



RAINFALL

structural soil

flower meadows

more grassy area

rain gardens

retention basin

flower meadows

HYDROPUNCTURE

PERMEABLE SURFACE

INFILTRATION

DROUGHT WATERING

INFILTRATION

WATER STORAGE

Country / City	Poland / Kielce
University / School	Kielce University of Technology
Academic year	2019 - 2020
Title of the project	Hydropuncture - groundwater problem in the city of Kielce
Authors	Ewelina Chapska, Kinga Deroń, Izabela Dibelka, Marta Dudzik, Kinga Sokółowska



TECHNICAL DOSSIER

Title of the project	Hydropuncture
Authors	Ewelina Chapska, Kinga Deroń, Izabela Dibelka, Marta Dudzik, Kinga Sokołowska
Title of the course	Landscape Architecture
Academic year	2019 - 2020
Teaching Staff	Magdalena Wojnowska - Heciak
Department/Section/Program of belonging	Department of Civil Engineering and Architecture
University/School	Kielce University of Technology



Written statement, short description of the project in English, no more than 250 words

Hydropuncture is a context - based system of flash-flood resilient solutions implemented in a dense city fabric (Kielce/ Poland). Recently, the city has been experiencing flooding which generates great economic costs. Another problem related to more extreme precipitation is dynamic changes in the water level off the Silnica river. The river floods the street and squares and fills the city with water like a bathtub with a clogged drain.

As a response to climate change and heavy rainfalls, the new design covers a net of rain gardens, green roofs and green walls sponge pocket parks, gutters, new plantings, in particular, trees and shrubs. By removing impermeable asphalt surfaces or concrete pavements the rainwater capacity is increased. Enabling water infiltration the urban vegetation receives better habitat conditions.

Hydropuncture is a combination of green and blue infrastructure that acts as a sponge, absorbing, and purifying rainwater. This combination of softscape and hardscape water retention solutions reduces the risk of flooding, improves water circulation, and has a positive impact on the microclimate, mitigating urban heat island, improving air quality, minimizing noise, and creating new recreation spaces for Kielce residents.

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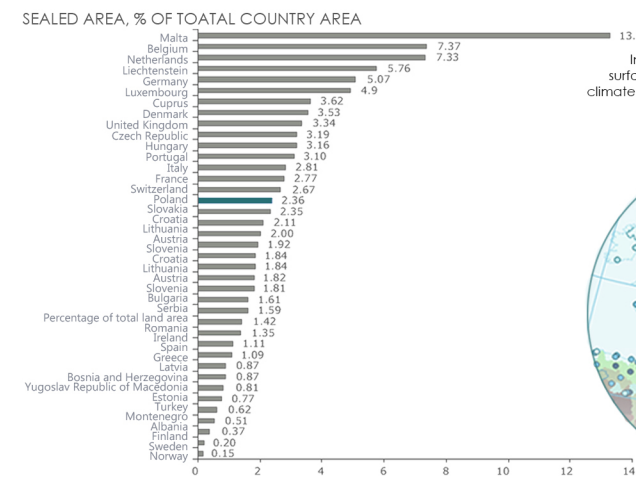
CLIMATE CHANGE AGAIN

11th International Biennial Landscape Barcelona

Barcelona September 2020
SCHOOL PRIZE



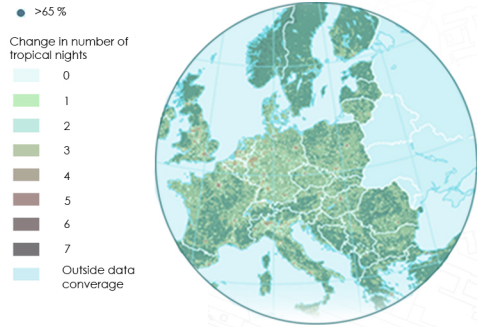
WORLD SITUATION



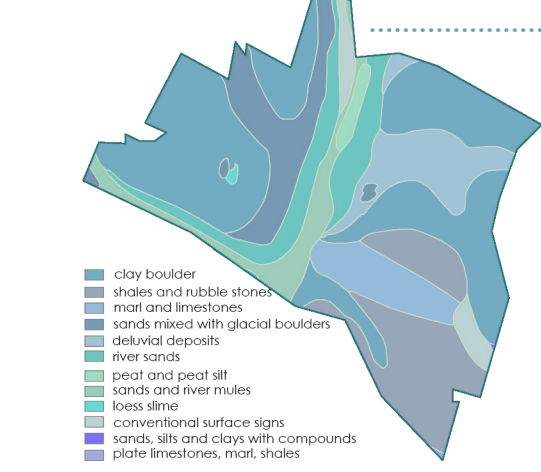
Increasing amount of impermeable surfaces in European cities combined with climate change resulted in the occurrence nights



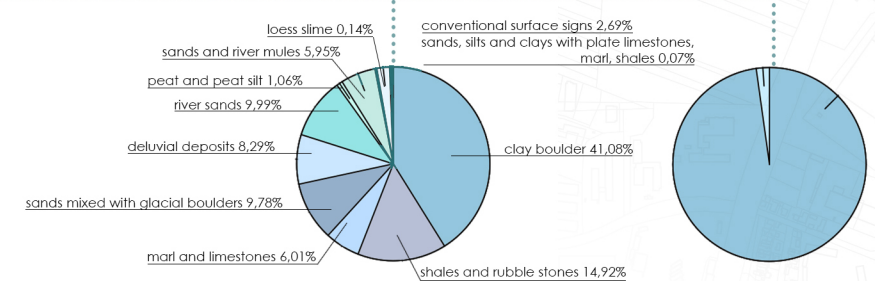
Imperviousness density in 2012



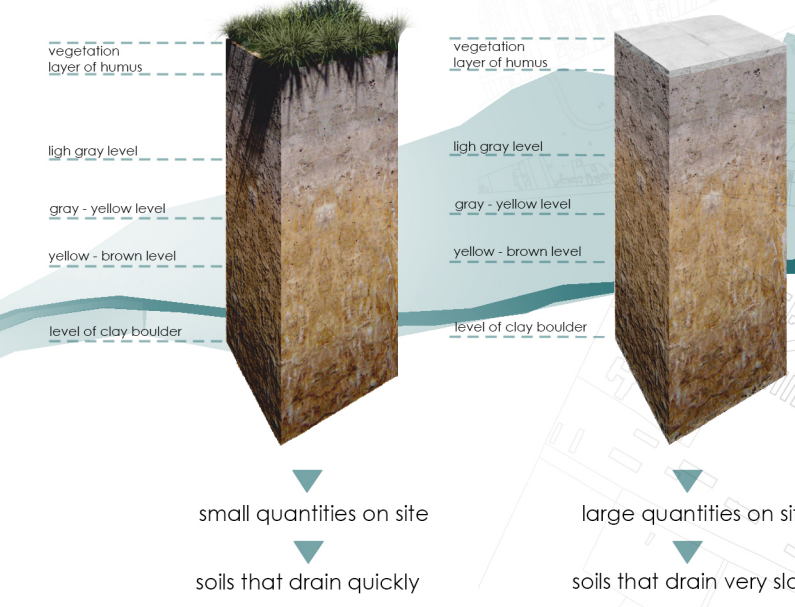
SITE AREA SOIL MAP



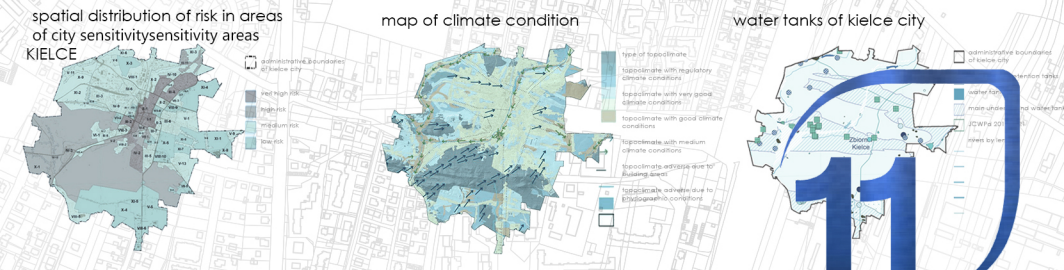
DIAGNOSIS: Soils with poor percolation covered with impermeable surfaces cover most of Kielce city



PATCHWORK OF PERMEABLE AREAS IN THE SITE



CLIMATE VULNERABLE AREAS IN KIELCE - WATER CIRCULATION



the most sealed part of the city

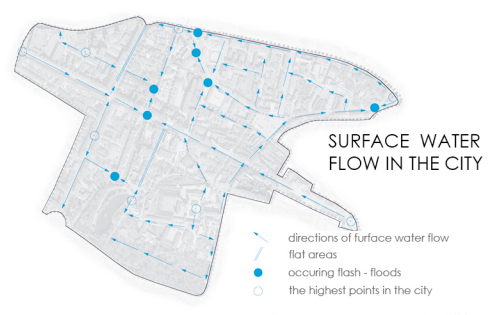
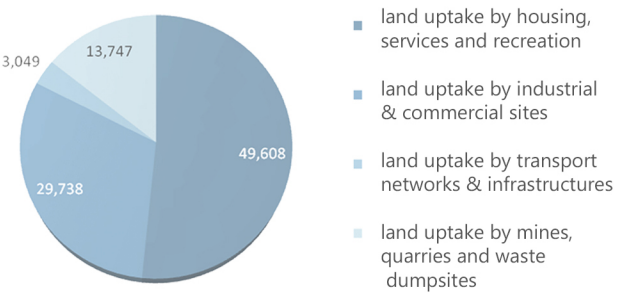
flood areas

Silnica river

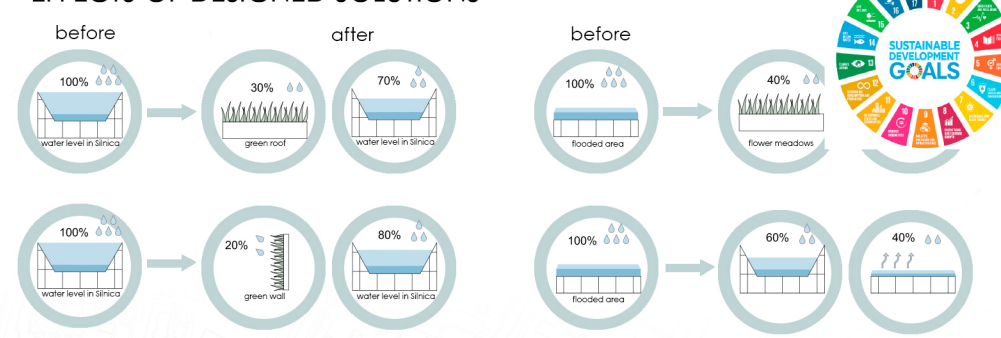
water tanks of kielce city



INTENSIVE LAND COVER OF THE KIELCE CITY



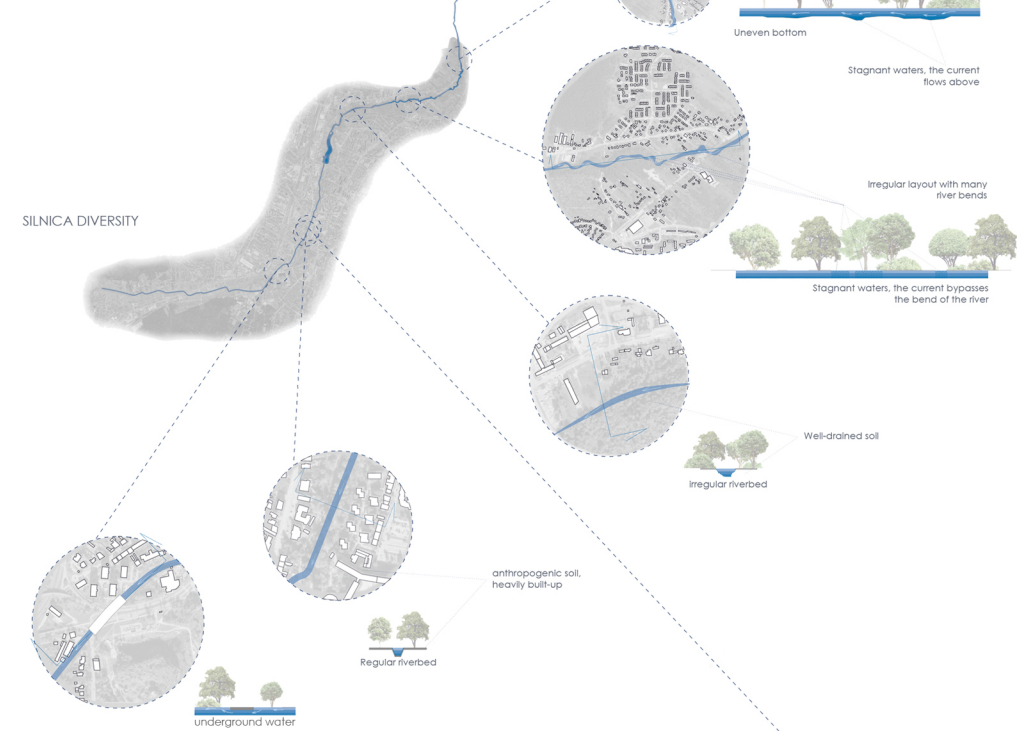
EFFECTS OF DESIGNED SOLUTIONS



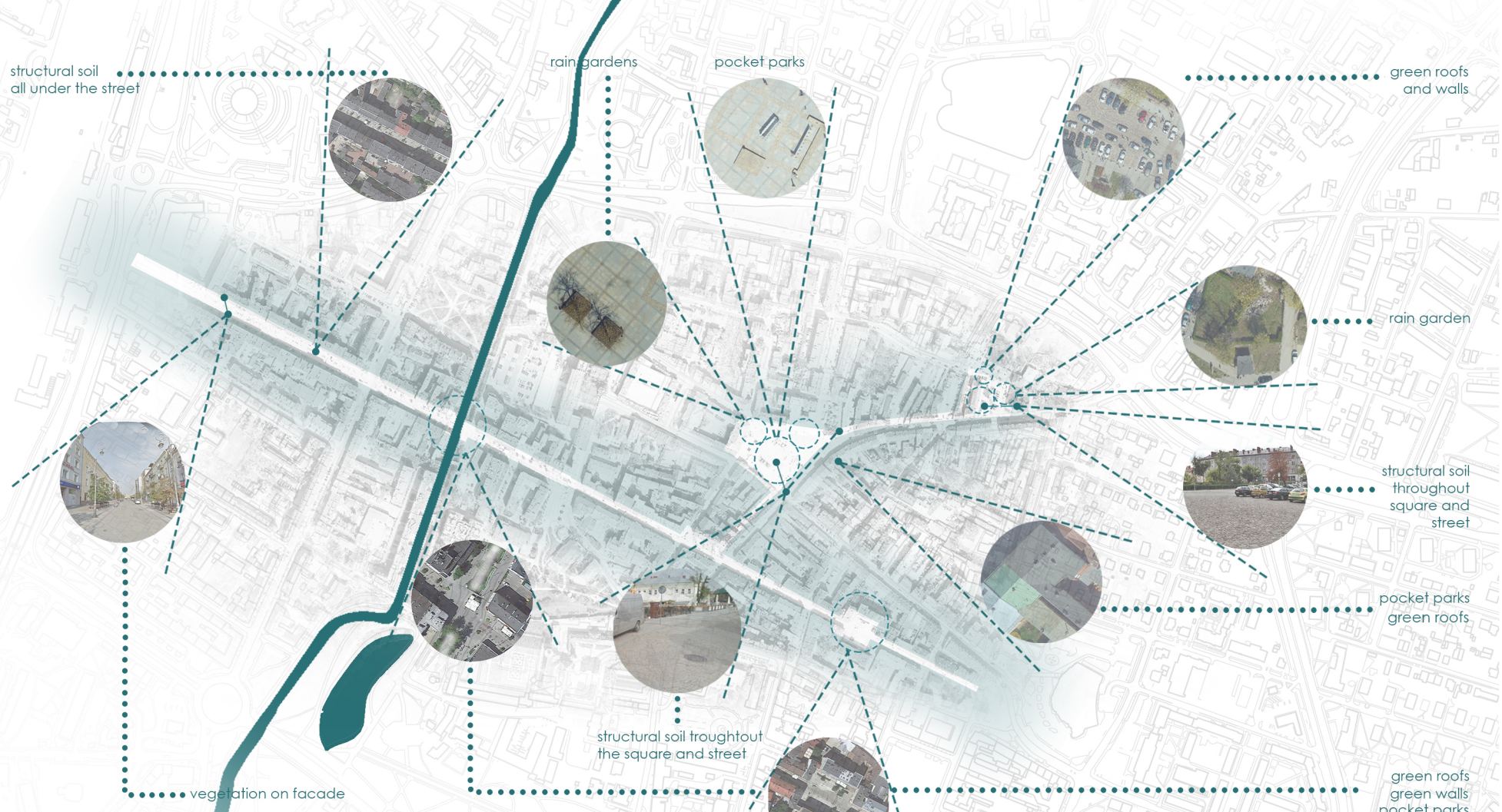
THE PROBLEM OF POURING THE SILNICA RIVER



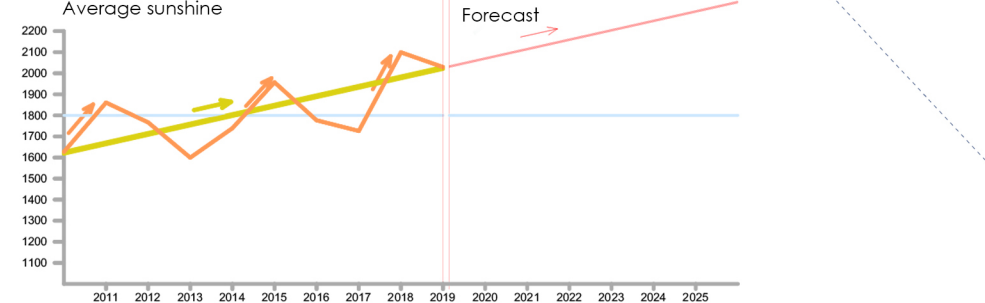
CLIMATE VULNERABLE AREAS OF SILNICA RIVER



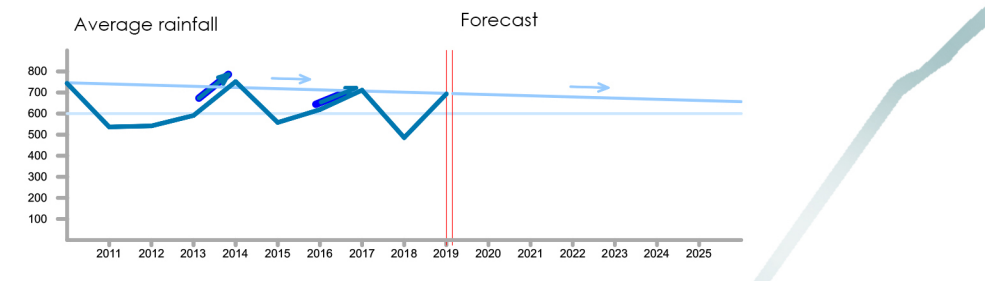
SCHEME OF APPLIED SOLUTIONS



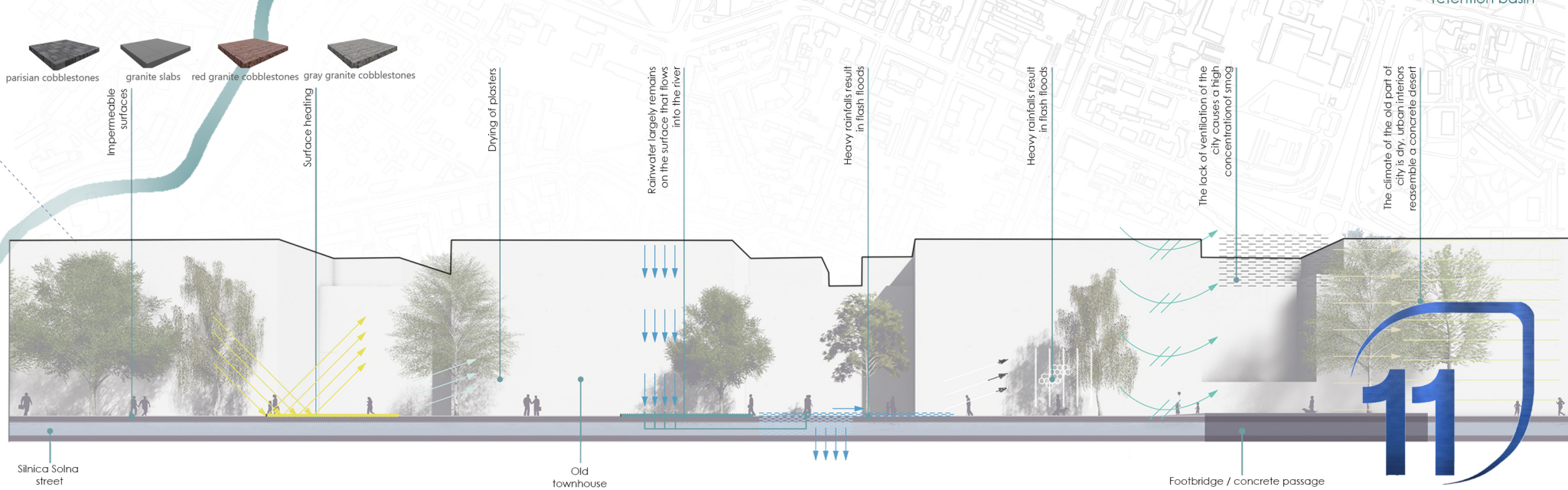
CLIMATE CHANGE FORECASTS - INCREASING THE AVERAGE AIR TEMPERATURES

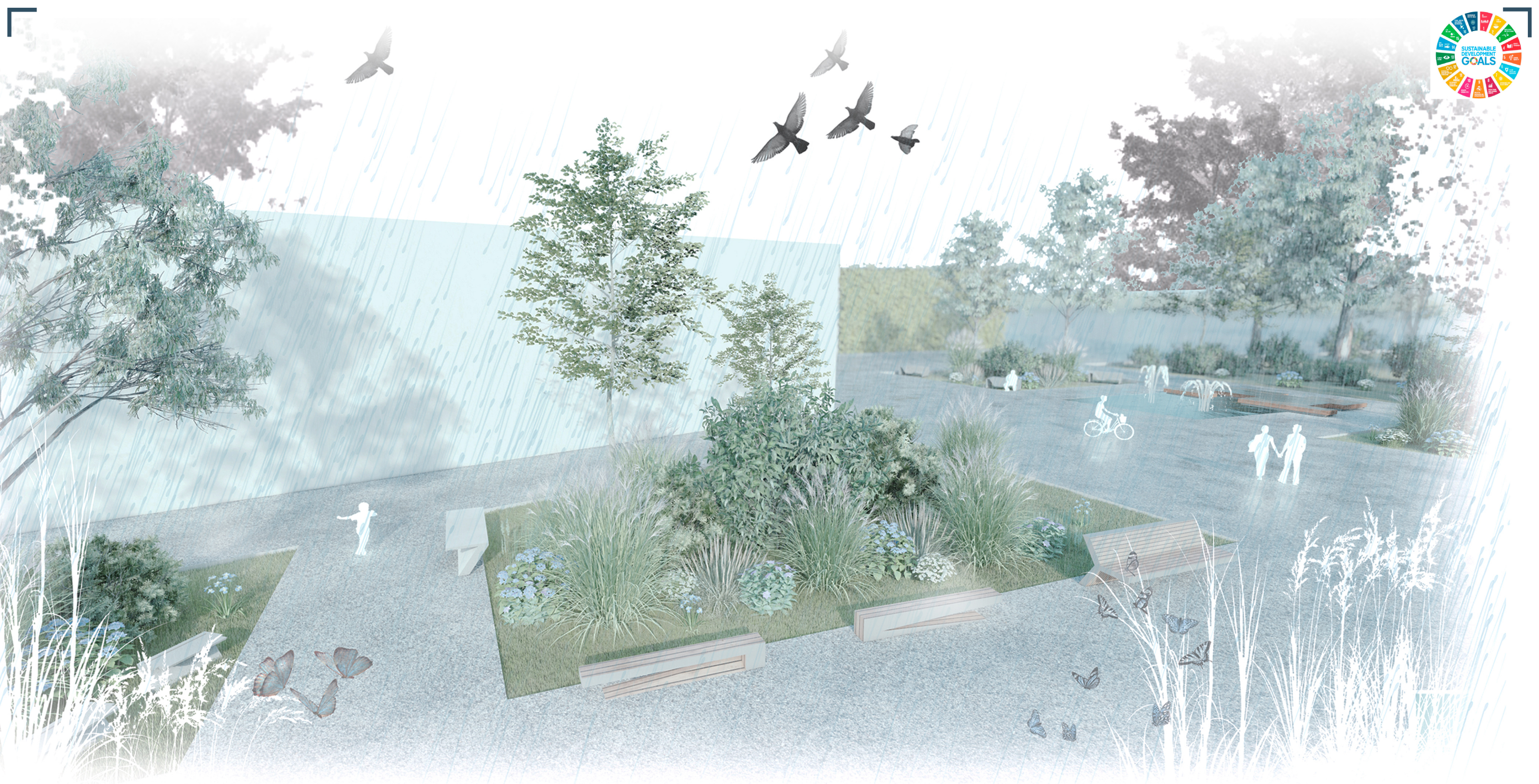


CLIMATE CHANGE FORECASTS - DECREASING THE AVERAGE PRECIPITATION



CROSS-SECTION OF SOLNA STREET ALONG THE SILNICA RIVER





CHANGES IN THE SPACE

