



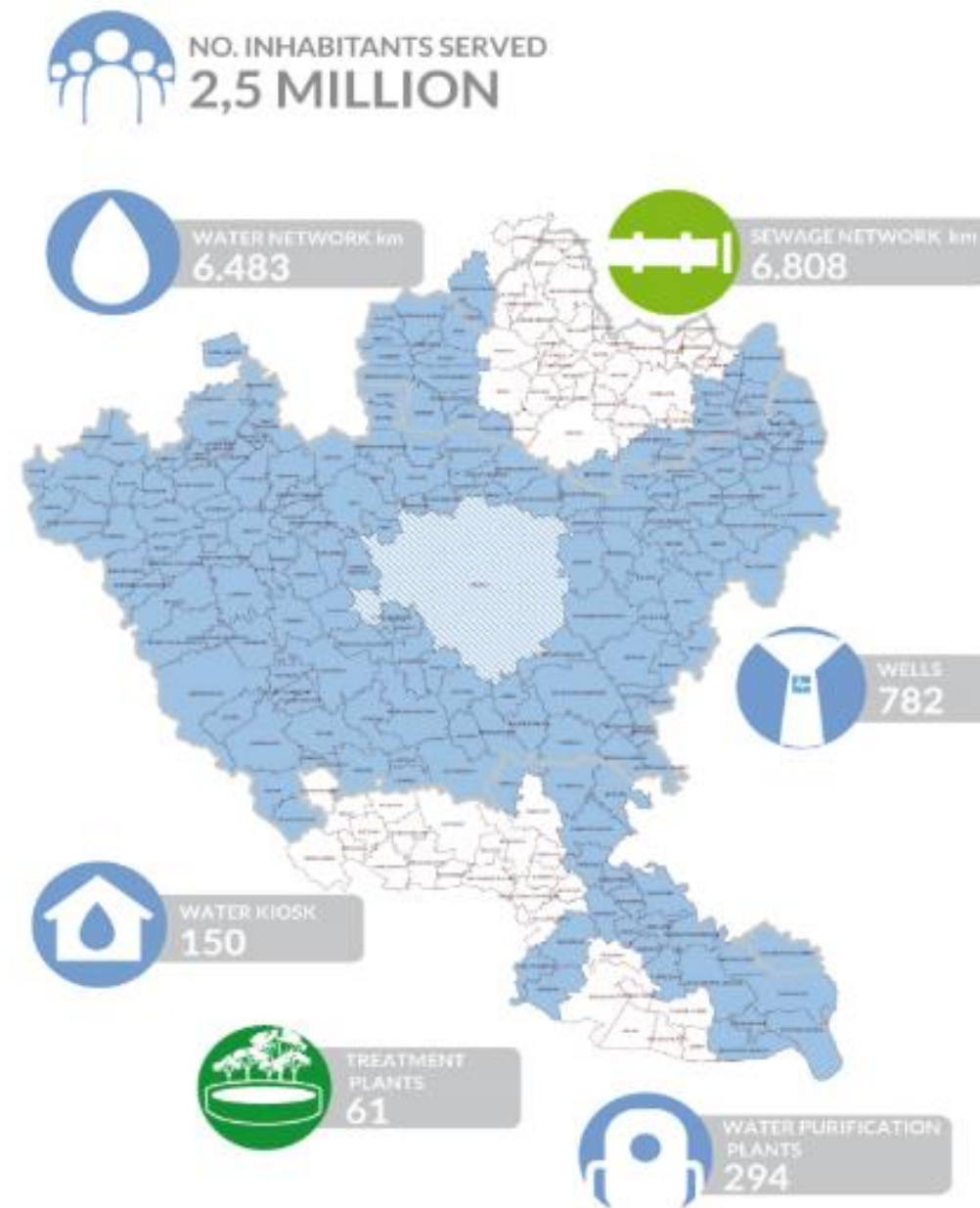
Case studies - Deploying green solutions for urban rainwater management: the importance of integrated, multi-stakeholder, long-term planning

09/11/2021



Gruppo CAP is the company that manages **the integrated water service** in the **Metropolitan City of Milan** and various other municipalities in the provinces of Monza and Brianza, Pavia, Varese and Como, according to the in house providing model, guaranteeing the public control of the member bodies in accordance with the principles of transparency, responsibility and participation.

Thanks to its size and its assets of almost €800 million, and with over €1 billion in invested capital, the CAP Group is one of the leading monutility companies in Italy, guaranteeing the integrated water service to over 2.5 million inhabitants.



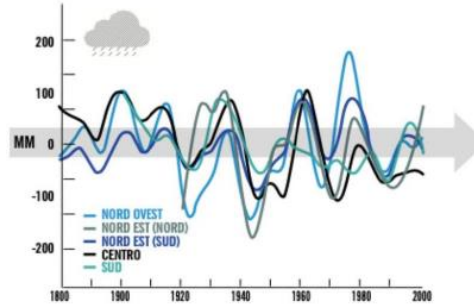


PROBLEM DEFINITION

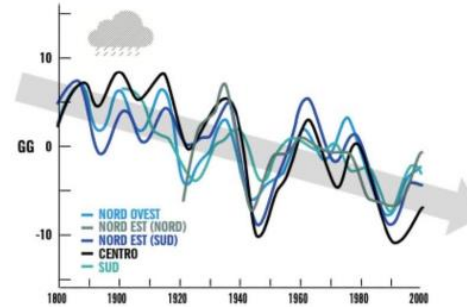
INTENSE METEOROLOGICAL PHENOMENA

Precipitation frequency and intensity

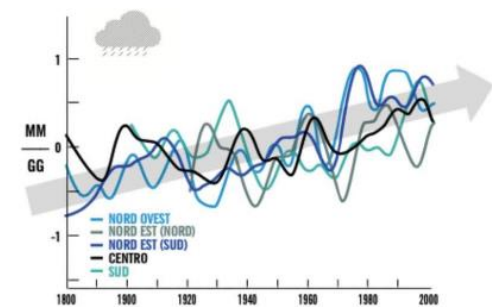
PRECIPITATIONS IN MM (per year)



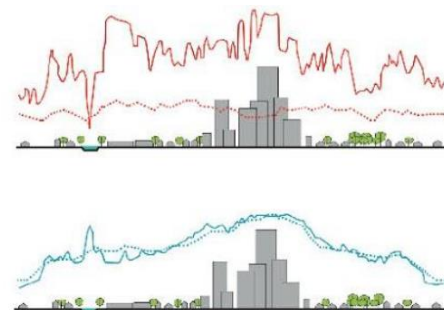
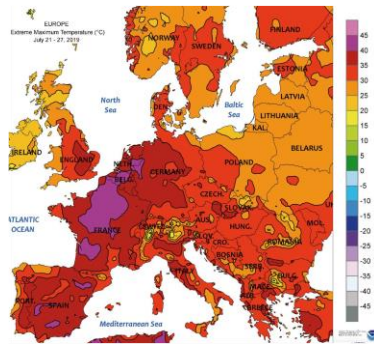
N. OF RAINY DAYS (per year)



INTENSITY OF RAIN IN ITALY (MM/DAY per year)



Illustrazioni REBUS / fonte: Trends of the daily intensity of precipitation in Italy and teleconnections a cura di M. Brunetti, M. Maugeri and T. Nanni

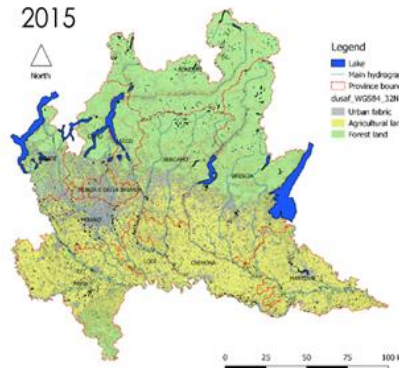


HEAT ISLANDS

Illustrazioni da Città per le persone, mostra REBUS fonte: VOGT 2003

URBANIZATION PROCESS

Land use change from past to present



Masseroni et al. 2017

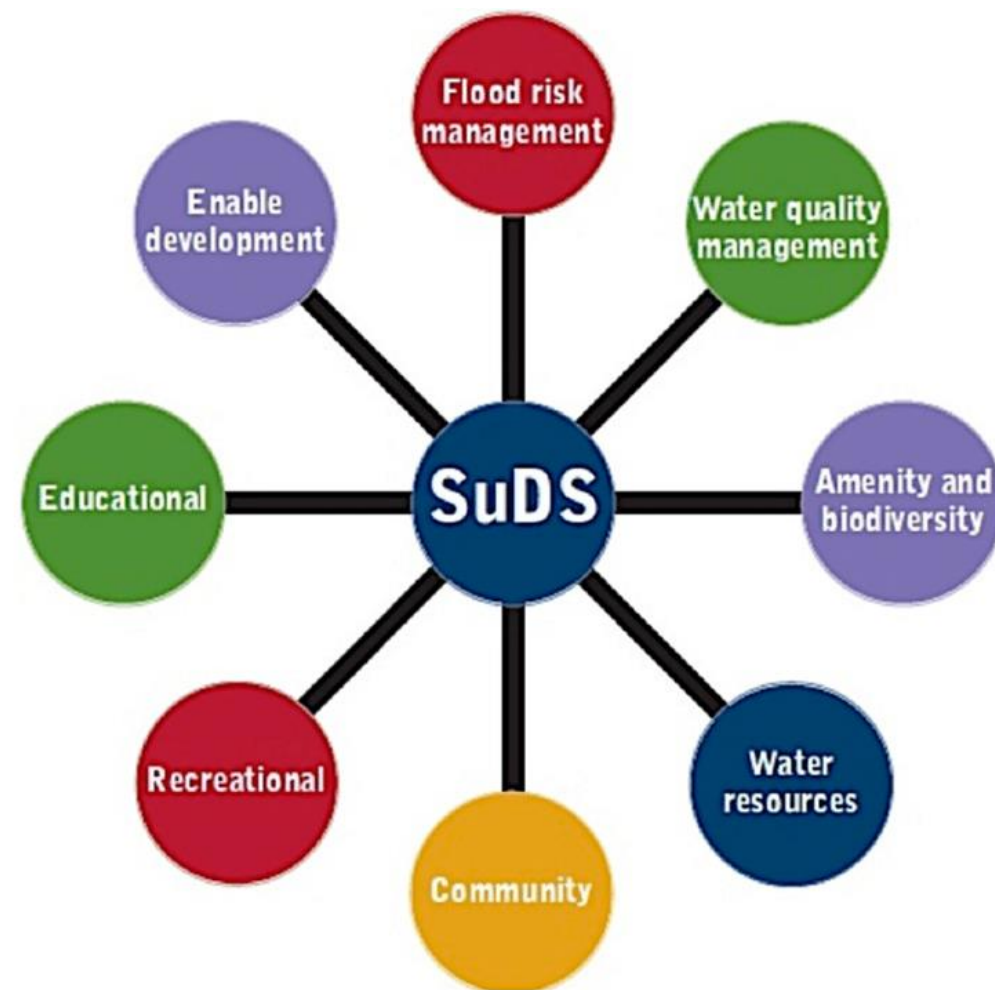
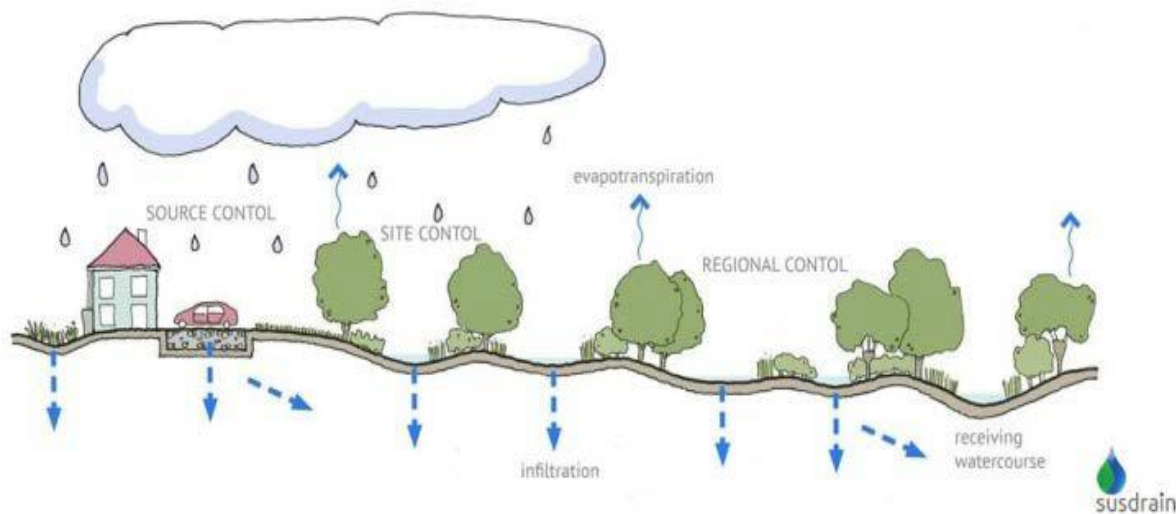


SUSTAINABLE URBAN DRAINAGE - Definition

Lombardia Regional Law n.4/2016 «Revision of regional legislation on soil protection, prevention and mitigation of hydrogeological risk and management of waterways»



Art.7 – Sustainable urban drainage: urban rainwater management system, consisting of a set of strategies, technologies and good practices aimed at reducing urban flooding phenomena, limiting the contributions of rainwater to the receiving water bodies through control to the source of rainwater and reducing the qualitative degradation of water.





WHAT IS METRO ADAPT?



WHAT IS METRO ADAPT IN SHORT?

Metro Adapt aims at **mainstreaming climate change adaptation strategies** in the Metropolitan Area of Milan (CMM). More specifically, the project aims at **fostering the creation of a common well-structured governance related to climate change adaptation** among the local authorities and produce tools that allow local authorities to implement cost-effective climate change adaptation strategies and policies adapted to the local context.

An important part of the project is devoted to **share and disseminate the project tools and good practices** with the other Italian and EU metropolitan areas.

WHAT ARE METRO ADAPT'S OBJECTIVES?

1. Mainstream the adaptation strategies and measures in the elaboration process of the CMM Territorial Plan and in the planning and building rules of the 134 CMM municipalities through an innovative approach identifying intermediate entities of governance (the 7 CMM Homogenous Areas);

2. Establish and promote Nature Based Solutions (NBS) according to a multi-objectives approach (flood risk and heat-island reduction, together with regeneration of neglected urban space) that enhance the technical knowledge required for their design and implementation of NBS at local level;

3. Enhance bottom up initiatives increasing citizens' awareness and engagement on climate change adaptation strategies;

4. Make available disaggregated meteorological and territorial monitoring data and tools that contribute to the development of accurate vulnerability analysis of the 7 Homogenous Areas of CMM;

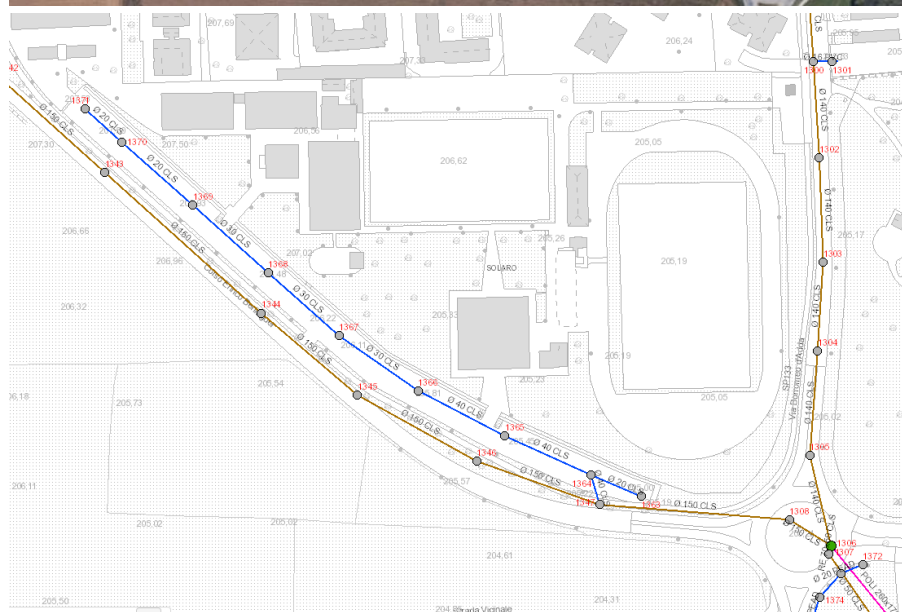
5. Develop a knowledge network of Italian and European metropolitan areas enhancing the mainstreaming of adaptation policies and Nature Based Solutions by sharing best practices, documentations and opportunities.



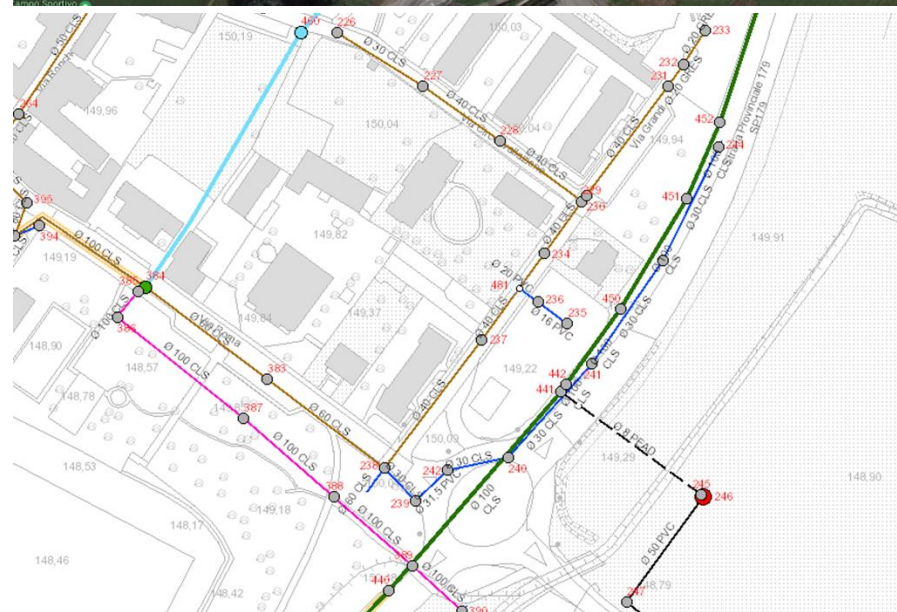
LIFE METRO ADAPT: SuDS APPLICATIONS IN PILOT AREAS



SOLARO

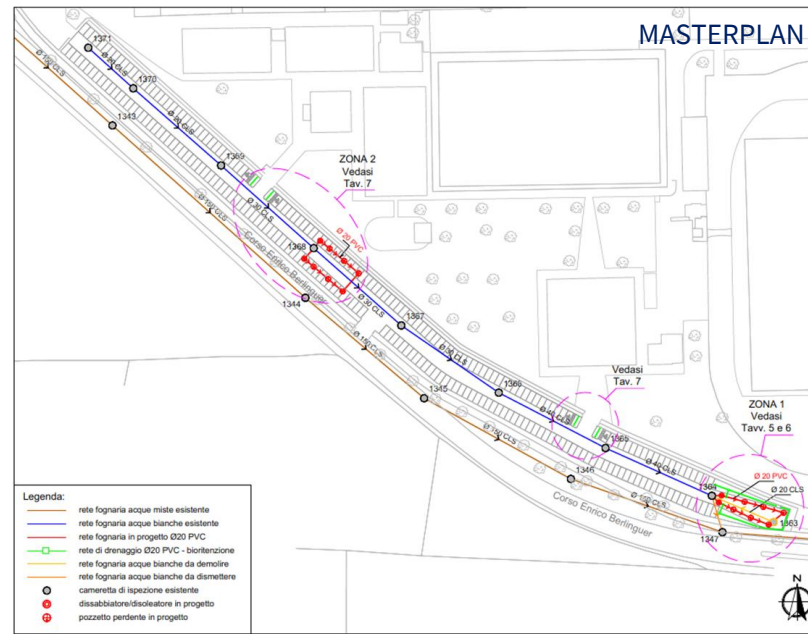
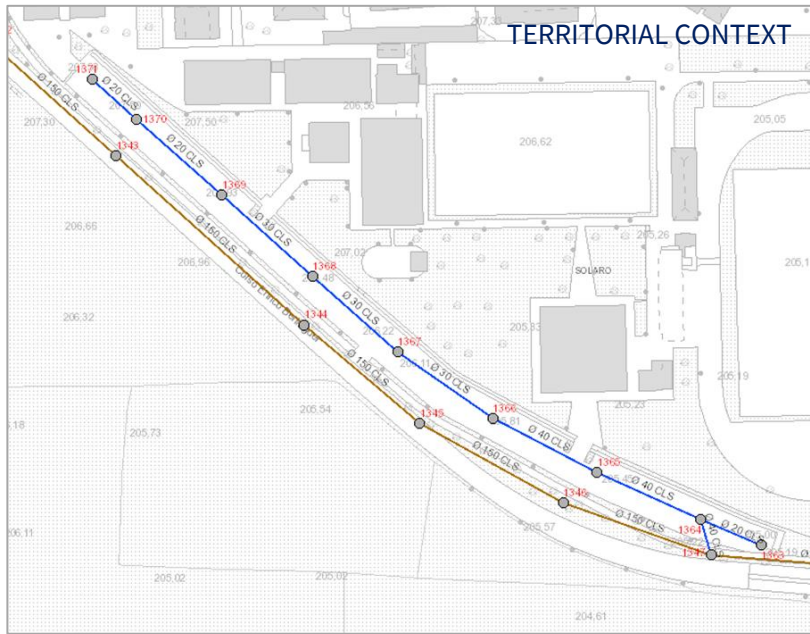


MASATE

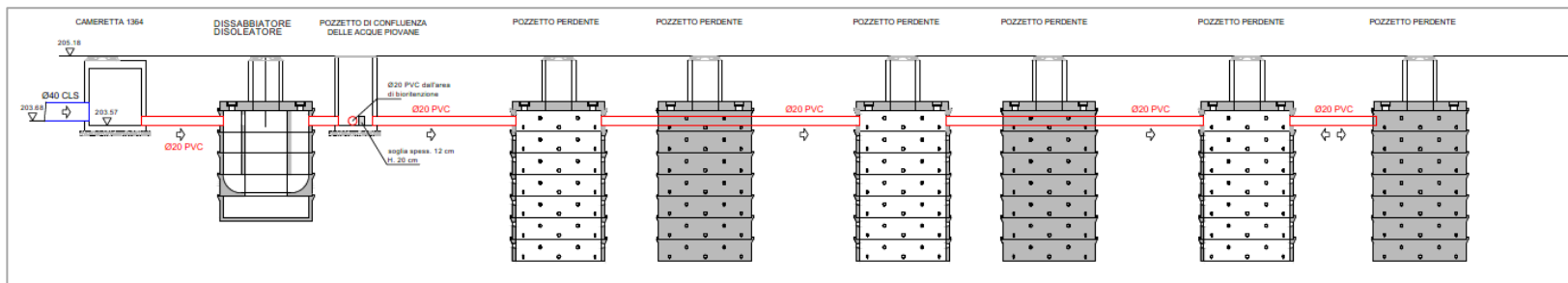
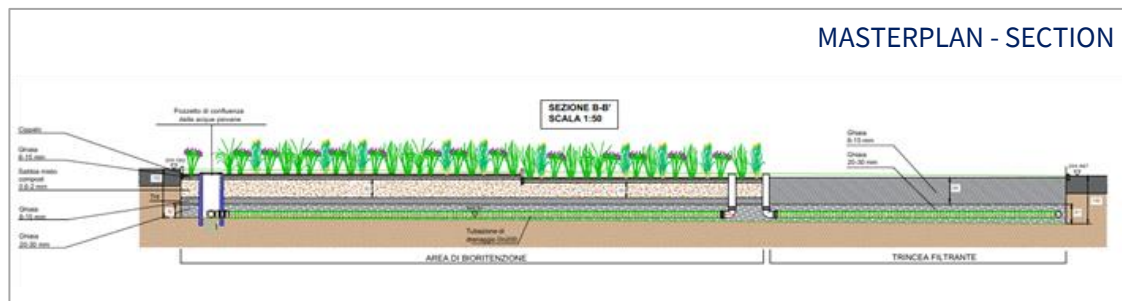
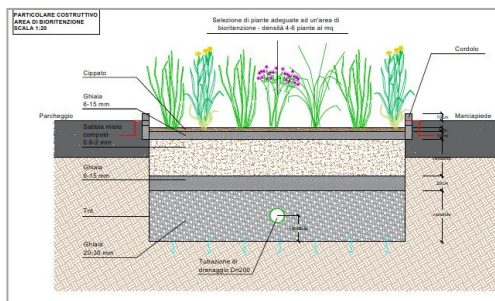




Disconnection of a public car parking in SOLARO (MI)



- Legenda:
- rete fognaria acque miste esistente
 - rete fognaria acque bianche esistente
 - rete fognaria in progetto Ø20 PVC
 - rete di drenaggio Ø20 PVC - bioretentione
 - rete fognaria acque bianche da demolire
 - cameretta di ispezione esistente
 - disabbiatore/disolatore in progetto
 - pozzetto pendente in progetto



DESCRIPTION

The project was aimed at implementing a mixed solution: the **de-impermeabilization** of a part of the parking and implementation of a **bioretention and infiltration basin** to combine with two **dispersion systems** composed of draining wells.

DETAILS

AREA	5.700 m ²
LIMITS	None
ACQUIFER	> 40m depth
PERMEABILITY	Good
UNDERGROUND SERVICES	None
TYPE OF INTERVENTION	Bioretention and infiltration basin draining wells
STATUS	Ended
COST	207.000,00 €



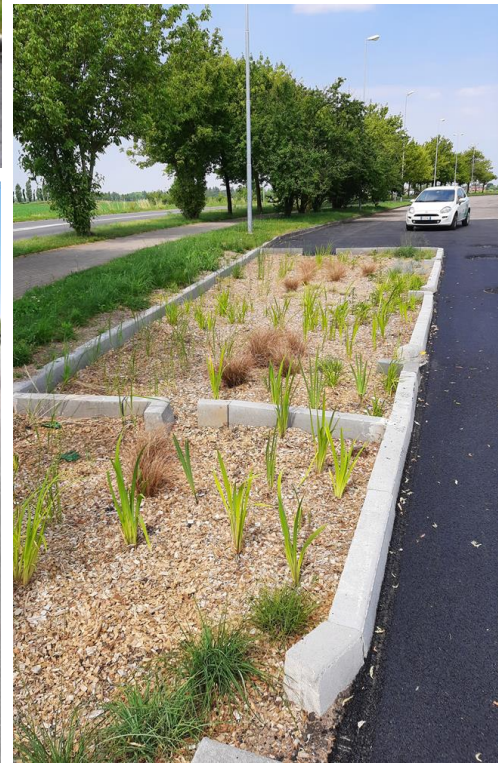
Disconnection of a public car parking in SOLARO (MI)



BEFORE



AFTER

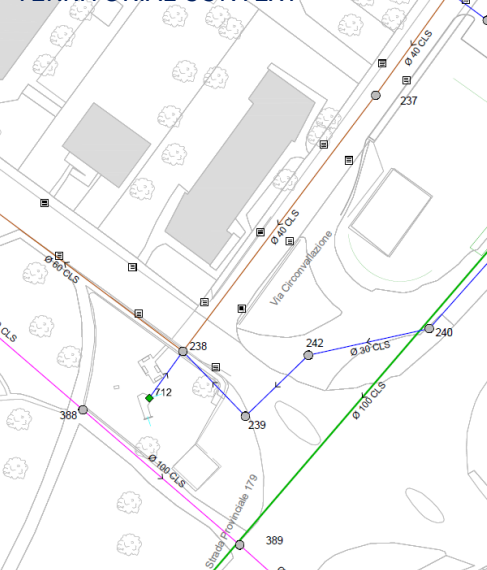




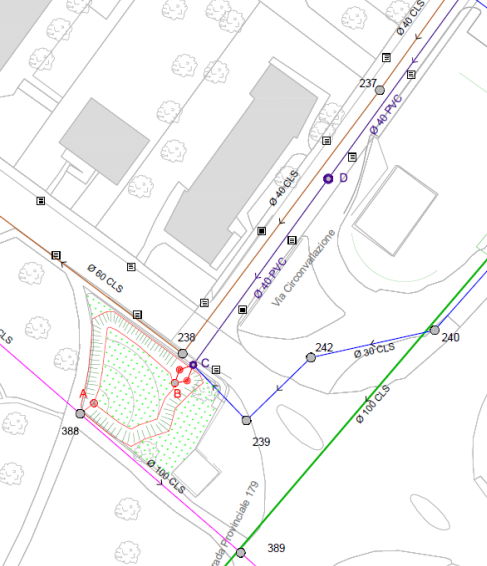
Disconnection of surfaces in MASATE (MI)



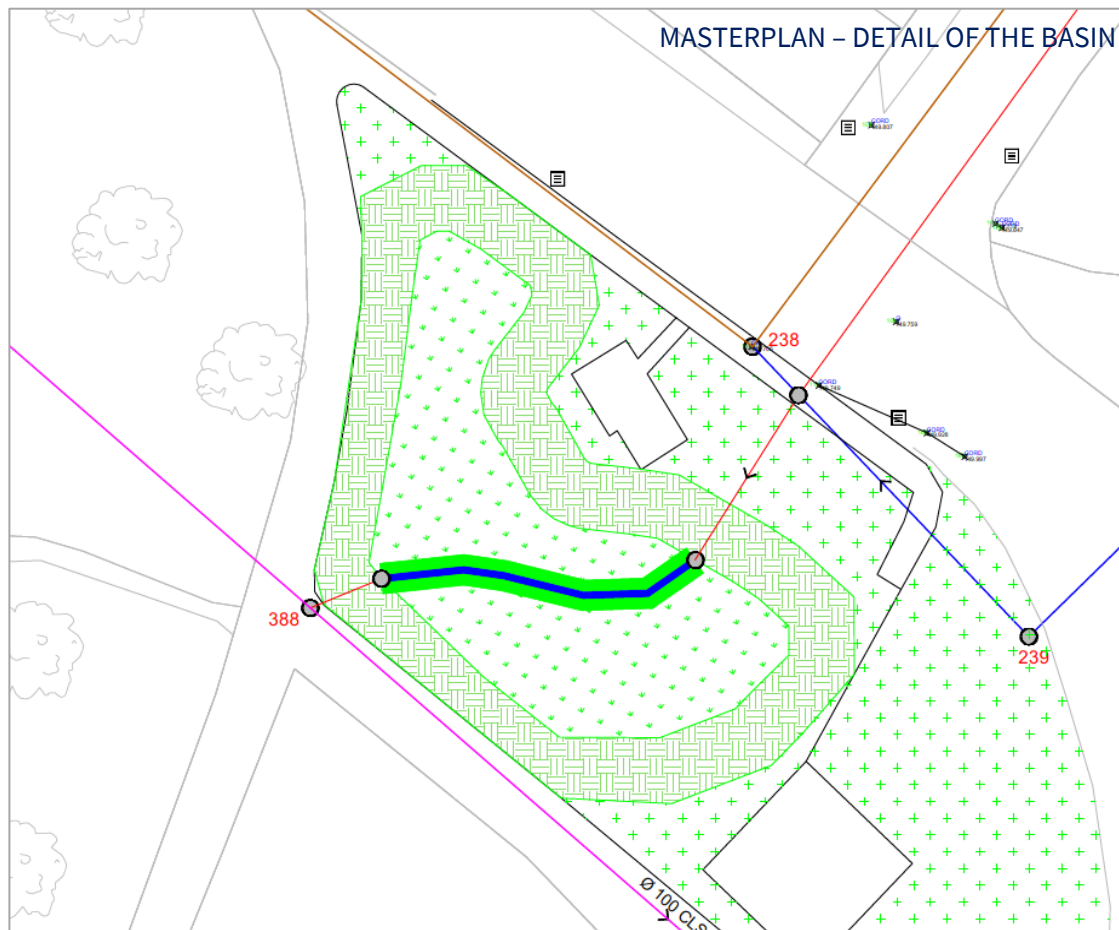
TERRITORIAL CONTEXT



MASTERPLAN

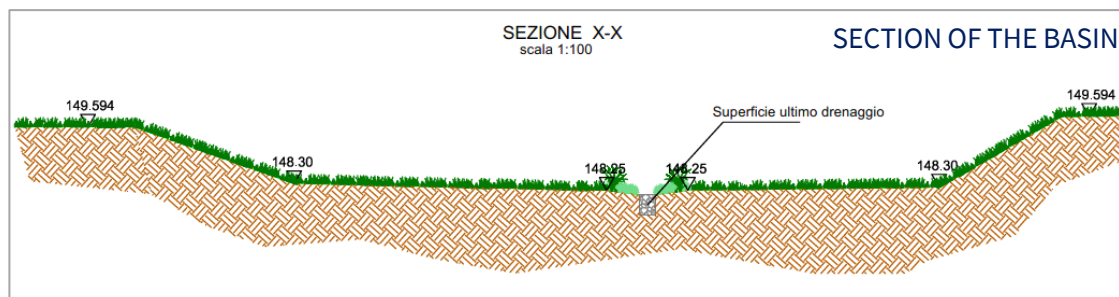


MASTERPLAN - DETAIL OF THE BASIN



SEZIONE X-X
scala 1:100

SECTION OF THE BASIN



DESCRIPTION

The project was aimed at the construction of a **rainwater retention basin** in an existing green area with drainage into an existing water canal (Fosso Valletta); the discharge will take place with a limited flow rate in accordance with the one specified by Art. 8, clause n.5 of RR 7/2017, that is equal to 40 l/s.

DETAILS

AREA	3.200 m ²
LIMITS	None
ACQUIFIER	> 12,5 m depth
PERMEABILITY	Limited
UNDERGROUND SERVICES	Public lightning system, gas system
TYPE OF INTERVENTION	Rainwater retention basin
STATUS	Ended
COST	95.000,00 €



Disconnection of surfaces in MASATE (MI)



BEFORE

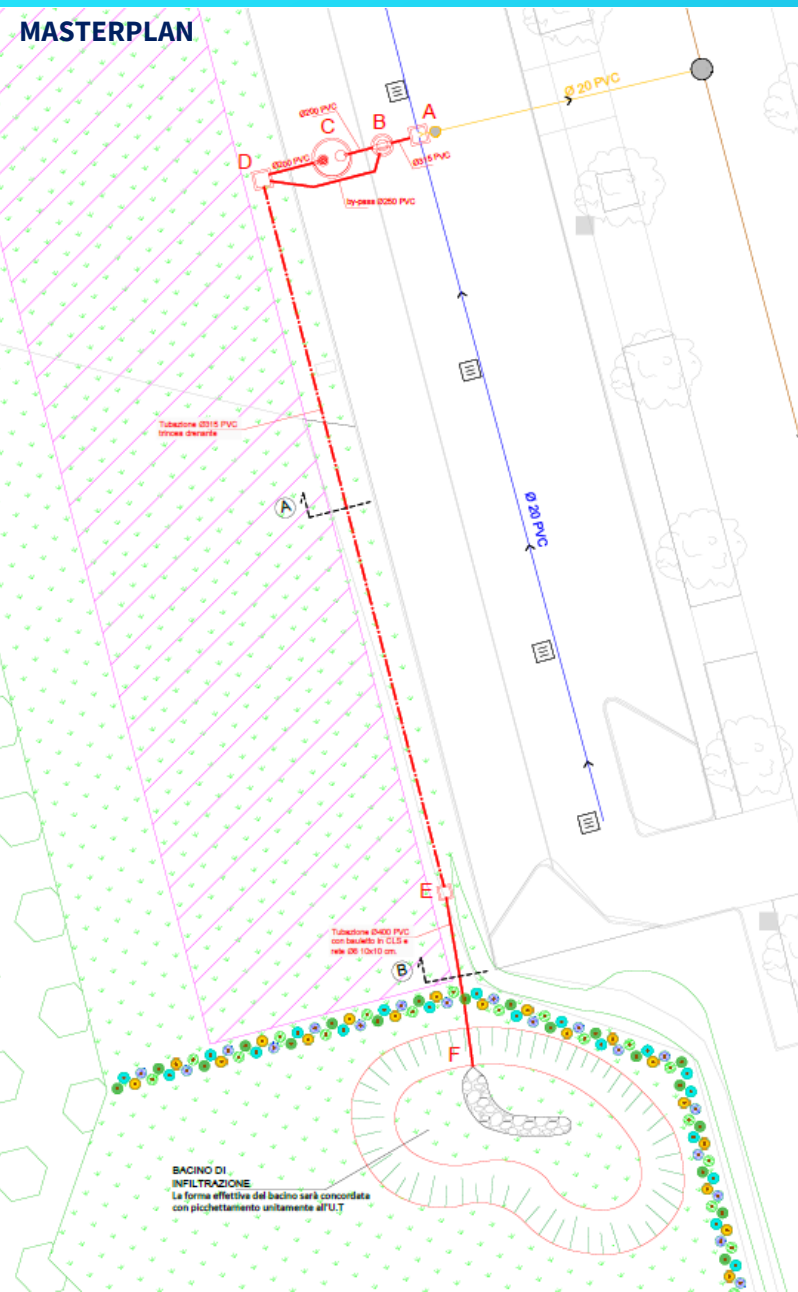


AFTER





OTHER EXPERIENCIES – Disconnection of a public car parking in VAREDO (MI)



DESCRIPTION

The project was aimed at the construction of a **rainwater retention basin** in a green area next to the car parking that was subjected to the works envisaged by this project.

DETAILS

AREA	2.000 m ²
LIMITS	None
ACQUIFIER	> 20 m depth
PERMEABILITY	Good
UNDERGROUND SERVICES	None
TYPE OF INTERVENTION	Rainwater retention basin
STATUS	Ended
COST	120.000,00 €



OTHER EXPERIENCIES – Water Park in PADERNO DUGNANO (MI)

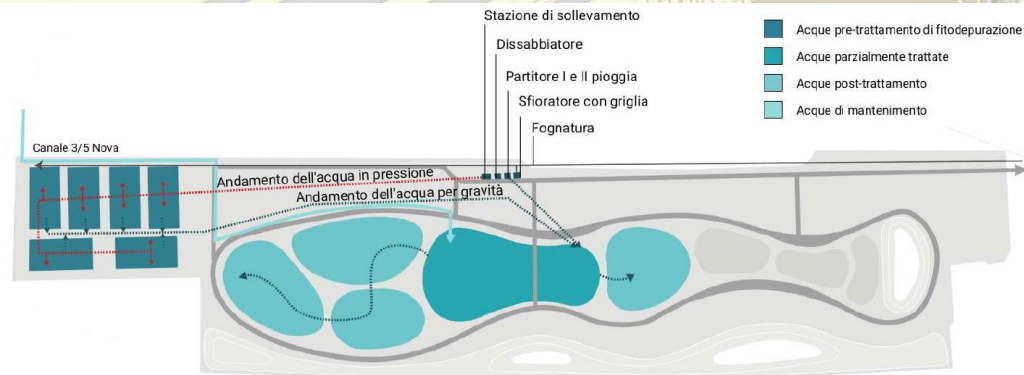


DESCRIPTION

The project is aimed at the implementation of an urban **water park** characterized by environmental and landscape systems' qualification, the integration of existing functions with multi-purpose spaces and the creation of a multi-functional water system for managing rainwater composed by different nature-based solutions.

DETAILS

AREA	14.000 m ²
LIMITS	Ecological network street buffer zone power line buffer zone
ACQUIFIER	> 17,5 m depth
PERMEABILITY	Good
UNDERGROUND SERVICES	None
TYPE OF INTERVENTION	Retention basins rainwater infiltration basins lawns phytodepuration systems woodlands drainage canals rain gardens artificial wetlands
STATUS	Feasibility study
COST	7.200.000,00 €





OTHER EXPERIENCIES – REGIONAL COMPETITIONS/CALL FOR IDEAS

1 CALL FOR URBAN REGENERATION PROJECTS (REGIONE LOMBARDIA, 2021)

ADDRESSED TO All the municipalities in single or associated form.

OBJECT OF THE CALL Selection of projects that aim at the **implementation of interventions in public areas / buildings** in order to **boost urban regeneration processes** according to urban regeneration strategies of the municipality.

FINANCIAL ENDOWMENT 100.000.000 €

GENERAL OVERVIEW:

- 6 MUNICIPALITIES INTERESTED IN PARTICIPATING
- 6 SUBMITTED APPLICATIONS
- 13 SUBMITTED PROJECTS
- 3.838.409,19 € TOTAL COST OF SUBMITTED PROJECTS
- 3.101.809,19 € REQUESTED FINANCIAL CONTRIBUTION

CURRENT STATUS OF THE APPLICATIONS:

- ✓ SUBMISSION OF APPLICATIONS
- ✓ EVALUATION OF FORMAL ADMISSIBILITY OF APPLICATIONS
- **EVALUATION OF THE PROJECTS (UNTIL 30/11/2021)**
- PUBLICATION OF THE LIST OF FINANCED INTERVENTIONS
- WORKS' BEGINNING
- ...



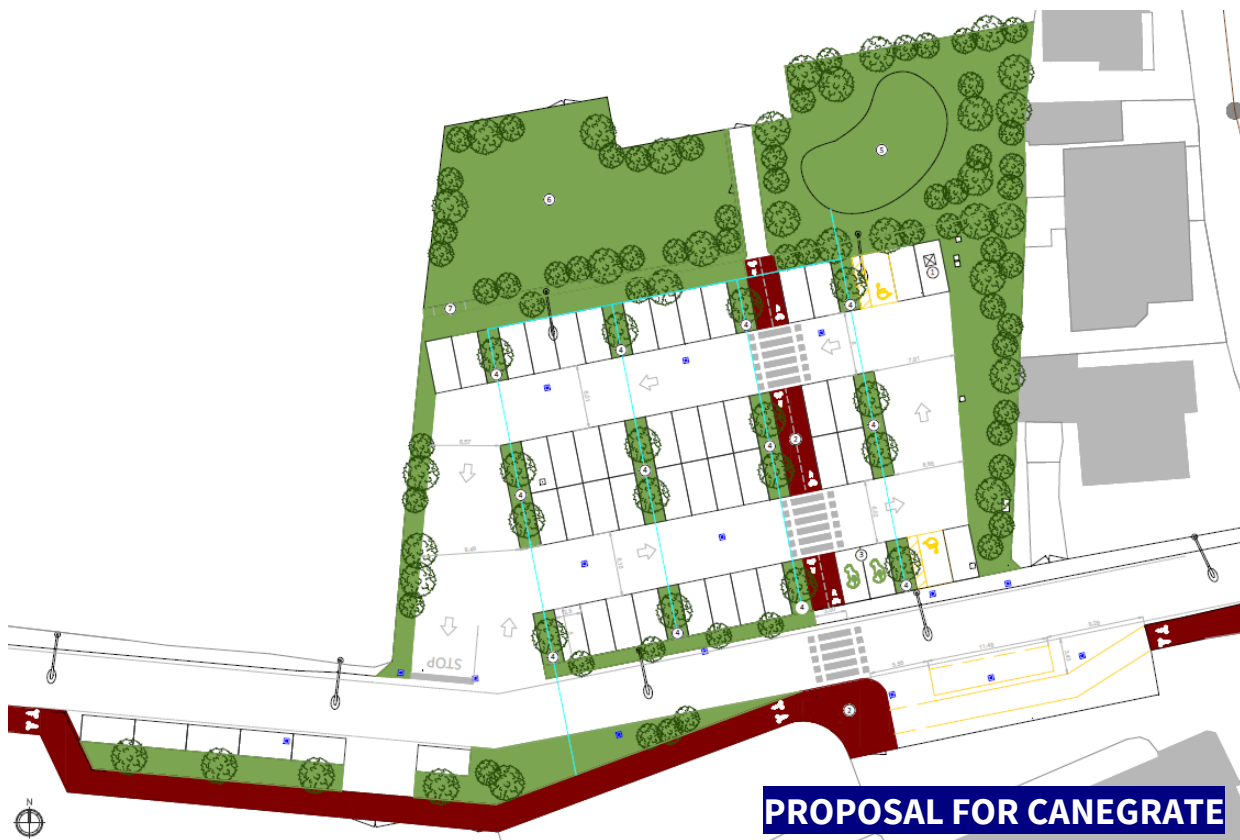
OTHER EXPERIENCIES – REGIONAL COMPETITIONS/CALL FOR IDEAS

2 CALL FOR DE-IMPERMEABILIZATION PROJECTS (REGIONE LOMBARDIA, 2021)

ADDRESSED TO All the **municipalities** in single or associated form.

OBJECT OF THE CALL Selection of projects that aim at the **implementation of interventions for climate adaptation and mitigation based on the use of SuDS - Sustainable Drainage System** in order to **increment permeable areas** and favor the infiltration of rainwater, reducing the risk of flooding and the formation of heat islands.

FINANCIAL ENDOWMENT 5.000.000 €





WHAT ARE THE PROBLEMS OF THIS APPROACH?

MAIN PROBLEMS WHILE FACING SuDS

- **PERMEABILITY** OF THE SOIL;
- **ACQUIFIER**;
- THE PRESENCE OF **UNDERGROUND SERVICES AND UTILITIES**;
- **RELATIONSHIPS** BETWEEN THE COMPANY THAT MANAGES THE INTEGRATED WATER SERVICE (CAP HOLDING) AND THE MUNICIPAL ADMINISTRATIONS;
- PROBLEMS REGARDING THE **COLLECTION** OF DATA, INFORMATION OR MATERIALS THAT ARE NECESSARY FOR THE PLANNING PHASE;
- PLANNING OF GREEN INTERVENTIONS THAT ARE NOT PART OF INTEGRATED WATER SERVICE'S **COMPETENCES**.



IT'S NECESSARY TO INCREASE THE KNOWLEDGE IN THIS FIELD AND TO EXPAND THE NETWORK OF RELATIONSHIPS

To conclude

- SUDS can also be implemented in interventions on a micro-scale and on existing works
- The SUDS design must be taken care of to adapt to the context and fit harmoniously
- how to finance SUDS as they are not always directly financeable with the Integrated Water Service resources



Autori: Daniele Masseroni, Federico Massara, Claudio Gandolfi, Gian Battista Bischetti
con la collaborazione di CAP Holding spa

MANUALE SULLE BUONE PRATICHE DI UTILIZZO DEI SISTEMI DI DRENAGGIO URBANO SOSTENIBILE

Manual on good practices about the use of Sustainable Urban Drainage Systems

(Gruppo CAP and DiSAA, 2018)

- **Collaboration** between the Department of Agricultural and Environmental Sciences (DiSAA) and CAP Holding;
- It **spreads the modern approaches**, control methods and sustainable management of urban outflows;
- It describes the technical economical characteristics of main solutions that can be adopted for mitigating the rain water outflow in the urban area, in particular by using the so-called **Sustainable Urban Drainage Systems (SuDS)** and it provides indications over maintenance activities for keeping their efficiency;

https://www.gruppocap.it/FileFolder/c4337907-c08e-4155-b548-245d23322578/File/Attivita/Ricerca%20E%20Sviluppo/Ricerca%20universitaria/Manuale%20SuDS_ese_LR.pdf



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DI SCIENZE
AGRICOLE E
AMBIENTALI





Invarianza idraulica

La gestione delle precipitazioni è diventata negli ultimi decenni più problematica, a causa della crescita frenetica delle aree urbane e dei cambiamenti climatici che hanno portato a un aumento dei fenomeni meteorologici estremi. Per far fronte a questo scenario, bisogna adottare un **nuovo approccio alla gestione delle acque pluviali** in ambito urbano.

La Regione Lombardia ha recentemente introdotto nel suo ordinamento legislativo (vedi L.R. 15 marzo 2016, n. 4 e atti conseguenti) il principio di **invarianza idraulica e idrologica** attraverso il quale si vuole **ridurre l'impatto idrologico delle attività di trasformazione del territorio**.

Consapevoli dell'importanza di questo tema a livello ambientale, abbiamo dedicato un **ufficio al tema dell'invarianza idraulica**, per assistere i comuni convenzionati nella stesura dei documenti semplificati di rischio idraulico e degli studi comunali di gestione di rischio idraulico (di cui l'art. 14 del R.R. n.7/2017) e svolgere **attività di progettazione** degli interventi di invarianza idraulica (ai sensi dell'art. 3 del R.R. n.7/2017) per le opere di interesse pubblico ricadenti nel territorio di competenza.

Collaboriamo inoltre con diversi enti di ricerca per la redazione di studi e analisi relativamente alla gestione delle acque meteoriche in ambito urbano. Tra i progetti a cui lavoriamo ci sono:

- **FLOOD-HIDE**: studio finalizzato alla valutazione del potenziale utilizzo dei terreni agricoli e dei canali rurali per la laminazione delle acque meteoriche;
- **SMART-GREEN**: progetto di ricerca per lo sviluppo di un modello per ottimizzare l'utilizzo delle green infrastructures a scala territoriale al fine di mitigare gli effetti negativi dei deflussi di piena;
- **SiRIC**: sistema informativo di invarianza idrologica e gestione del rischio idraulico comunale.

<https://www.gruppocap.it/it/cosa-facciamo/territorio-e-resilienza/invarianza-idraulica>

Per approfondire

Manuali e guide



THANKS FOR YOUR ATTENTION!