Nature Based Solutions For Water

WP6 – Task 6.6 Buddy System Activities
Webinar 25th September 2018
RINA-C

Speaker: Sara Botto - sara.botto@rina.org
Carolina Ferrando – carolina.ferrando@rina.org
Margherita Cioffi – margherita.cioffi@rina.org

European Commission
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Webinar agenda

- Introduction about risks connected to water in cities and overview of the related NBS
- Eindhoven: detailed informations & replication conditions for the NBS: daylight water course
- Genoa: detailed informations & replication conditions for the NBS: retention basins, draining areas
- Tampere: detailed informations & replication conditions for the NBS: waterstorm management
- Success stories from already implemented projects in FR cities/examples of NBS that inspired FR cities actions in the management of urban water challenges
- Q&A sessions for interaction between FR and FL cities

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Introduction about risks connected to water in cities and overview of the related NBS

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The Water Related Risks In Cities

The population growth and the climate changes are the main reasons connected with the water issues that increasingly involve cities worldwide

Water related risks that can't be ignored:

- Disasters related to flooding and droughts
- Water pollution and deteriorating water quality
- Variation in water availability/lack of water

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The Water Related Risks In Cities
Water Quality Issues

The problem of water pollution and deteriorating water quality causes risks to human and ecosystem health

Main sources of water pollution

- AGRICULTURE (over-application of agrochemicals/ removal of vegetation/intensified ploughing)
- INDUSTRY (untreated wastewater)

Impacts on ecosystem

- Degradation of the soil/vegetation layer ecosystem
- Reduction of the ability of water related ecosystems to provide services like natural water purification

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The Water Related Risks In Cities
Water Disasters - Floods and Droughts

Around 30% of the global population is estimated to reside in areas and regions routinely impacted by either flood or drought events

Major cause of increasing water disasters → ECOSYSTEM DEGRADATION

Socio - economic & environmental Impacts

- Immense growing human and economic losses globally
- Contamination of water supplies and diffusion of diseases especially in poorly serviced settlements
- Soil erosion and loss of biodiversity

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The Water Related Risks In Cities
Water Availability

Today around 1,9 billion of people live in potentially severely water-scarce areas and water use is expected to continue increasing at the global level

Factors that influence water availability

- WATER DEMAND AND SUPPLY
- WATER QUALITY
- DISASTROUS FLOODS & DROUGHTS

Socio – economic & environmental Impacts

- Lack of soil-vegetation: difficulty of water infiltration, groundwater recharge, soil moisture retention
- Poor agriculture production and extremely hard life conditions

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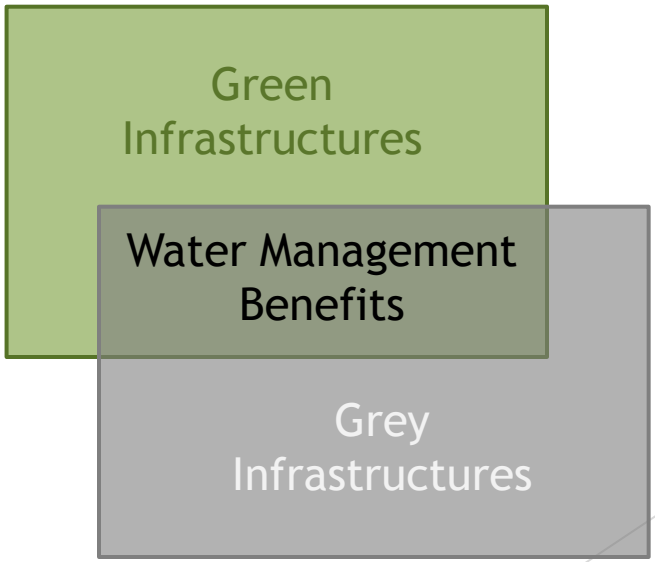
The Water Related Risks In Cities
Nature Based Solutions For Water

Nature plays a fundamental role in regulating different features of the water cycle, acting as a regulator, a cleaner, and/or a supplier of water

Green Infrastructures For Water

- Natural or semi-natural systems that provide water resources management options equivalent or similar to conventional grey water infrastructures.



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The Water Related Risks In Cities
NBS For Managing Water Quality

NBS that have a very high water purification function both in water filtering and in water bioremediation

Constructed Wetlands	Basins filled with sand or gravel substrate. The stormwater runoff can flow through the substrate layer while it is naturally filtered and cleaned
Intensive Roofs	Layer of vegetation planted over a waterproofing system installed on top of a roof. It temporary stores rain/wastewater, filters and binds impurities
Biofilter	System developed to collect and purify storm and wastewater. Bacteria and microorganisms are located on a filter medium (biofilm)

Virginia's Soil & Water Conservation Districts

Côte des Neiges Maison de la Culture, Montreal

Biofilter system, Hydro International, UK

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The Water Related Risks In Cities
NBS For Managing Water Quality

NBS Analyzed	Benefits	Limitations	Economic Impact	Related Grey Infrastructures
Constructed Wetlands	▶ Water Purification ▶ Stormwater Regulation	Large Areas	Amortization 10-20 years	Dams and Leeves
Intensive Roofs	▶ Wastewater Quality ▶ Habitat Wildlife	Limited space for rooting Limited spread of flora&fauna	Amortization 0-10 years	Urban Stormwater Infrastructures
Biofilter	▶ Quality of Life	No particular limitations	Amortization 0-10 years	Urban Stormwater Infrastructures

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The Water Related Risks In Cities
NBS For Managing Water Disasters

NBS with a very useful function in the surface water regulation, considering water conveyance, infiltration, retention/detention, storage, reuse

Bioswales water conveyance/ retention/detention	Vegetated, linear and low pit that absorb, store and convey surface water runoff (mainly draining from roadways)	 Clareview ,Edmonton, Alberta
Detention Ponds Dry/Wet Water retention/ detention/storage	Surface storage basins that retain stormwater. The wet ponds retain water continuously. The dry ponds fill up during heavy rains and after that the water flow away in the sewer system	 Detention pond, Friendswood, Texas
Infiltration Basins water reuse/ infiltration	Flat areas planted with grass and normally dry. After a heavy rain the water fills up the basin and it soaks later into the ground	 Infiltration basin application ,Susdrain, UK

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The Water Related Risks In Cities
NBS For Managing Water Disasters

NBS Analyzed	Benefits	Limitations	Economic Impact	Related Grey Infrastructures
Bioswales	▶ Stormwater Management and Control ▶ Reduced Flood Risk ▶ Water Quality ▶ Amenity Value ▶ Quality of Life	Trees and habitat are limited	Amortization 0-10 years	Urban Stormwater Infrastructures
Detention Ponds Dry/Wet		Medium/Large Areas Included in parks	Amortization up to 15 years	Urban Stormwater Infrastructures
Infiltration Basins		Large Spaces	Amortization 0-10 years	Urban Stormwater Infrastructures

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The Water Related Risks In Cities
Water NBS Applications

Fornebu, Oslo Stormwater Management

- Reduced stormwater pollution
- Management of flood events
- Developed cost-effective drainage system
- Implementation of detention/ retention ponds and bioswales

Hammarby Sjostad, Stockholm Wastewater Management

Water NBS applied:

- Urban Water Channel
- Bioswales
- Ground Infiltration
- Roof gardens
- Temporary Rain Water Buffers

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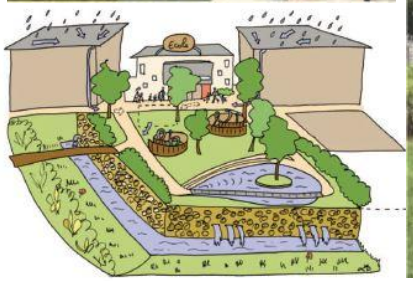
The Water Related Risks In Cities
Water NBS Applications

Park Jacob Kaplan, Lyon Stormwater Management

- Stormwater control
- Construction of an elevated water basin
- System to harvest rooftops and runoff water
- Underground drainage system



Burghplan, Eindhoven Stormwater control & water quality improvement

- Reconstruction of water system
- Filtering construction introduced to clean the runoff water from roads
- Construction of a connecting stream to contain water when it's raining

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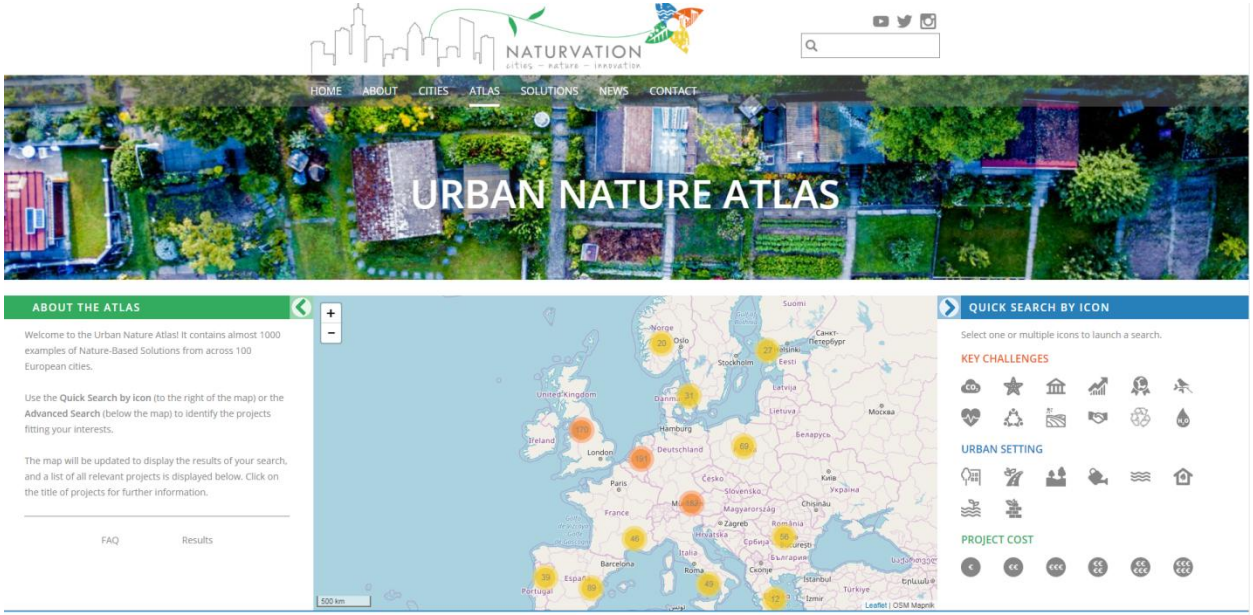
The Water Related Risks In Cities
Useful links & informations



www.naturvation.eu/atlas

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The Water Related Risks In Cities
Useful links & informations

Risks connected to water in cities and overview of related NBS:

- Report on NBS for Water – World Water Forum International Event (8th edition)

http://www.unwater.org/publications/world-water development-report-2018/

- WWF Flood Green Guide Publication- https://www.worldwildlife.org/publications/natural-and-nature-based-flood-management-a-green-guide
- www.urbangreenup.eu/ - New Strategy for Re-Naturing Cities through Nature Based Solutions
- www.naturvation.eu/atlas - Urban NBS Projects from across 100 European Cities

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The Water Related Risks In Cities
Useful links & informations

Water NBS application study cases:

- http://nwrm.eu/case-study/sustainable-stormwater-management-and-green-infrastructure-fornebu-norway
- http://www.urbangreenbluegrids.com/projects/hammarby-sjostad-stockholm-sweden/
- http://www.aqua-add.eu/?page=handbooks

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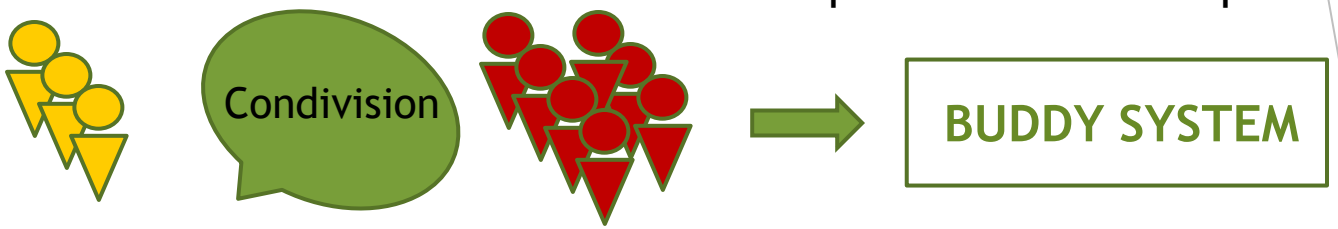
The Water Related Risks In Cities
Front Runner Cities Experiences

The condivision of examples, previous challenges and successful stories related to the application of NBS, is fundamental to better understand how these solutions could be implemented and improved



EINDHOVEN	Daylight Watercourse
GENOA	Retention Basins/Draining Areas
TAMPERE	Waterstorm Management

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Agenda of Cities' presentations

- Introduction: description of the studied area and of the water related challenges that had to be faced
- Description of the different water related NBS adopted
- Successful stories that inspired the water related NBS implemented
- Conclusions: suggestions related to the previous reported experiences that could be helpful to the other cities

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Eindhoven:
detailed information & replication conditions for the
NBS: daylight water course

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Eindhoven
Topics Agenda

- Introduction: Eindhoven started almost 20 years ago with the reconstruction of water courses in order to make the watersystem visible and to create a more robust and as natural as possible watersystem.

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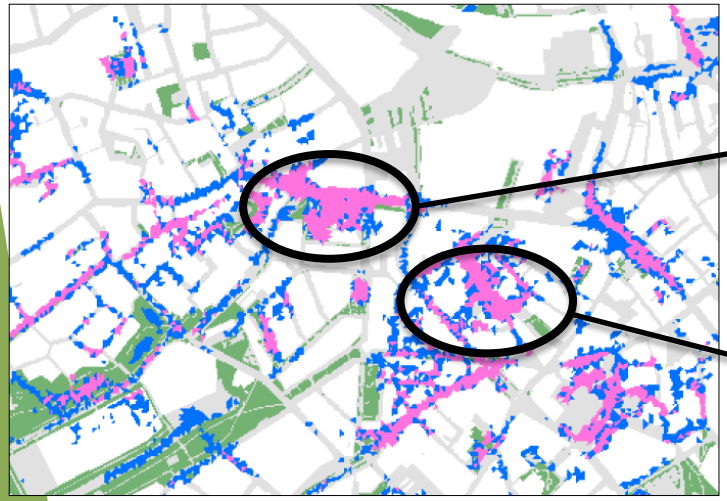

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Eindhoven
Topics Agenda

- **Introduction:** Eindhoven started almost 20 years ago with the reconstruction of water courses in order to make the watersystem visible and to create a more robust and as natural as possible watersystem.
- **Current status:** Part of the 'Gender' is already constructed as well as a few other water as will be shown
- **Conclusions:** suggestions related to the previous reported experiences that could be helpful to the other cities

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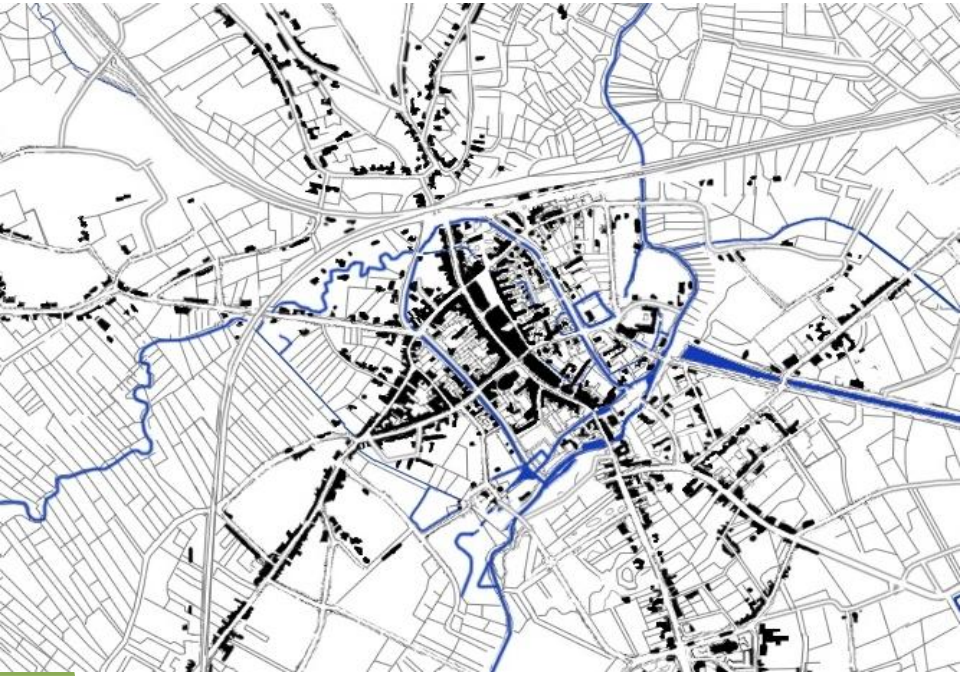
Eindhoven
NBS: Daylight Watercourse

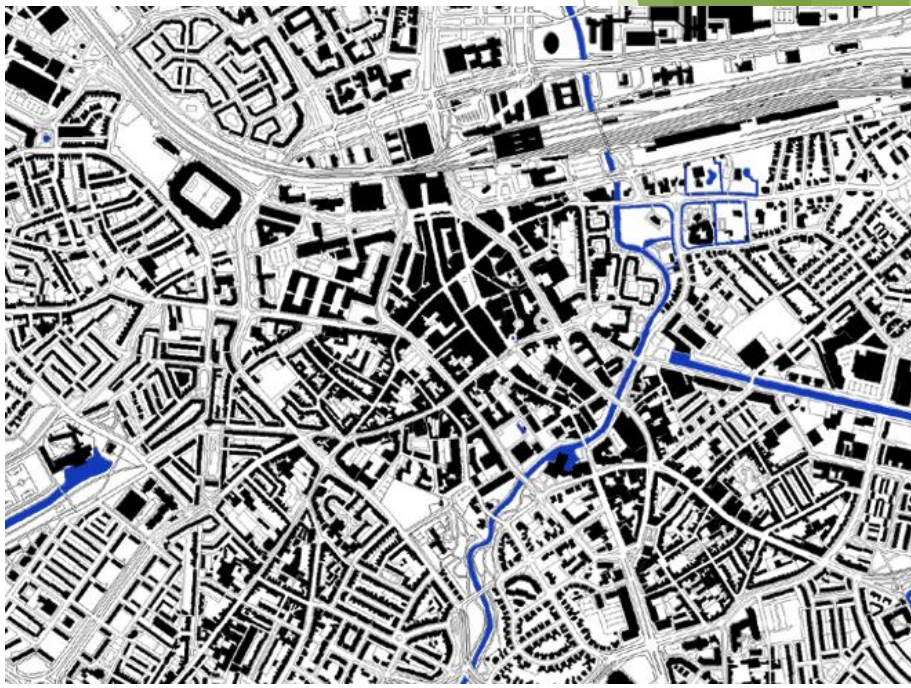
Description of the studied area

In the past the ‘Gender’ was covered and finally changed into a sewage. How to daylight the ‘Gender’ again.

Eindhoven 1899



Eindhoven 2012



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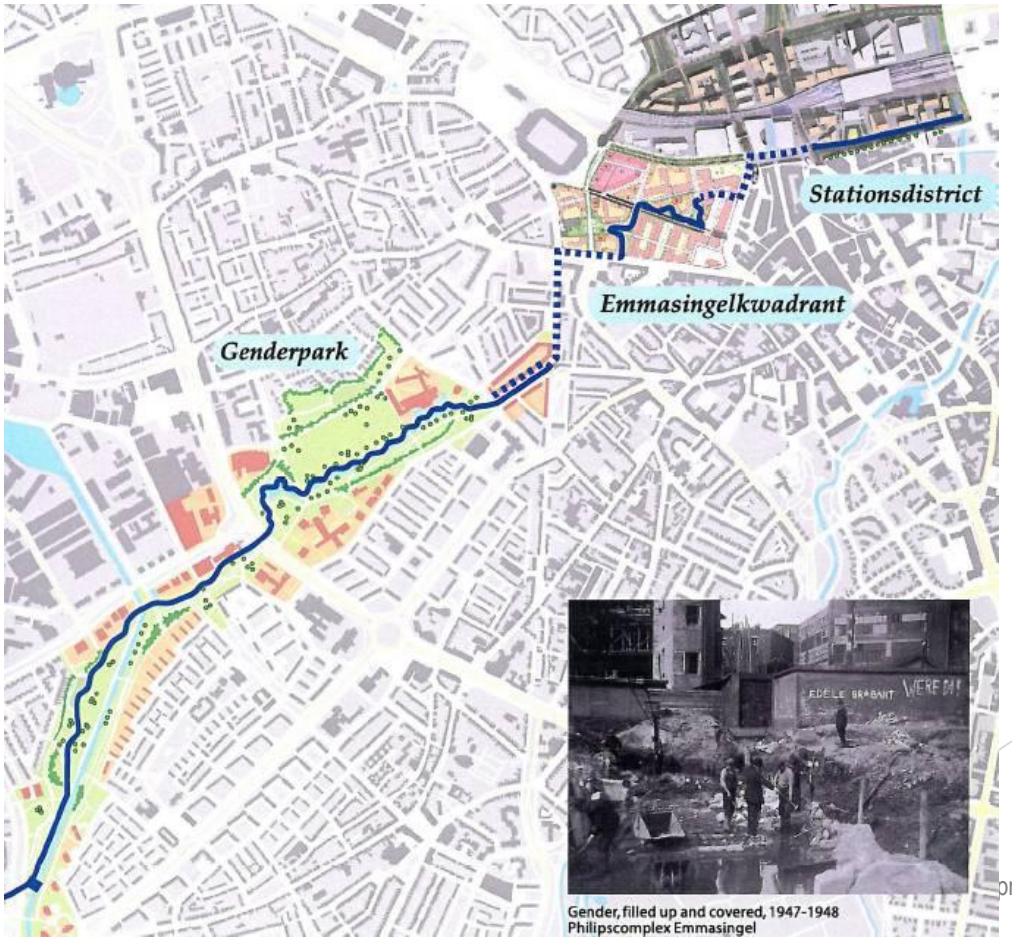

Gender, filled up and covered, 1947-1948
Philipscomplex Emmasingel

programme under Grant Agreement No. 730052

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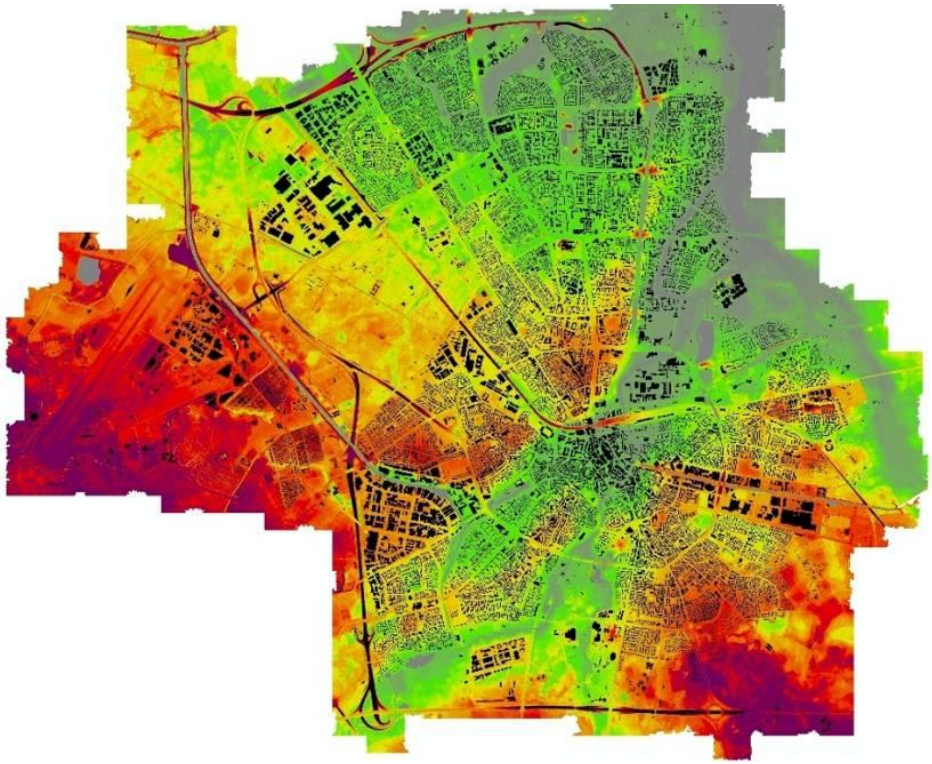

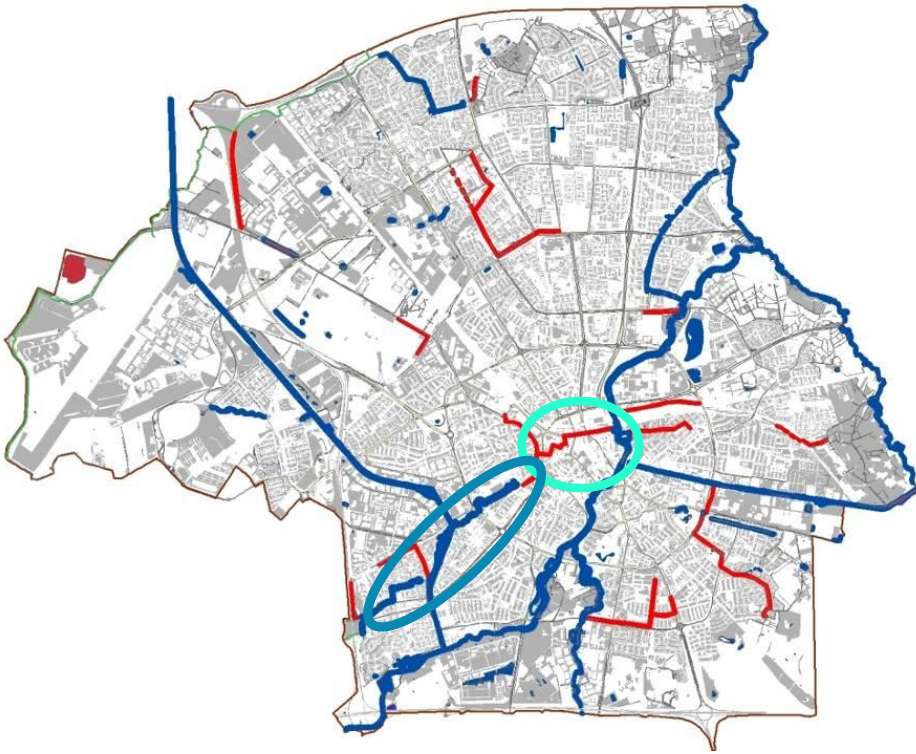

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Eindhoven
NBS: Daylight Watercourse

NBS 1: daylighting water course	
Objectives	Making the water system visible
Description	Because the city has grown it's hard to find places to create a water course
Relation with grey infrastructures	Mostly water courses will be situated next to a road. The wider a road is the easier it is to create a water course
Actors involved	Citizens, the Waterboard, politicians, civil engineers
Role of the community	They will be given the opportunity to produce input and discuss the designs

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Eindhoven
NBS: Daylight Watercourse

NBS 1: daylighting water course	
Technical & legislative pre-conditions	Sometimes available space is not enough to create the ideal solution The waterboard demands special solution
Cost & financing	Who's going to pay: • Municipality (water department) • Waterboard
Barriers	Ownership of the area Value of a water course is underestimated Space can only be used once

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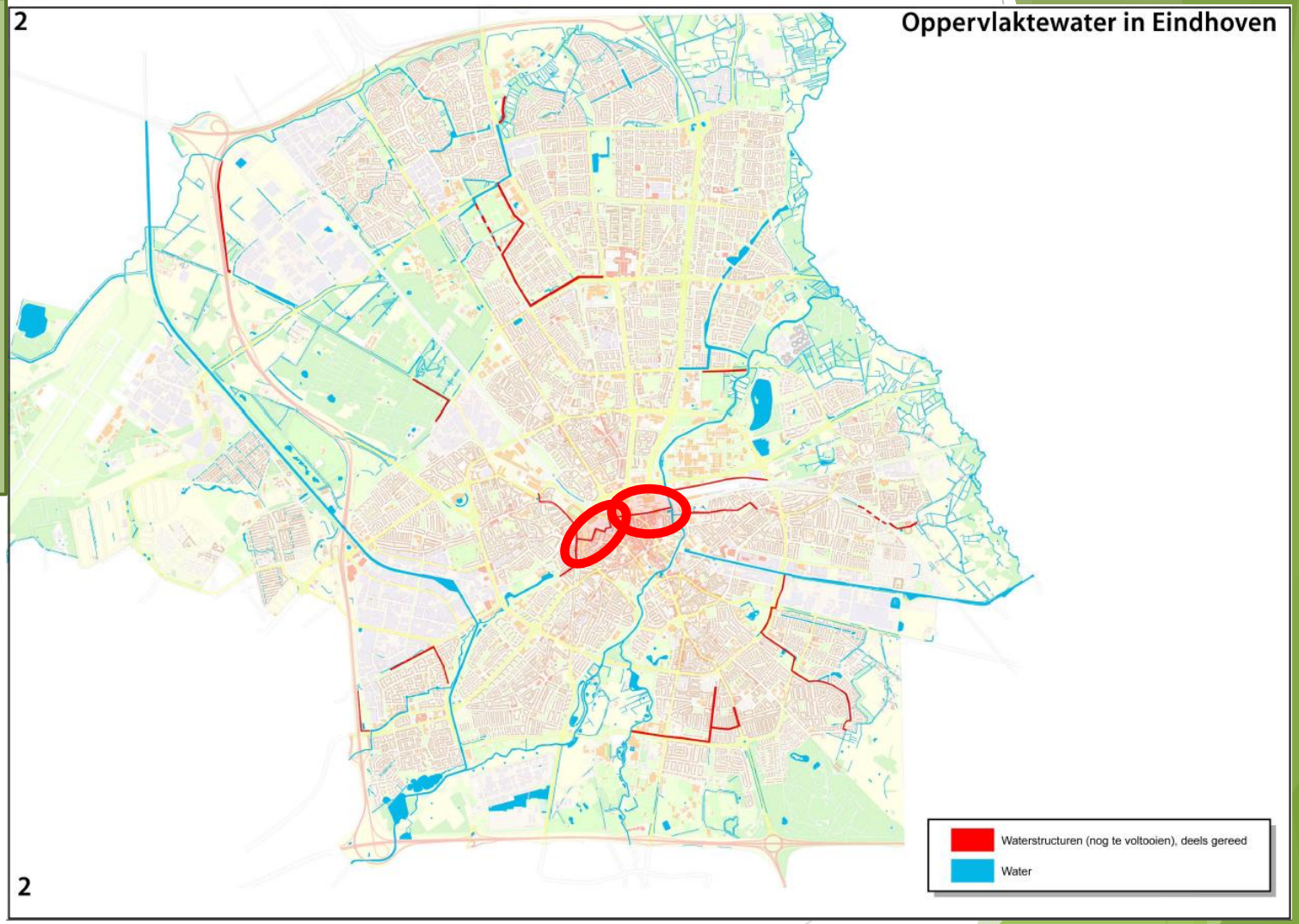
Eindhoven
Successful Study Case: Gender

Daylighting of the river «Gender»

For stormwater management and making watersystem visible



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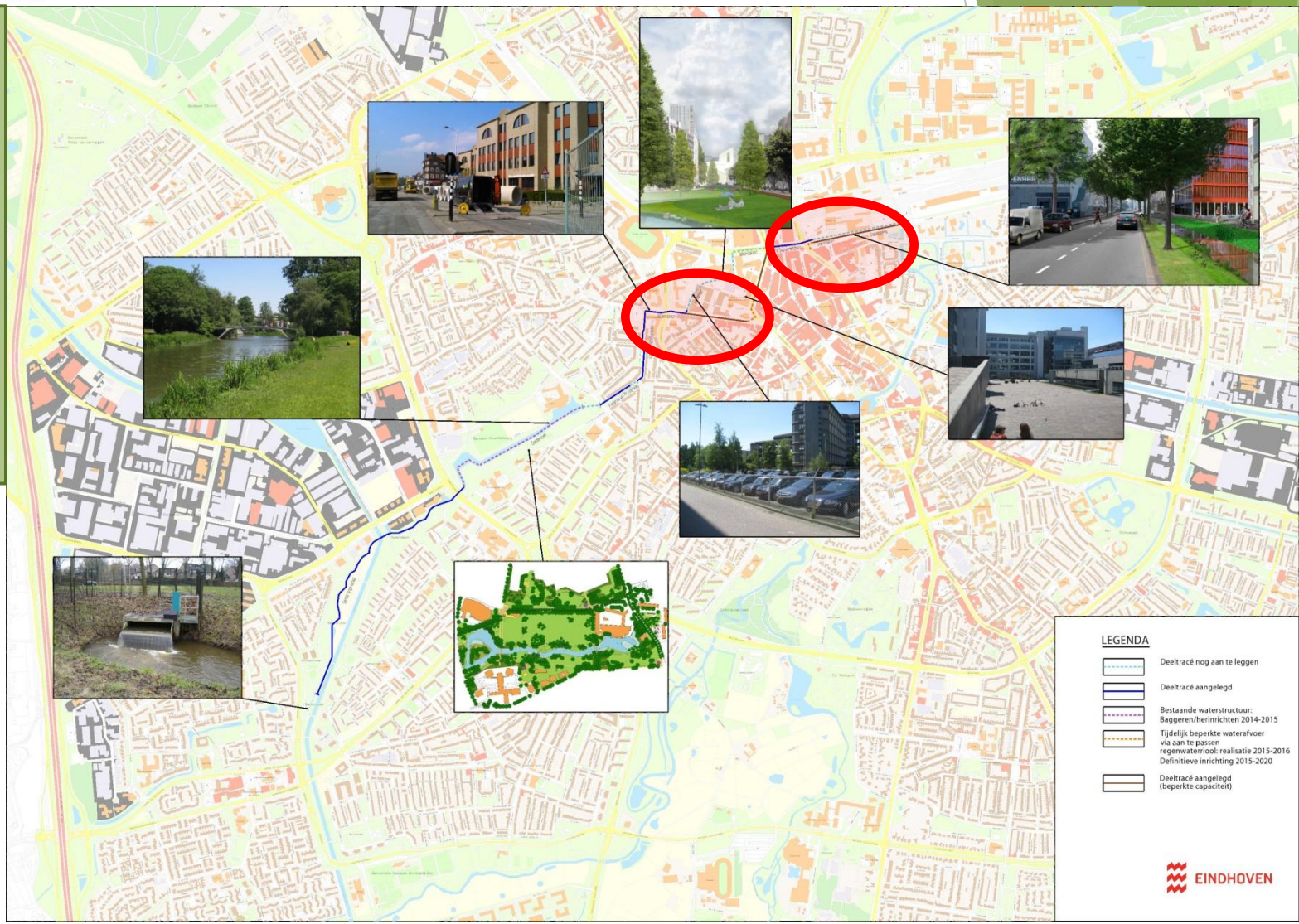

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Eindhoven
NBS: Daylight Watercourse

NBS 1: creating water storage

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Topic: SCC-2-2

Eindhoven
Successful Study Case

Water system «De Burgh» Connecting water bodies and disconnecting from sewage plant

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Eindhoven
Helpful Suggestions

- More examples (designs and constructed) of water systems are available

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Transfering a ditch next to the railway into a stormwater storage

A new created water system: Meerhoven

pump

Water system
artificial flow

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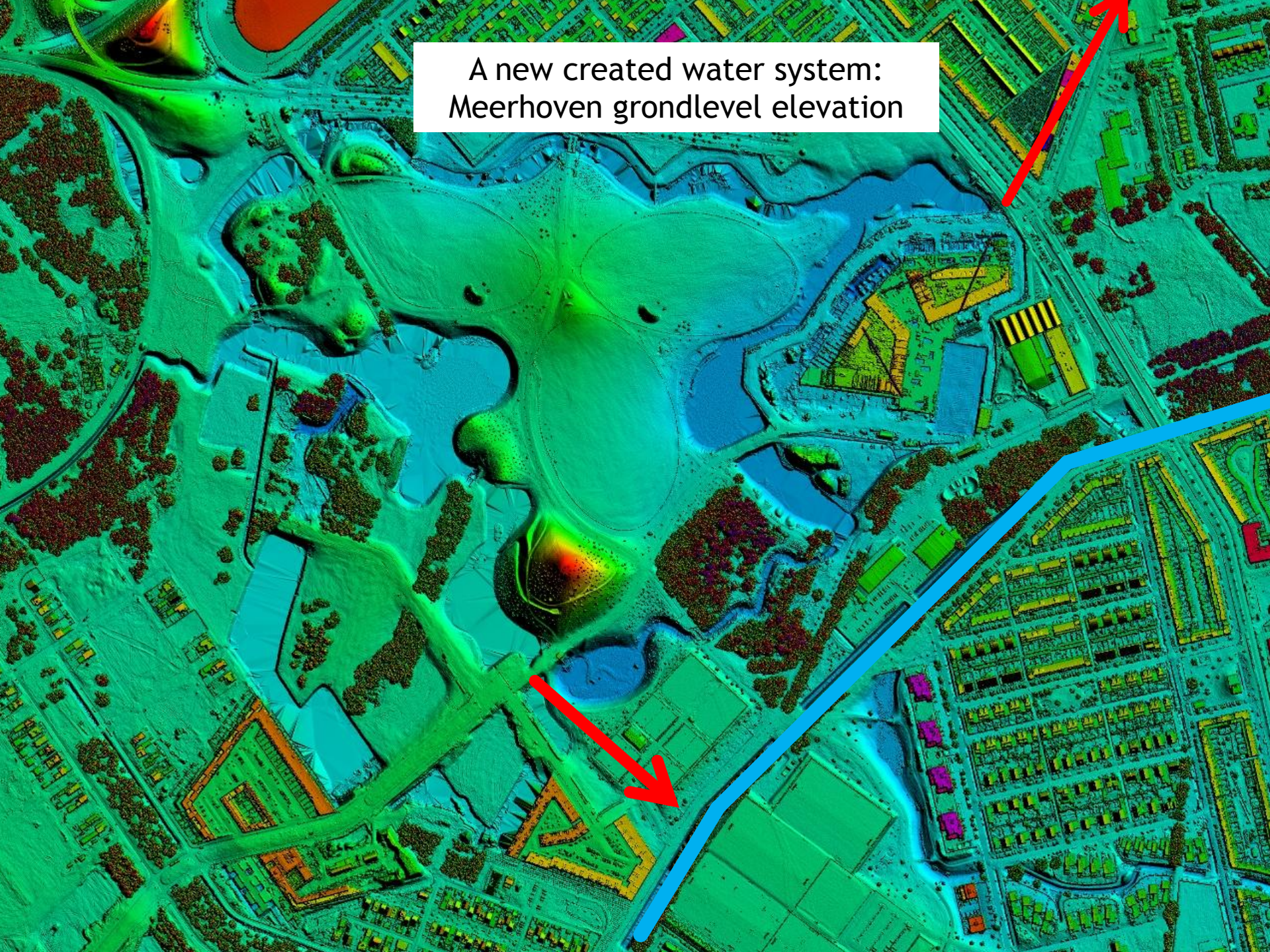
A new created water system:
Meerhoven


A new created water system:
Meerhoven grondlevel elevation

Genoa
detailed information & replication conditions for the
NBS: retention basins, draining areas

COMUNE DI GENOVA

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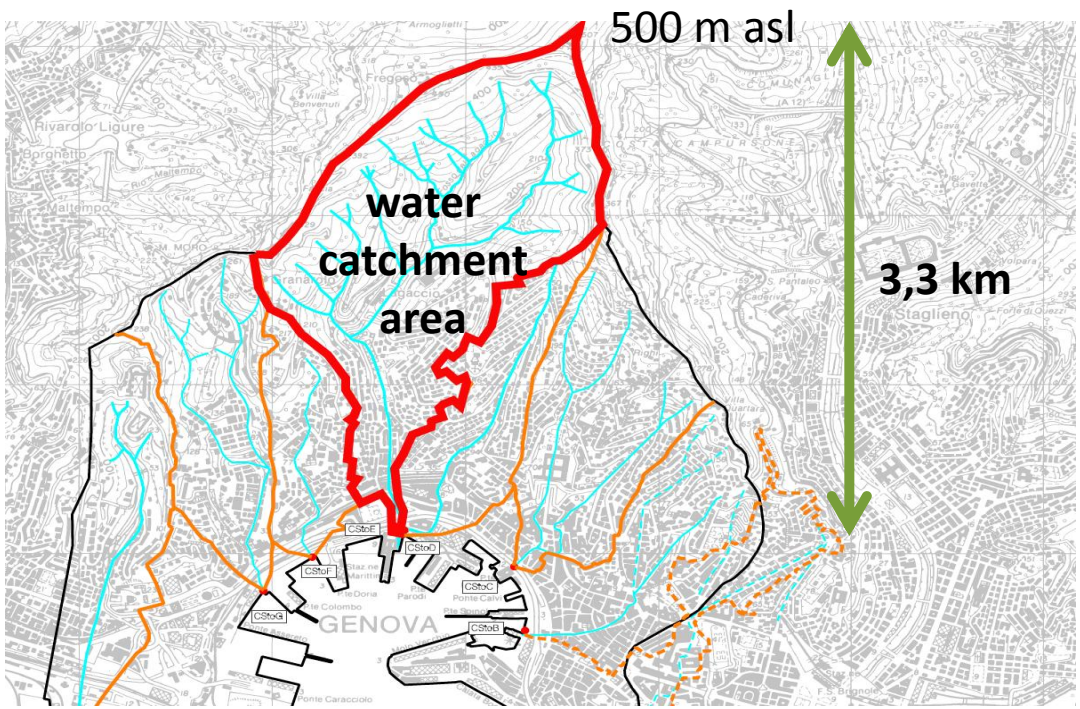
Genoa: the Lagaccio river



The Lagaccio river basin

- High slopes gradient
- Short distance between the sources and the sea
- Bedrocks
- High percentage of sealed soil in the urbanised area
- Channeled rivers and built up
- Flooding and damage

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Genoa: the Gavoglio Urban Park

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Genoa
NBS: Retention Basins/Draining Areas

Infiltration areas	
Objectives	Management of runoff water from the slopes and pathways relative to the Rio Cinque Santi, their infiltration into the soil
Description	Depressions of vegetated soil for the temporary retention of surface meteoric water. Filter bottom and herbaceous vegetation
Relation with grey infrastructures	Deduce the rainwater that falls in the park area from the network of mixed water pipes that could be overloaded in the event of heavy rains
Actors involved	Municipality
Role of the community	Citizens understood the importance of adopting a natural solution to manage rainwater

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Genoa
NBS: Retention Basins/Draining Areas

Infiltration areas	
Technical & legislative pre-conditions	permeable subsoil, not rocky; regulations that allow land movements
Cost & financing	*€15-25 /m2* Annual maintenance costs must include necessary pruning; mowing of the vegetation existing in the park; periodical cleaning tasks of the park; inlet and outlet control structures of water flow of the detention basin.
Barriers	lack of experience of the PA in this type of rainwater management

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Genoa
NBS: Retention Basins/Draining Areas

Draining Pavements	
Technical & legislative pre-conditions	Compliance with regulations regarding spaces open to the public. Possibility of easy access for people with disabilities
Cost & financing	€15 - 20 /m2 Public financing
Barriers	need skilled workers for the realization

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Genoa
NBS: Retention Basins/Draining Areas

Rain garden	
Objectives	A rain garden is a bioretention shallow basin designed to collect, store, filter and treat water runoff.
Description	It must include a porous soil mixture, native vegetation and some hyperaccumulator plants, capable of phytoremediation.
Relation with grey infrastructures	Rain gardens represent an important technique of sustainable drainage, harmonizing the serious impacts of urbanization and soil sealing.
Actors involved	Municipality
Role of the community	Rain garden can be implemented including participatory planning.

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Genoa
NBS: Retention Basins/Draining Areas

Raingarden	
Technical & legislative pre-conditions	Sub soil structure
Cost & financing	€40 /m2
Barriers	NA

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Genoa
NBS: Retention Basins/Draining Areas

Underground detention systems	
Objectives	Reduction of surface runoff of rainwater through collection and detention of rainwater, creation of water supplies for irrigation
Description	Underground rooms in modular elements of self-supporting semi-recycled polypropylene with detention / retention capacity of rainwater
Relation with grey infrastructures	Stored water will be reused for irrigation through pumping stations Exceeding water will be directed into the sewage network with delayed time from the rain event
Actors involved	Municipality
Role of the community	Citizens have understood the importance of saving rainwater for further uses and to provide spaces to mitigate natural hazards

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Genoa
NBS: Retention Basins/Draining Areas

Underground detention systems

Technical & legislative pre-conditions	Watershed plan legislation, accurate insulation on borders to contain water without using concrete walls, maintain acceptable water quality standards to reuse for irrigation, provide outlet into proper infrastructure when full capacity is reached
Cost & financing	€ 78.000 Public investment or experimental sponsorship
Barriers	Unusual installation in local context, maintenance of underground rooms

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Genoa
NBS: Retention Basins/Draining Areas

Afforestation on slopes	
Objectives	Arboreal areas can alleviate the impacts of flooding in urban areas and climate change effects
Description	Afforestation with young plants (local species) on specific pattern along the slopes
Relation with grey infrastructures	Increase of shading surfaces, C02 absorption, reduction of heat island effect, partial rainwater absorption, increase of biodiversity. Afforestation is combined with containing walls along the slopes
Actors involved	Municipality
Role of the community	Extensive stakeholder engagement in planning for implementation, and for interdisciplinary input.

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Genoa
NBS: Retention Basins/Draining Areas

Afforestation on slopes	
Technical & legislative pre-conditions	Permeable soil with acceptable pedological conditions
Cost & financing	€ 36.000 Public investment
Barriers	Soil preparation and maintenance on steep not-easily-accessible surfaces, identifying participation actions

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Genoa
Successful Study Cases

Gazzo's area, Genoa Hill's slope consolidation

- Reduction surface runoff rainwater with infiltration direct in the ground
- In operation since 2016
- Public financing
- Reusability of local materials: wooden poles and stones
- Lower disposal costs of landslide material
- Constant maintenance over time

Gazzo's area, Genoa Meteoric water management

- rainwater regulation
- preservation of the hillsides

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Successful Study Cases

Genova Vegetated stone gabions

- Gabionate system in wire mesh
- filled with crushed debris coming from the demolitions arranged to form three

type of elements:

- containment walls steps with integrated seats
- Renovated terracing with roofing in
- shrubbery

Lura river area, Como IT Meteoric Water Management

- river flooding areas, afforestation areas, natural engineering on riverbanks
- In operation since 2017
- basins temporarily flooded during intense rainy, whilst the pond will recharge constantly the ditch to maintain wetland vegetation all over the year to guarantee its phytodepuration functions..
- ....

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Successful Study Cases

(courtesy of LAND Italia Srl)

LAND

Varesine Garden, Milan IT Meteoric Water Management

- Public roof garden
- In operation since 2014

- The intervention aimed to create a high quality green open space with sustainable feature in accordance with the objectives of the whole project (LEED certification)

Krupp Park, Essen DE Meteoric water management

- Public park with rainwater disposal facilities
- In operation since 2012

- On former industrial area
- Bioswales, retention pond, draining paths, afforestated slopes
- Rainwater is collected and directed through bio-swales to a retention pond at the northern end of the park, a 9,000m2 lake

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Genoa
Helpful Suggestions

- The interventions carried out in extra-urban territory have given good results in terms of functionality and environmental performance
- Good maintenance planning must be done to ensure durability over time
- Useful links & informations
  direzioneurbanlab@comune.genova.it

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Storm water management in Tampere

City of Tampere

Maarit Särkilahti

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Water in Tampere

50
Nature Based storm water management Solutions

29
public beaches

160
lakes

100%
urban wastewaters treated

UnaLab demos in Tampere
2 case areas:

brownfield Hiedanranta

greenfield Vuores

Case area Hiedanranta

- A planning phase brownfield area
- Aim 25 000 residents to the area
- Dense area with only a little space for NBS
- Contaminated soils

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UnaLab demos in Hiedanranta

Biofilter demo 2018 for leakage waters from contaminated site

Hiedanranta
NBS: Storm Water Management

NBS 1: Biofilter for leakage from contaminated soil	
Objectives	Preventing pollutant and nutrient load to Lake Näsijärvi, preventing odors, increasing biodiversity, measurement of water quantity and quality and other relevant parameters, replicable in many sites
Description	Filtration area 100 m2. Bacteria and microorganisms are located on a filter medium (biofilm), which consists of peat, sand, biochar and Leca gravel. The biofilm degrades nutrients and pollutants (heavy metals, PAHs) in the leakage that is piped through the filter material.
Relation with grey infrastructures	Completes grey infrastructure, qualitative treatment
Actors involved	Storm water planners, landscape architects, Ramboll, construction department, builders, environmental authorities, NGOs, citizen society, SMEs
Role of the community	Active participation in co-creation workshops that have been part of a planning process. Stakeholdes opinions have been taken into account in planning e.g. in choosing plants. Initiative for treatment has risen from citizen feedback of odors.

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Hiedanranta
NBS: Storm Water Management

NBS 1: Biofilter for treating leakage from contaminated soil	
Technical & legislative pre-conditions	The existing structures of old landfill and underdrain levels had to be taken into account in planning, nutrient load and odors/gases were the main issues to prevent.
Cost & financing	Construction and materials estimated cost 39 000 €, financing from UNaLab-project. Planning from Ramboll (UnaLab partner).
Barriers	Limited space because of avoiding the disturbation of contaminated soil. Performance during cold months.

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Hiedanranta
NBS: Storm Water Management

NBS 2: Green roof	
Objectives	Increase rainfall interception, enhance C storage (climate regulation); reduce albedo; reduce heat stress, increase biodiversity, looking for optimal solution (feasible), testing different solutions in changing Nordic winter conditions, recreational and social space.
Description	ca. 800 m2 green roofs in Hiedanranta to manage water flows, with particular focus on their performance during cold seasons, suitable growth media, plants (biodiversity) and maintenance needs.
Relation with grey infrastructures	Retention capacity, resource recycling?
Actors involved	Storm water planners, landscape architects, research institutions, city units, construction companies, green infra builders, SME's, NGO's, citizen society
Role of the community	Active participation in co-creation workshops. Stakeholders opinions are taken into account in planning. Co-creation will continue (SOME, on site "additional value to residents").

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Hiedanranta
NBS: Storm Water Management

NBS 2: Green roof	
Technical & legislative pre-conditions	Strict legislative orders regarding building and fireproofing that must be considered. Choosing suitable vegetation in order to resist in the sub-arctic climate with changing freezing-melting cycle and snow load as well as to support native species and enhance biodiversity. Retention capacity vs. building requirements.
Cost & financing	Construction and materials estimated cost 100 000 €, financed from UNaLab-project. Planning from Ramboll (UnaLab partner).
Barriers	Suspicions about possible effects on roof structures and health. Performance concerns during cold seasons and in changing climate, unclear maintenance needs during summer. Avoiding nutrient leakage, which has been identified as a challenge in earlier research.

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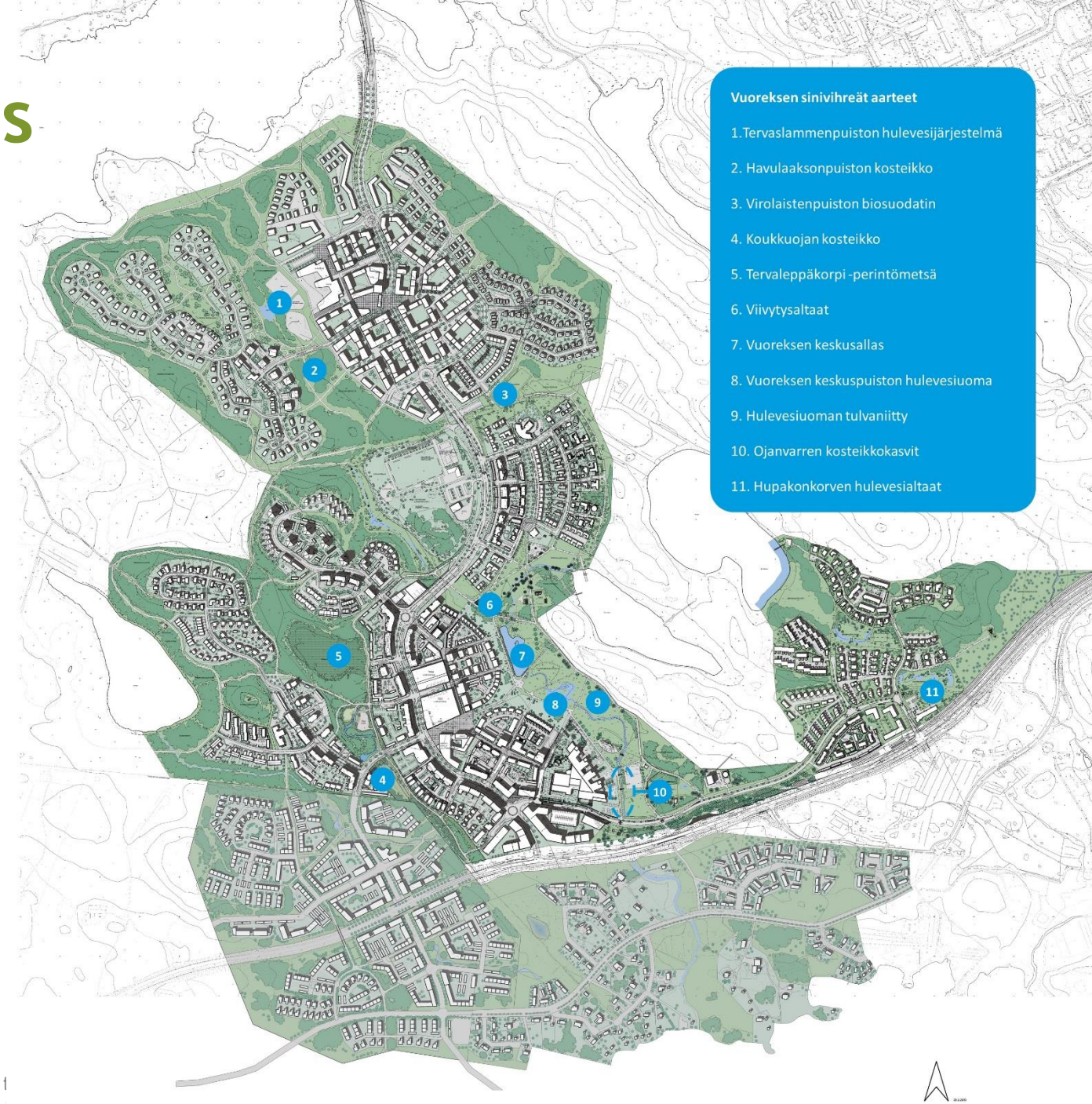
Case area Vuores

- A construction phase green district in the middle of natural waterbodies.
- Aim 13 000 residents to the area.
- 3000-5000 jobs
- To be completed in 2030
- NBS located in parks and surrounded by blocks



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Demos in Vuores

Accessibility and education

Novel multi-funtional NBS (biofilters, floating wetlands) to complement existing NBS

Innovation vouchers for local housing co-operatives and other communities to improve plot-scale NBS

Monitoring of nature based storm water management system.

UnaLab demos in Vuores
NBS: Storm Water Management

NBS 1: Biofilter, retention basin and alluvial meadows	
Objectives	Prevent solids and nutrient load to waterways, handle the first flush, prevent urban floods, retain and increase biodiversity, regulate flow rates to the pre-construction level by drainage area, recreational values of blue-green network
Description	Biofilter in Virolaisten Park (area of biofilter ca. 650 m2) and retention/infiltration basin with alluvial meadows in Tervaslammen Park (area of retention basin and alluvial meadows ca. 700 m2).
Relation with grey infrastructures	Complements and replaces grey infrastructure. Qualitative treatment to protect natural water bodies.
Actors involved	Storm water planners, landscape architects, Ramboll, construction department, builders, NGOs, citizen society, pupils
Role of the community	Active participation in co-creation workshops. Online survey. Different viewpoints are taken into account in planning.

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UnaLab demos in Vuores
NBS: Storm Water Management

NBS 1: Biofilter, retention basin and alluvial meadows	
Technical & legislative pre-conditions	Nature protection laws have to be considered. In Virolaistenpuisto park the trees have to be saved for the bats. Public pressure to sustainable development.
Cost & financing	Construction and materials estimated cost 100 000 €, financing from UNaLab-project. Planning from Ramboll (UnaLab partner).
Barriers	Environmental laws regarding endangered species. Changing Nordic climate. Lack of knowledge regarding the NBS among the residents. Maintenance challenges of multifunctional NBS.

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Unalab demos in Vuores
NBS: Storm Water Management

NBS 2: Plot scale NBS	
Objectives	Increase rainfall infiltration, prevent solids and nutrient load to waterways, prevent urban floods, combine recreation, food production and/or biodiversity preservation and social connectivity targets
Description	Rain gardens, green roofs and/or similar plot-scale solutions
Relation with grey infrastructures	Complements and replaces grey infrastructure, decentralized storm water management should start from plots and support public NBS
Actors involved	Landscape planners, housing companies, residents, green infrastructure builders, Vuores service company
Role of the community	The NBS will be co-created and residents have a chance to participate the planning process. Responsibility to maintain the NBS.

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UnaLab demos in Vuores
NBS: Storm Water Management

NBS 2: Plot scale NBS	
Technical & legislative pre-conditions	Small space, plenty of functions, existing storm water system.
Cost & financing	Funded via innovation vouchers 30 000 € from UnaLab, 10 000 €/housing company.
Barriers	New yards, interest to renovate? Own funding, maintenance costs, storm water fee.

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Advanced online monitoring

- **6 online monitoring stations**
- **Monitoring** NBS performance (water quality and flow)

Water quality monitoring station

Kids monitoring Vuores NBS

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Vuores Storm Water Management
Successful Study Case

- Tampere's main NBS demonstration site is Largest in Nordic countries
- Central park storm water system is designed by a famed German design office Atelier Dreiseitl.
- Developed further in UnaLab via co-creation process
- Built on greenfield area and a lot of emphasis has been put on storm water management especially during massive excavation work.
- 4 bioswales, 10 retention ponds, 3 wetlands, willow treatment, 2 alluvial meadows and a biofilter.
- Visually aestethic blue green areas for people to recreate
- NBS are surrounded by walking baths, areas to rest and picnic areas.
- Many endangered animals like flying squirrel, bats, and certain water insects.

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Helpful suggestions

- A will to make the area environment friendly
- Co-operation with city's different units and other stakeholders from planning to building and maintenance
- Measurement of the quality of soil and bedrock in land use planning phase
- Treatment of the waters from the construction work areas (e.g. retention and filtration). Treatment in plots and in public areas. Detailed guidelines!
- Educating people of urbanization and climate change related challenges and also how the problems can be solved with NBS
- UnaLab co-creation process with different stakeholders helps in mapping different viewpoints for further development of existing NBS
- Detailed guidelines for maintenance
- Storm water fee (from 2018) 5,6 million €/year supports the implementation of NBS also in old areas

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Kiitos!
Thank
You!
TAMPERE
TORNI
KYOCERA
KYOCERA
Photos: Laura
Vanzo/Visit Tampere

Questions&Answers Session

?

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NEXT «BUDDIES» ACTIVITES

- Update of Buddy Space with shown ppt presentations
- Feedback collection from cities on the webinar/buddy activities
- Launch the forum!
- Organization of the third webinar in January 2019
- Proposed Calendar:
  - January 2019: **Management of rapid growth/densification**
  - April 2019 **Increase biodiversity**
  - July 2019 **Creating/Financing/Implementing NBS**

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THANK YOU FOR YOUR ATTENTION!

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