

Grow Green

Modena

Systemic approach and integrated planning

Drivers behind the cities' decisions to develop NBS strategies and facing its environmental suffering and focuses: 2 Themes and 2 Challenges

Modena Working Method is based on:

- THE PATH - The Geological Report attached to PUG considering the environmental themes for a correct Territorial and Urban Planning: vulnerability studies, hydraulics, urban green, rules and provisions. This led to consider GROW GREEN and NBS as innovative choice for facing the Climate Change
- THE TOOLS - 30 years of experience, rules, field experimentation, simulation, the relationship with citizens and Stakeholders and the collaboration with European Partners
- THE CORE OBJECTIVES - The reduction of floods and related damages, the containment of heat waves and heat islands effects, improved static and dynamic resilience
- THE STRATEGY - articulated on three levels: City, District and Site. The combined actions on the 3 areas offer solutions and add environmental and social benefits
- THE SOLUTIONS - diversified between urban and green-agricultural areas, but also with a specific targeted effect in relation to the territorial level of application (city, district or site)

1° GOAL is the Elimination of Urban Floods for Events less than 20 Years of Return



2° GOAL is Reduction of 1,5° C the temperature perceived



Strategy

About the STRATEGY, Modena trusts on its planning experience, on relationship with citizens, on policy and forecasting models. Not forgetting the rules, of course. In 60 years, Modena passed from the economic boom to the ecological transition as a model of development. The city aims at a better quality of life with knowledge, with citizens, with simulations and rules, with Grow Green as well. The Modena strategy works on the 3 above mentioned levels like a zoom that decreases the scale of the territory on which to intervene: from large to small focus.

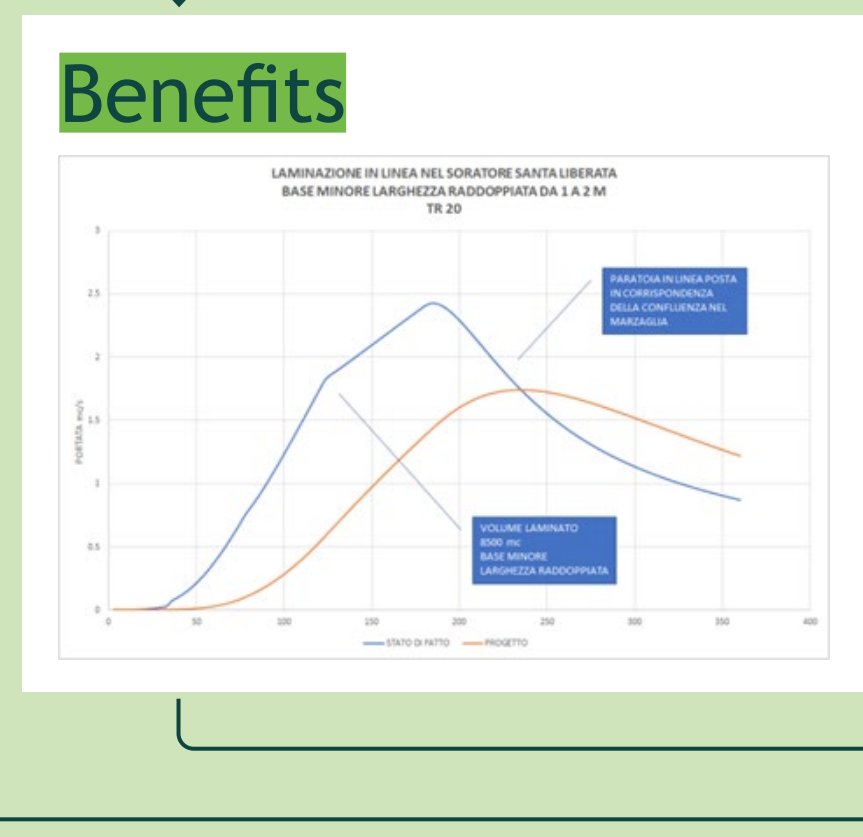
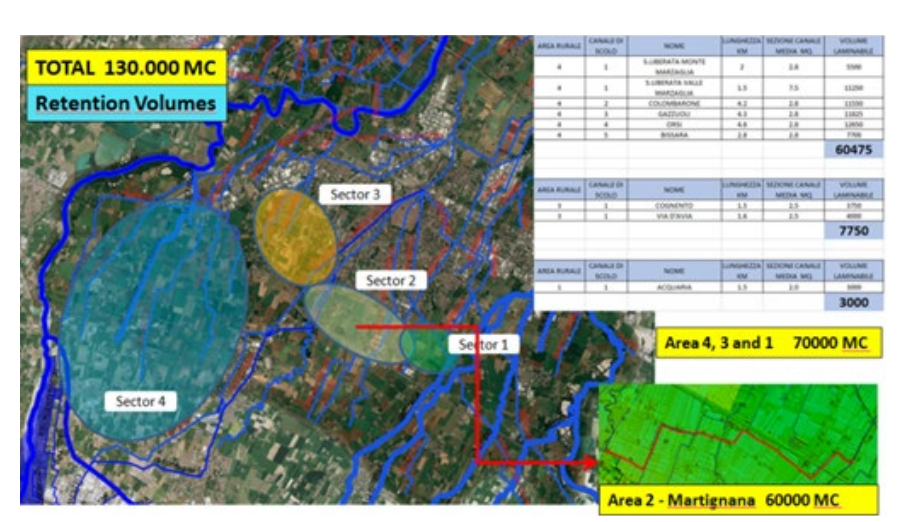
The combination of these 3 NBS actions will take the city out of a hydraulic load situation at least for events less than 20 years.

City level in presence of diffuse retention. A reduced peak, large volumes stored and a delayed delivery will take place;

District level when you introduce a permeability reduction. The same peak time but smaller flow value and flood volume will happen;

Site level where there is the hydraulic invariance and permeable surface. A fixed flow rate calibration, a lot of stored volume and possible water reuse is foreseen.

Replicable process



Core objectives

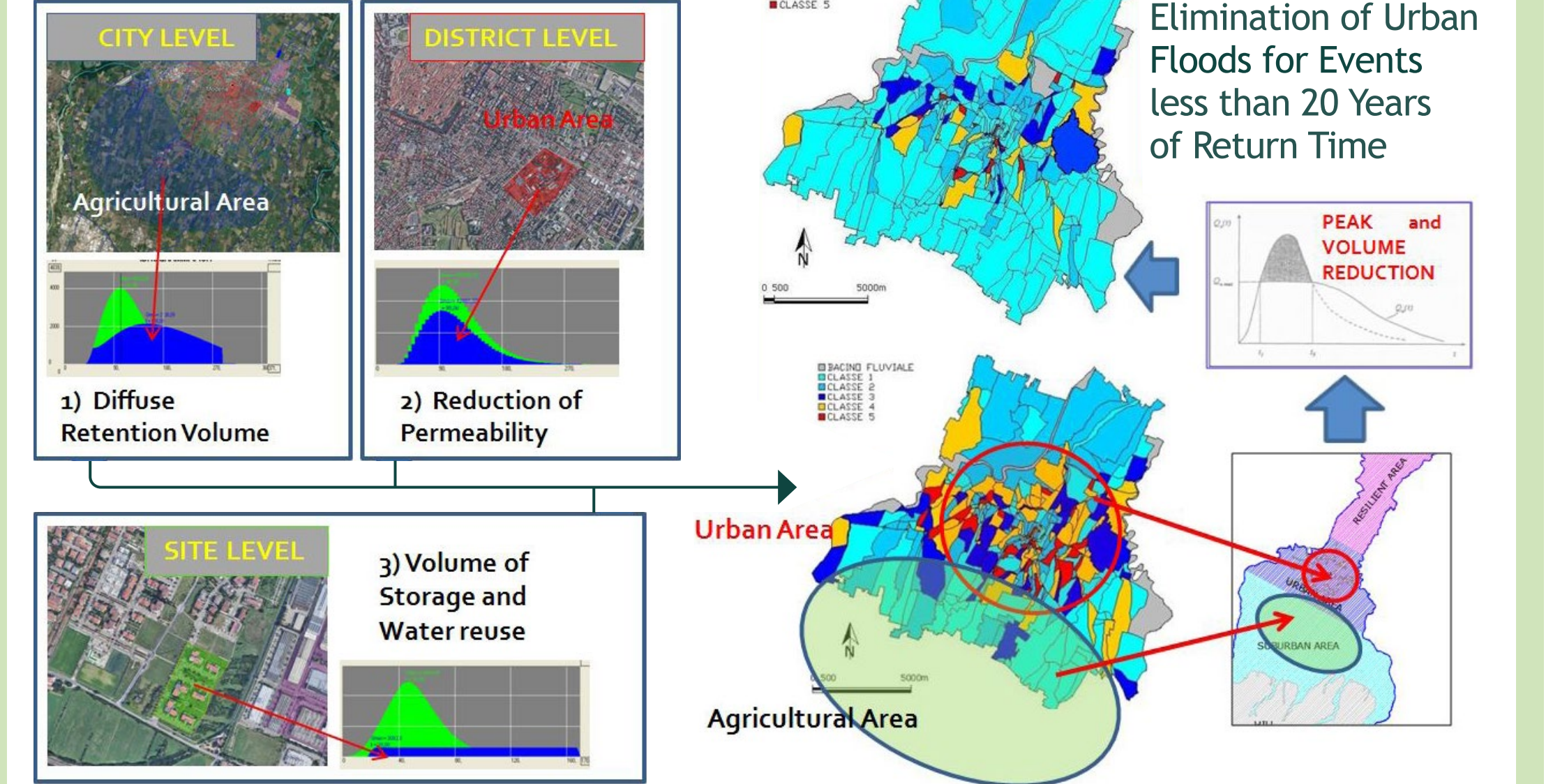
GROW GREEN CORE OBJECTIVES for Modena are 3:

1. **Benefits:** identification of ambitious thresholds and goals for a decisive action on WATERS and HEAT. Regarding the Floods, the work done is addressed to have them completely harmless under 20 years return time. With reference to Heat, the goal is to reduce the risk of Modena for heat waves, by trying to decrease the perception of temperatures of about 1/1.5° C.
2. **Replication:** with GROW GREEN local pilot project, the NBS feasibility and exportability in similar realities have been experimented. The hypothesis is to replicate it in the agricultural area in the belt outside the city (from simulation, at least 130 thousand cubic meters of retention has been obtained).
3. **Systemic change:** GROW GREEN has started a dialogue with the General Urban Plan to plan the territory referring to both NBS and rules. GROW GREEN elements begin to integrate in urban planning both as an analysis and as solutions.

Systemic change

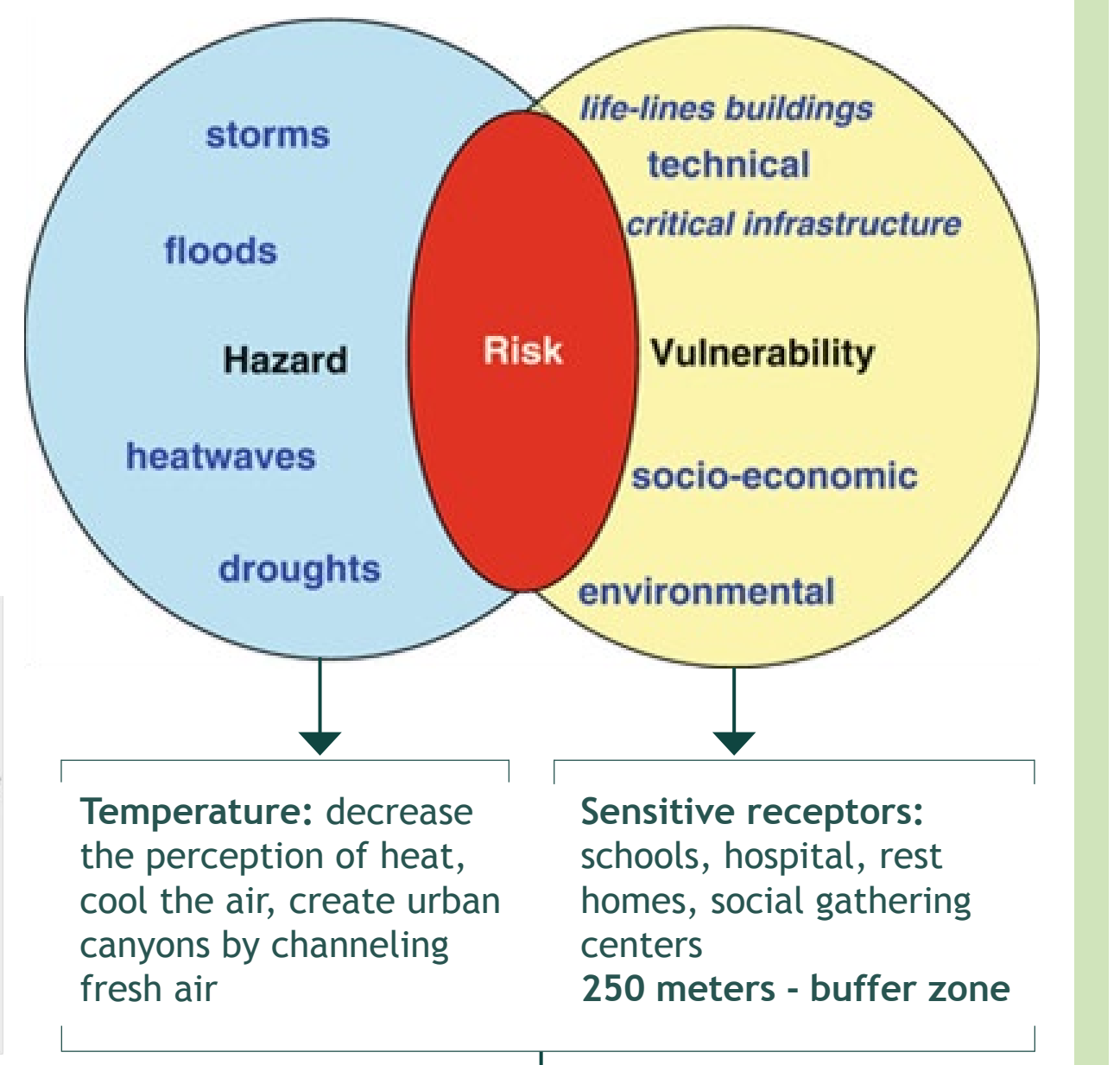
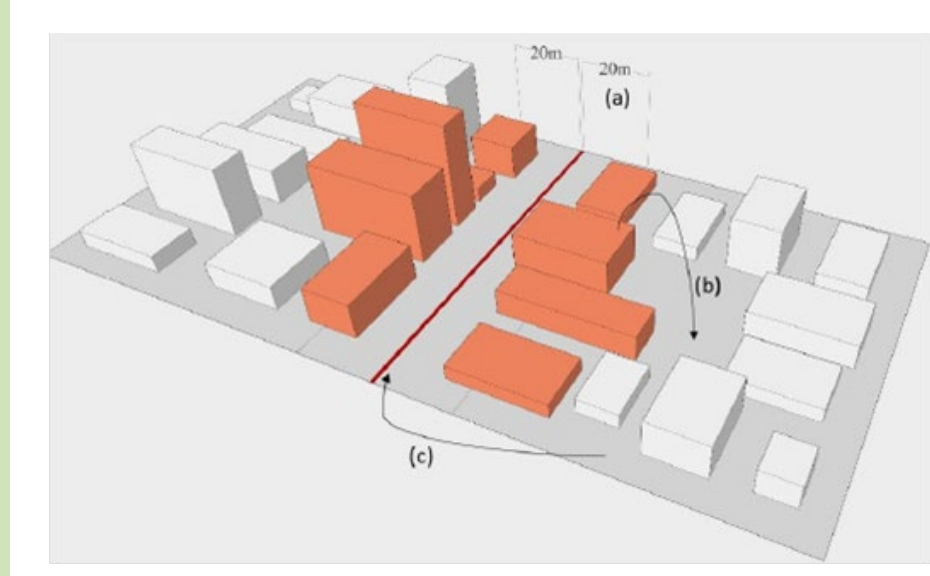


Floods

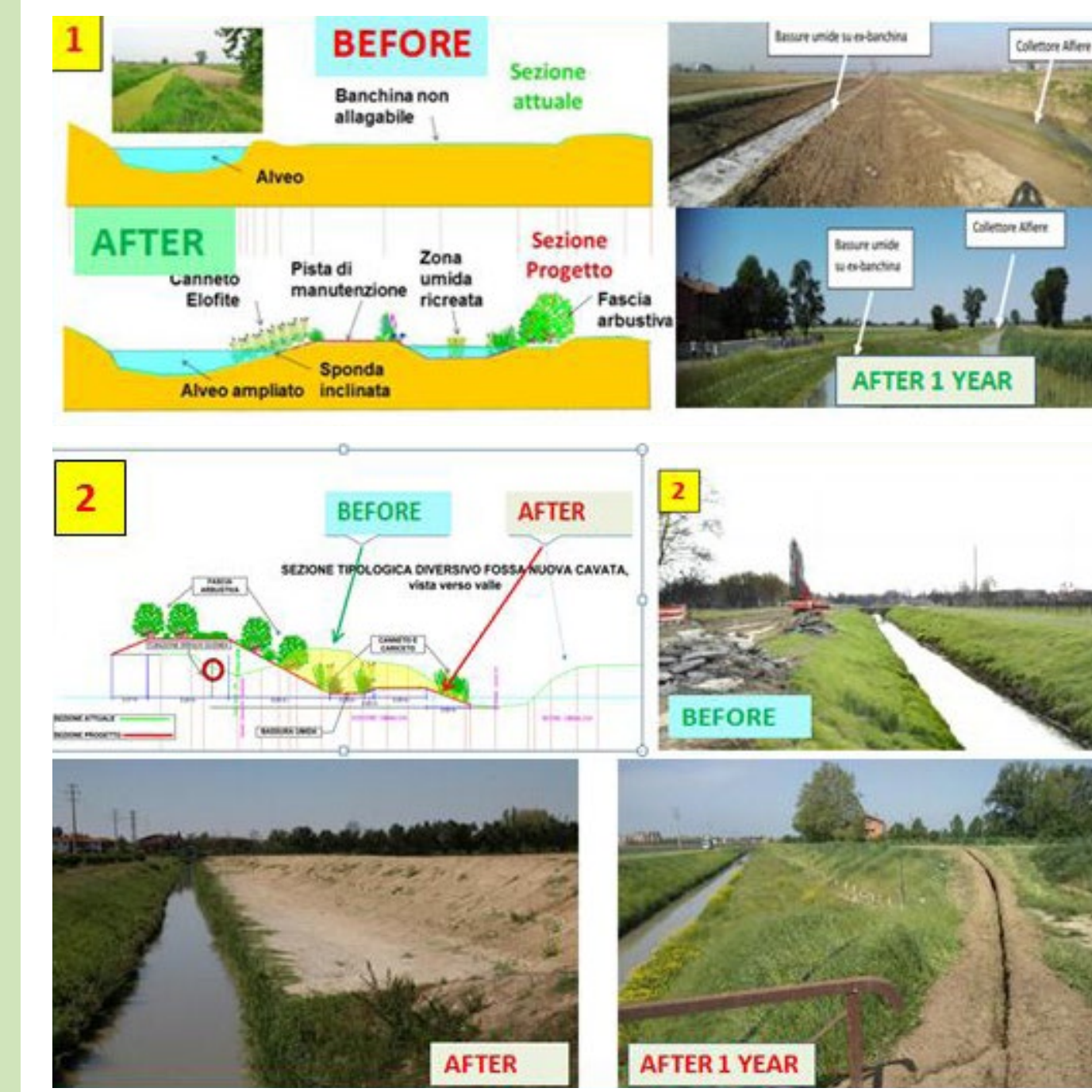


Heat stresses

For the TEMPERATURES analysis, ΔT calibration model is based on literature data and on the formula proposed by Oke. The relationship between the height of the building and the width of the road axis, also called H / W ratio, is widely used as an indicator of ΔT . The ΔT values obtained in the actual state were used to calibrate the empirical model proposed by Oke in order to simulate the urban canyon.



Solutions at city level



Solutions at district level

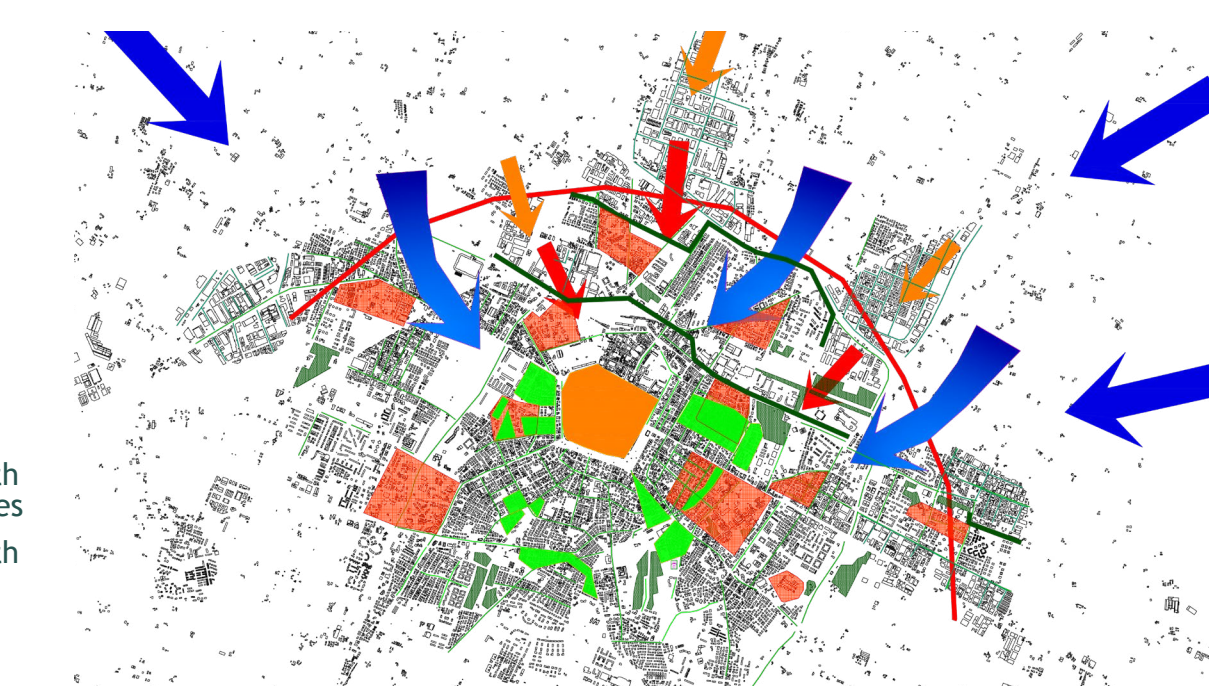


Solutions at site level



Green Plan

- Green barrier
- Tree line in industrial area
- Tree line in urban area
- Urban forest
- Greening for mitigation of areas with high density of heat-sensitive centres
- Greening for mitigation of areas with high dt. from heat islands (> 8°C / 1°)
- Tree line in urban area



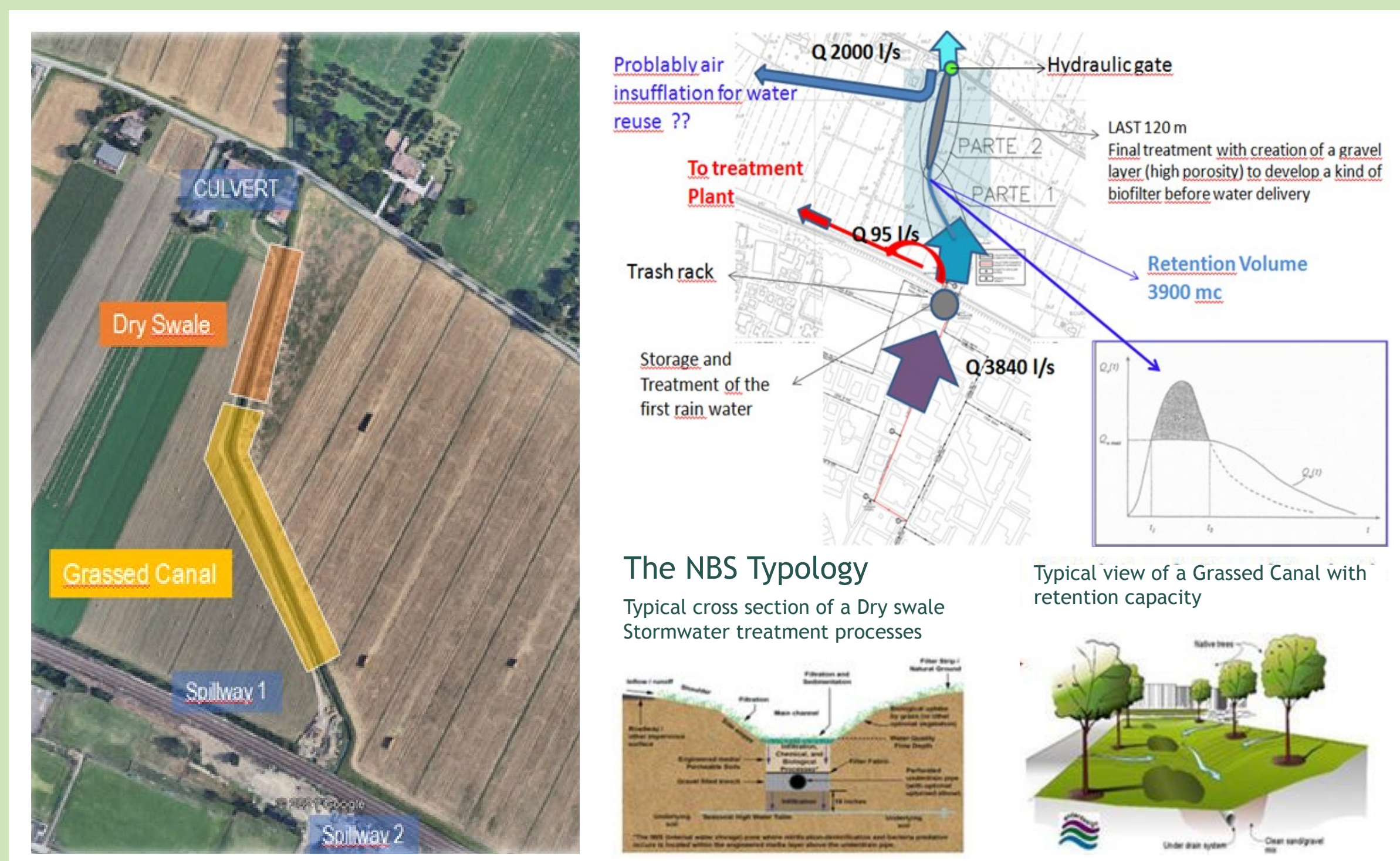
Modena Strategy

About the pilot project

GROW GREEN Team of Modena have prepared the executive design with HERA (the multi-utility Service Company). The design is now ready and by the end of the project the dry swale will be built. Concerning the monitoring it should start shortly.

The pilot project on the Cazzola Canal provides for the construction of both natural section extension (retention) and of a dry swale (natural treatment), in order to reduce the contaminant load of the mixed rainwater produced by the Modena East district.

We believe that the REPLCABLTY of the Modena strategy adopted for Grow Green is dedicated to all the lowland cities that have a mixture of natural and sewerage networks. The proposed solution, which consists in creating a widespread retention of alluvial volumes in the vast green area, has the advantage of enhancing the agricultural landscape, slowing down the speed of rainwater and more, also reducing the polluting load and, first of all, reduces the hydraulic load in the urban area, avoiding floods and damage to the population.

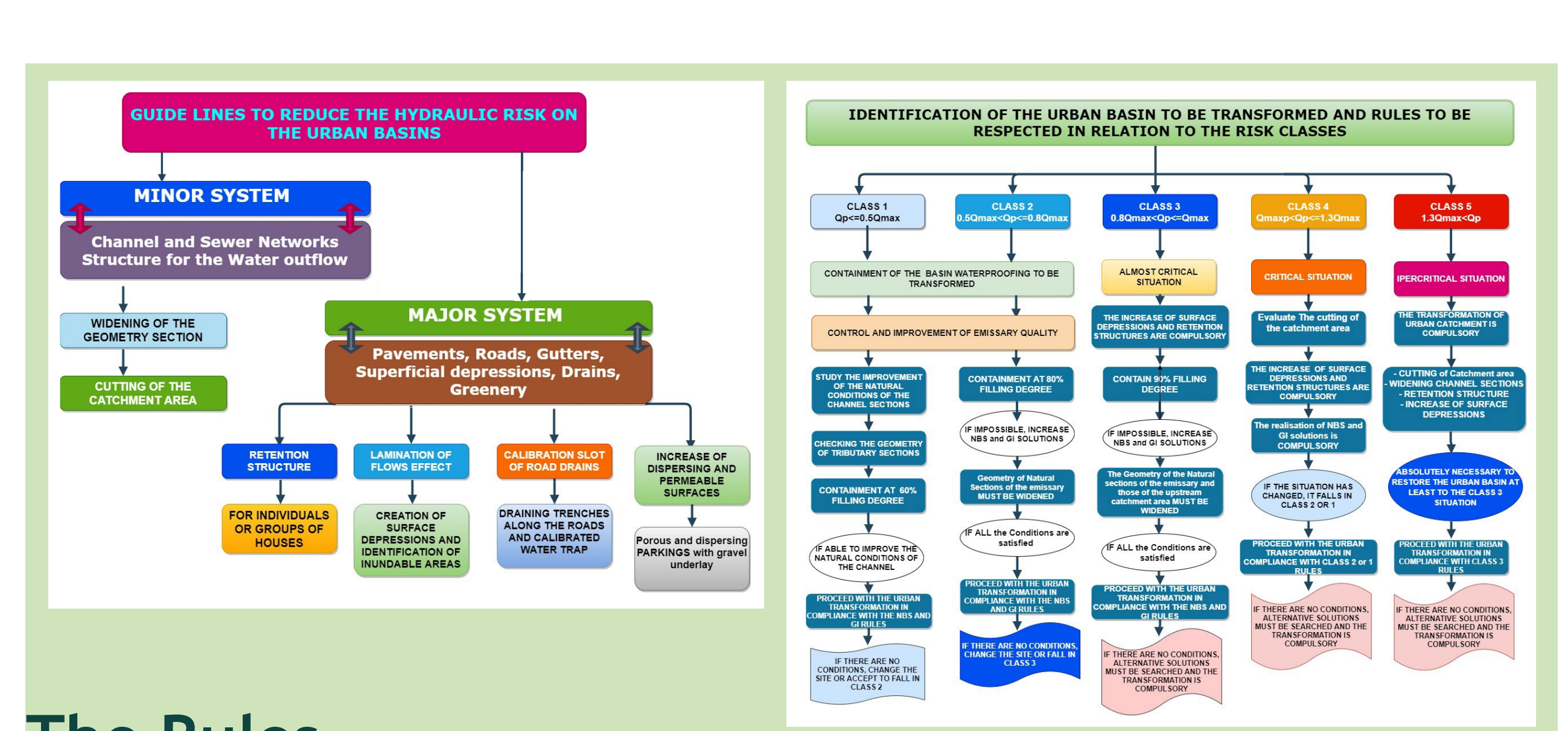


The Pilot Project

SUDS / NBS systems

- SUDS - Sustainable Urban Drainage System or NBS - Nature Based Solutions VS Grey Structure
- 2 SCENARIOS
- 1 - without retention volume (in the absence of Regulations)
 - 2 - with retention volume (as per regulation)
- 4 ALTERNATIVES
- A0 - ROAD FLOORING ONLY
 - A1 - PERMEABLE FLOORING
 - A2 - FILTERING TRENCHES
 - A3 - BIORETENTION AREAS

The Business Model



The Rules