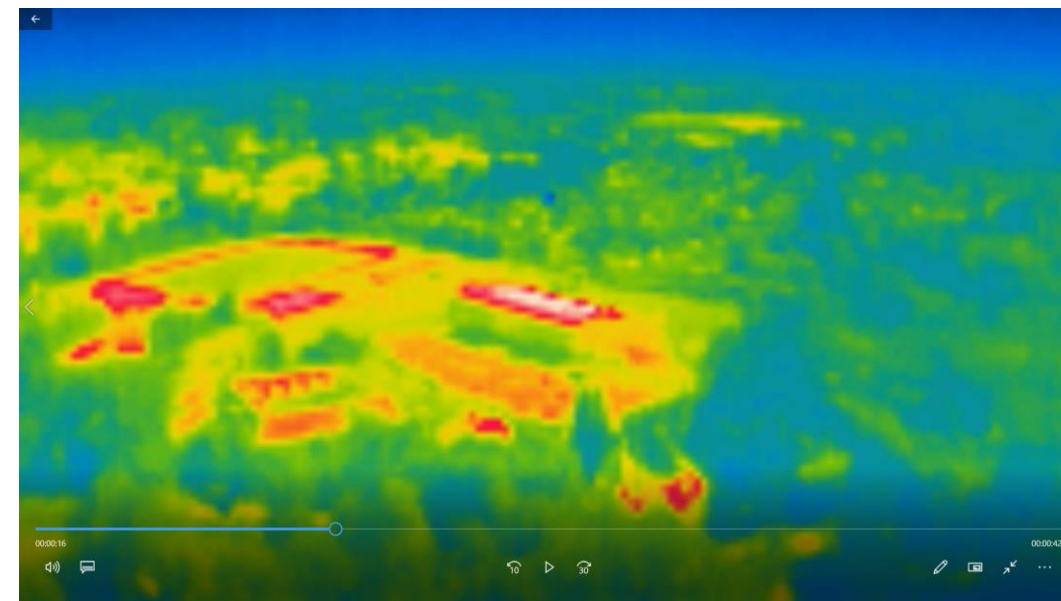
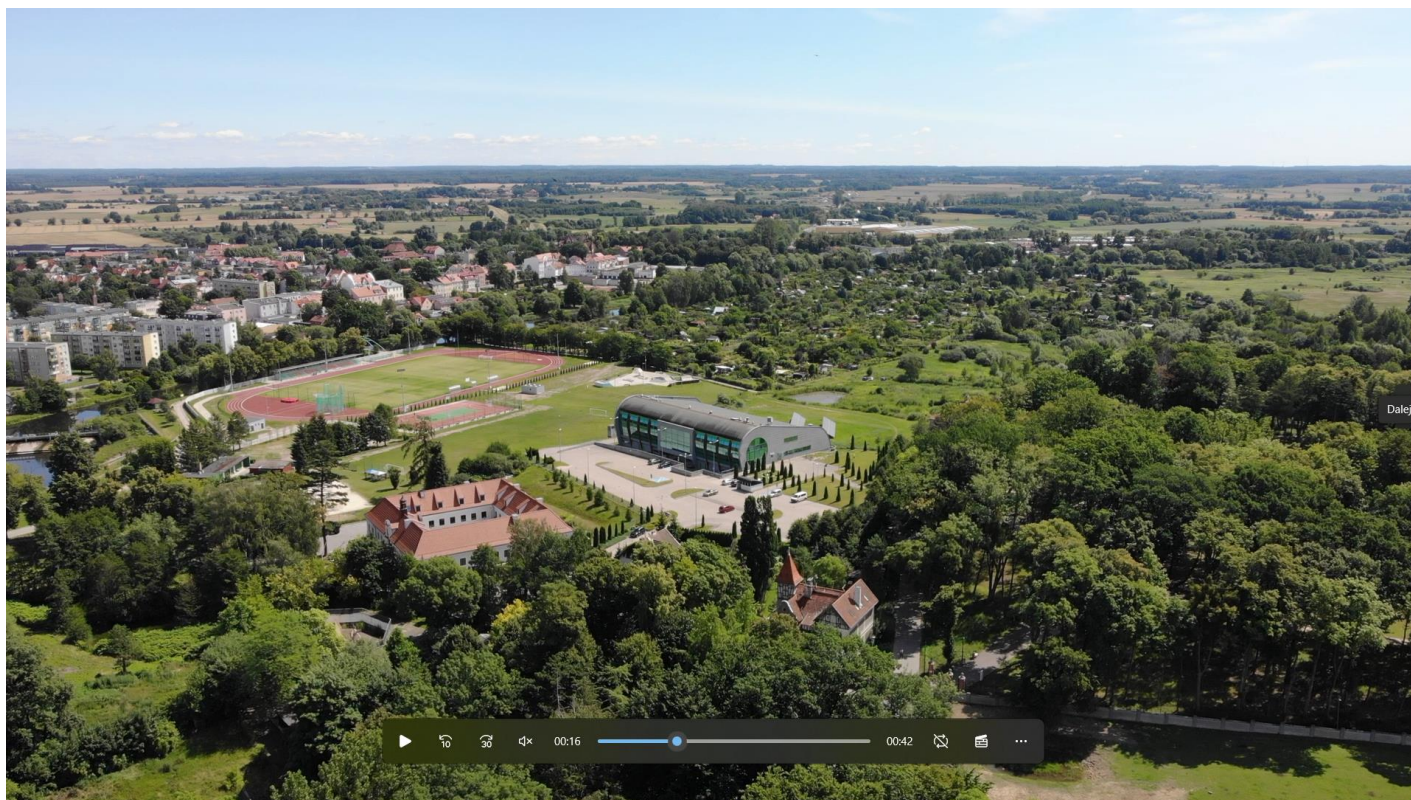
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Łąkowa 1 Street, Braniewo, Poland



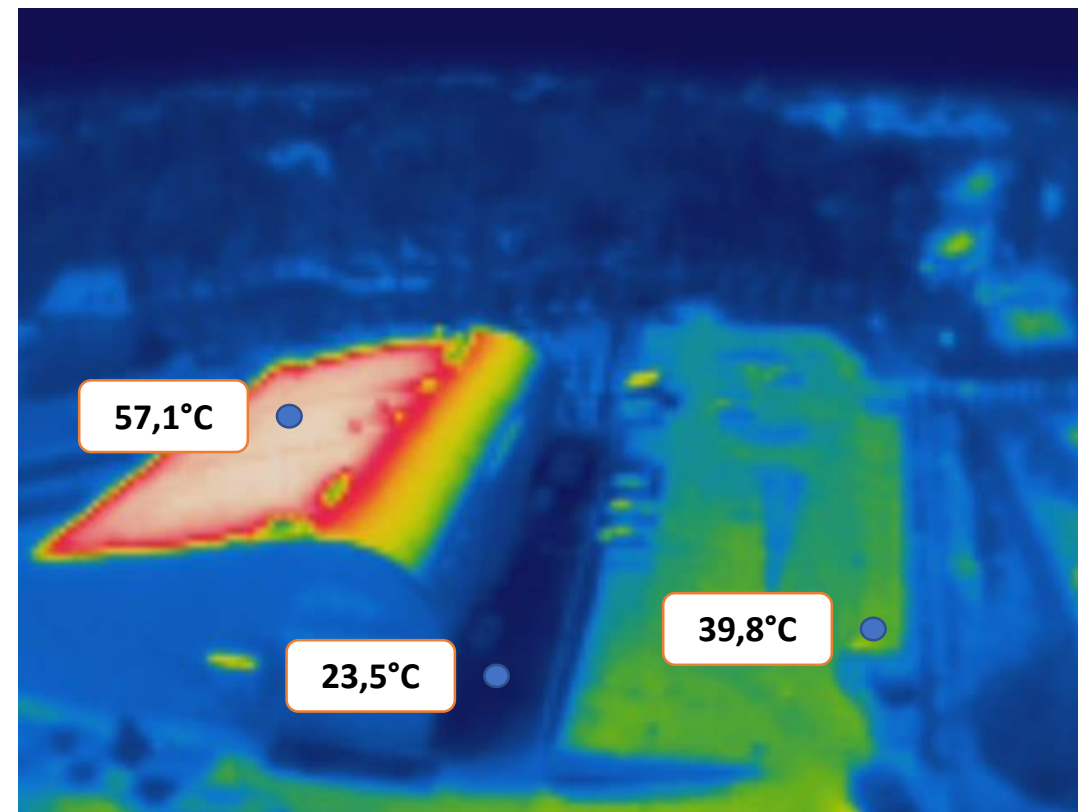
# Problems

## Creating urban rain gardens in the Municipal Sports Centre



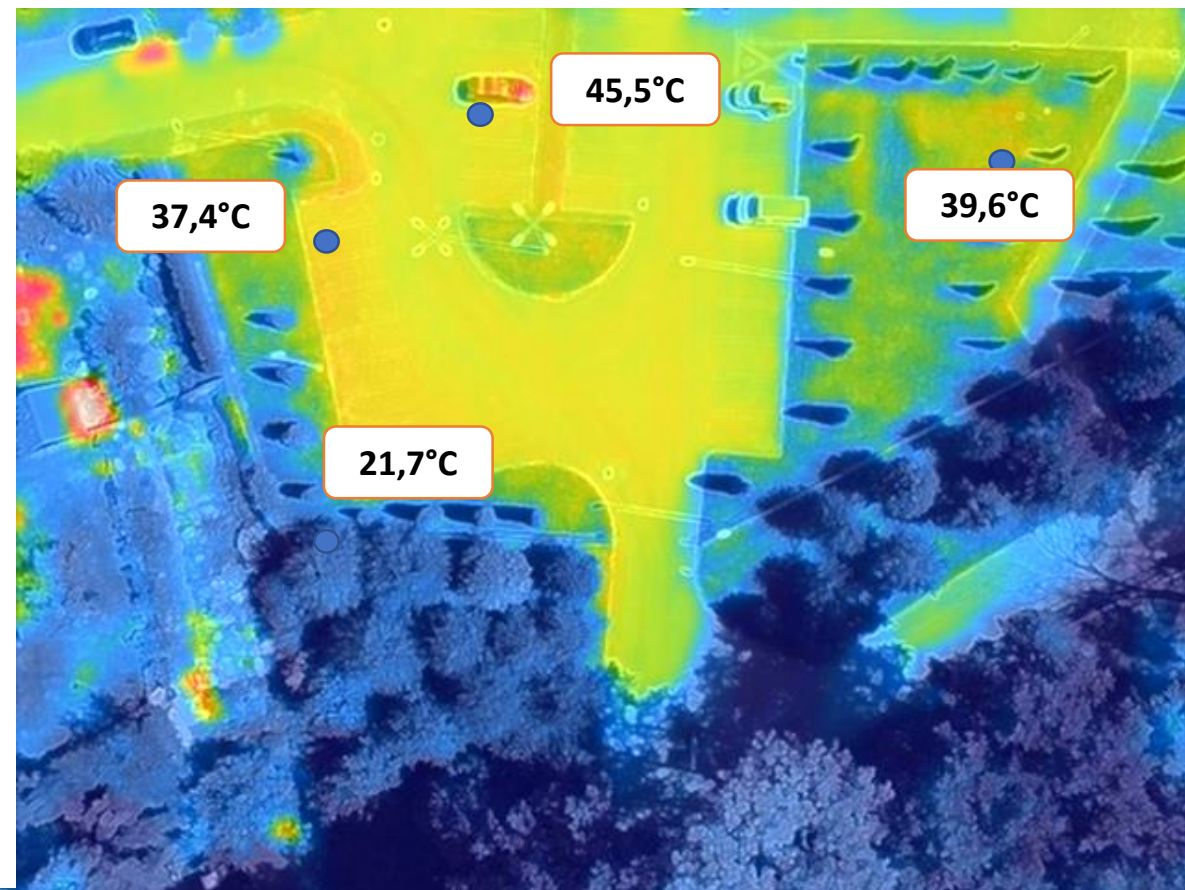
# Problems

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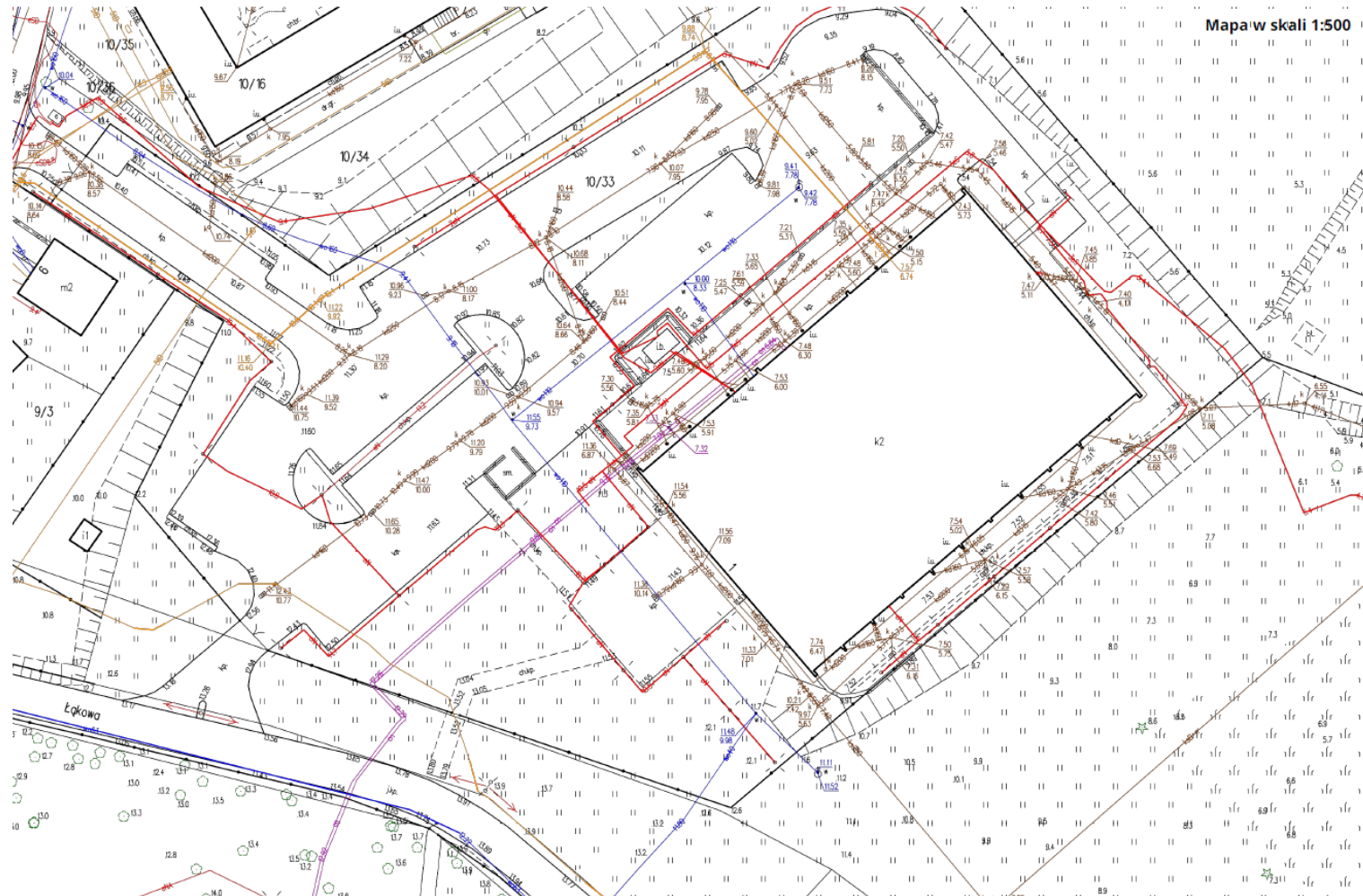


# Problems

## Creating urban rain gardens in the Municipal Sports Centre



# Creating urban rain gardens in the Municipal Sports Centre



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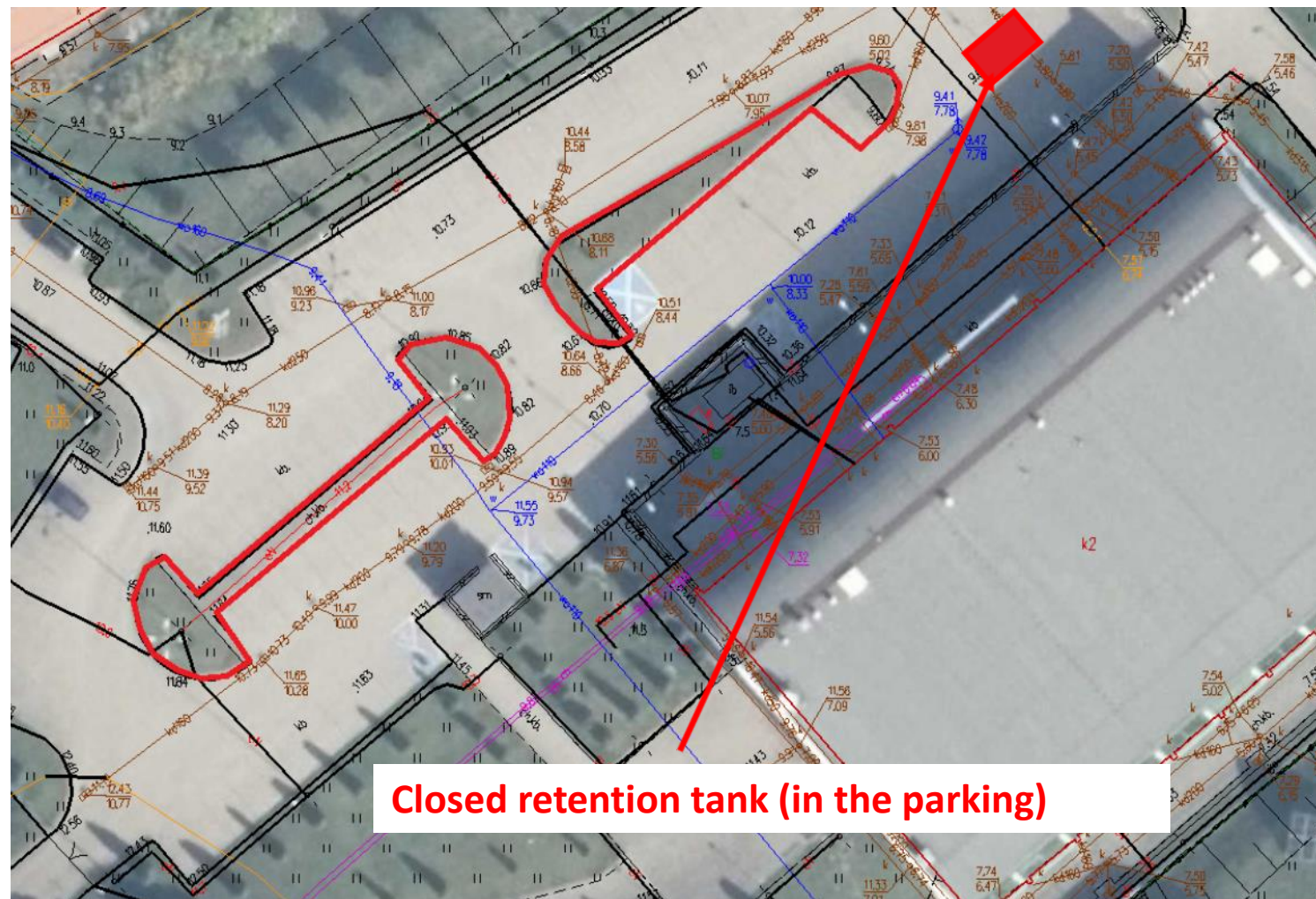
# Braniewo - study visit & discussion

## Creating urban rain gardens in the Municipal Sports Centre



## The works covered the flowerbed area in the middle of the parking lot (290 m<sup>2</sup>)

A plan was adopted that focused primarily on managing stormwater runoff from the parking lot. This will also reduce the urban heat island.



**Closed retention tank (in the parking)**

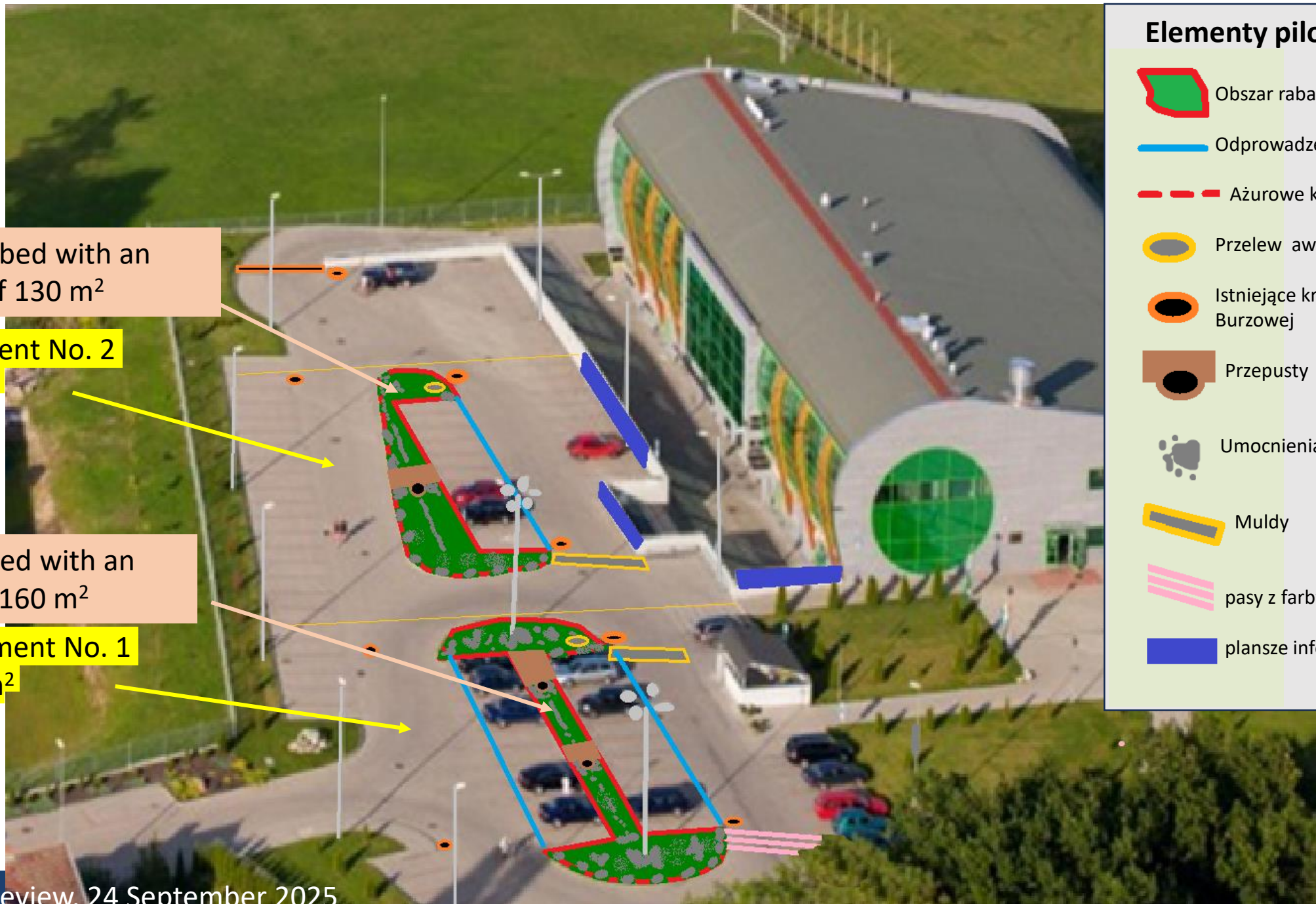
# Creating urban raingardens in the Municipal Sports Centre



Work sequence:

1. Digging depressions
2. Reconstruction of curbs
3. Partial soil replacement
4. Installation of supporting stones
5. Installation of culverts
6. Installation of emergency overflows
7. Construction of linear drainage
8. Construction of road troughs/ speed bumps
9. Supplementing the substrate for plant growth
10. Planting plants
11. Reinforcing the flowerbeds with burlap and stone

The rate and level of filling of the depressions were constantly monitored during heavy rainfall.



flowerbed with an area of 130 m<sup>2</sup>

Catchment No. 2  
550 m<sup>2</sup>

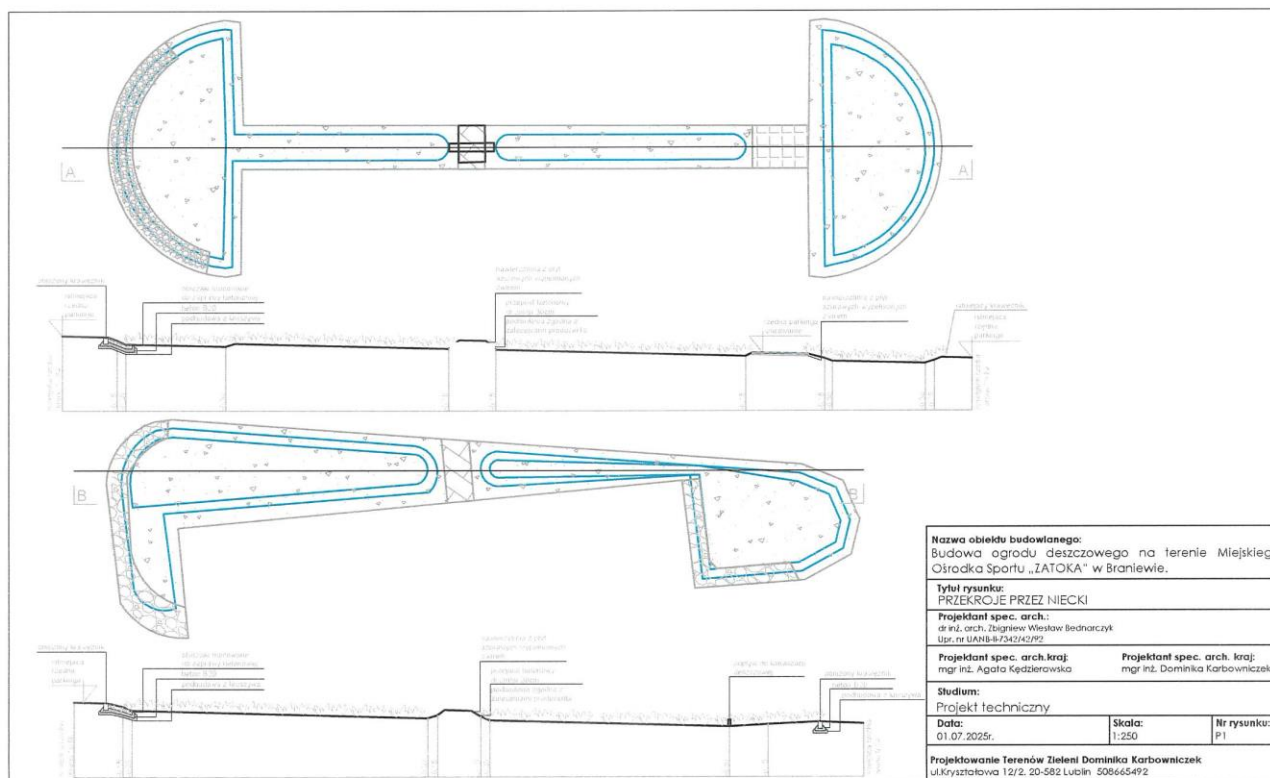
flowerbed with an area of 160 m<sup>2</sup>

Catchment No. 1  
800 m<sup>2</sup>

### Elementy pilota

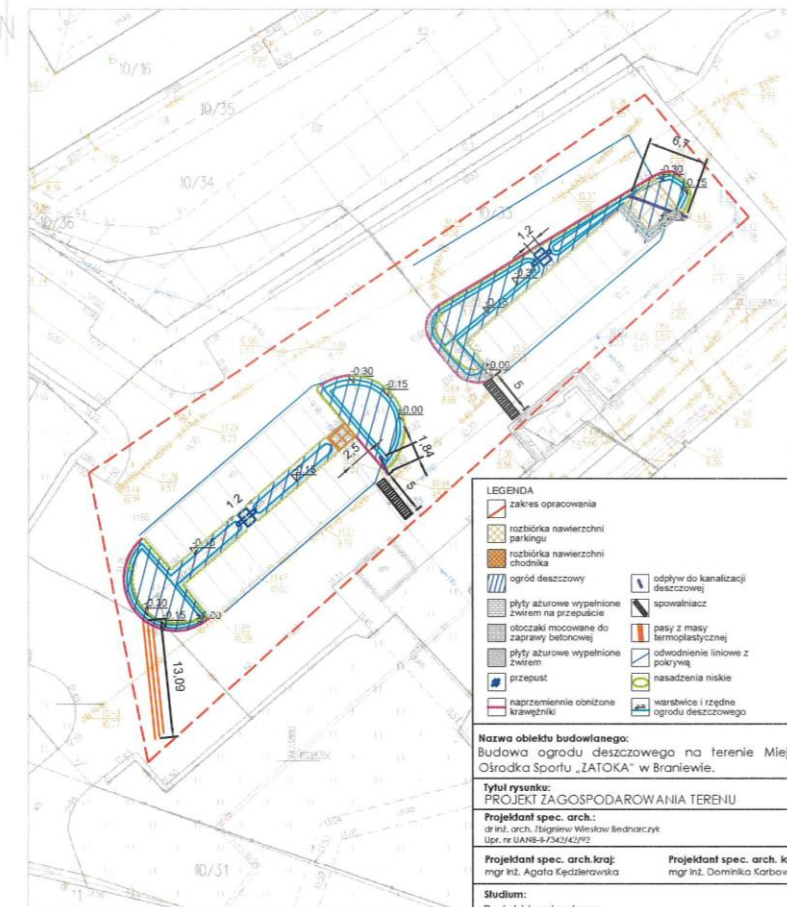
- Obszar rabaty
- Odprowadzenie liniowe
- Ażurowe krawężniki
- Przelew awaryjny
- Istniejące kraty sieci Burzowej
- Przepusty
- Umocnienia z kamienia
- Muldy
- pasy z farby natryskowej
- plansze informacyjne

# Design and construction

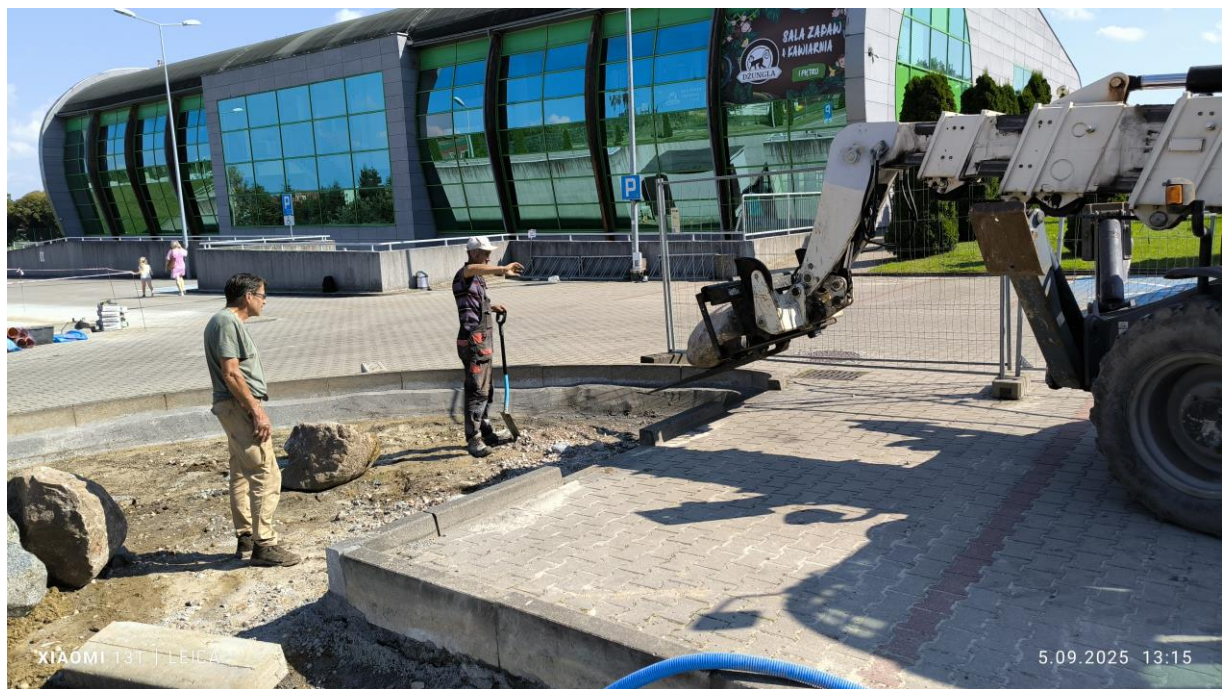


Mapa zasadnicza  
Skala 1:500

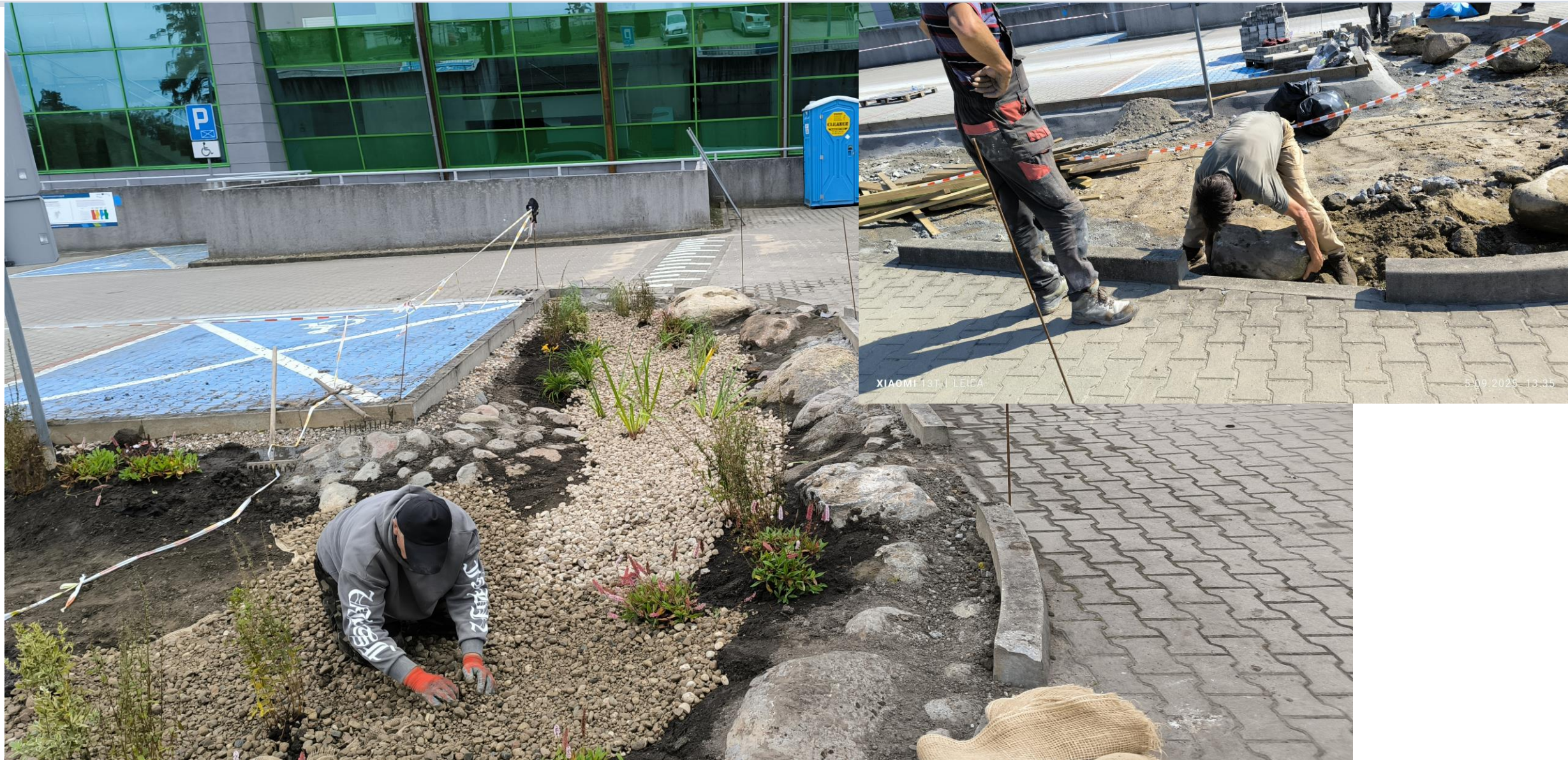
Województwo: warmińsko-mazurskie  
Powiat: braniewski  
Jednostka ewidencyjna: MIASTO BRANIEWO  
Obręb: BRANIEWO 08



## CONSTRUCTION August/September 2025









# Creating urban raingardens in the Municipal Sports Centre



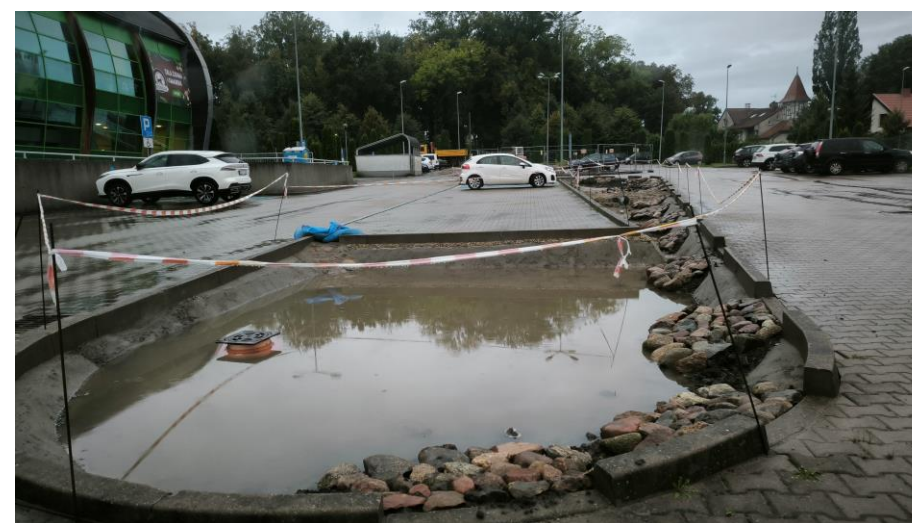
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# Rain is the best evaluator



## Benefits: Creating urban rain gardens in the Municipal Sports Centre

1. reducing the urban heat island effect
2. improved drainage of the car park area and use of rainwater, which has so far been discharged into the drainage system to irrigate greenery and increase soil moisture - mitigating thermal conditions
3. improvement of the local microclimate (air circulation, air purification from pollutants (dust, etc.),
4. aesthetics of the space and increasing its attractiveness for visitors to the MSC (small architecture, camouflage greenery)
5. economical approach to greenery maintenance
6. increasing the awareness of the inhabitants of Braniewo regarding climate change and the operation of green infrastructure.





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The „BSR Water Recycling Toolbox” was elaborated as part of the WaterMan project, which is co-financed by the European Union (European Regional Development Fund) and implemented within the Interreg Baltic Sea Region Programme. More information:

[eurobalt.org/WaterRecyclingToolbox](http://eurobalt.org/WaterRecyclingToolbox)

[interreg-baltic.eu/project/waterman](http://interreg-baltic.eu/project/waterman)

WaterMan promotes a Baltic Sea Region-specific approach to water recycling, which makes use of the alternation of too much and too little water that has become typical for humid areas in the EU to strengthen the resilience of local water supply. Building on this approach, the project supports municipalities and water companies in adapting their water supply strategies.

*The contents of „BSR Water Recycling Toolbox” are the sole responsibility of the authors and can in no way be taken to reflect the views of the European Union, the Managing Authority or the Joint Secretariat of the Interreg Baltic Sea Region Programme.*

