



A European Union
Programme

EU-CHINA RESILIENCE AND ADAPTATION TO CLIMATE CHANGE ONLINE DISCUSSION BETWEEN CHINESE AND EUROPEAN EXPERTS

Copenhagen & Rotterdam GREEN INFRASTRUCTURES BEST PRACTICES

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Copenhagen & Rotterdam GREEN INFRASTRUCTURES BEST PRACTICES

- 1. Copenhagen & Rotterdam | cities challenges**
- 2. COPENHAGEN BEST PRACTICES**
- 3. ROTTERDAM BEST PRACTICES**
- 4. THINGS TO REMEMBER**

1 Rotterdam

. City challenges

Rotterdam | Delta city Vulnerable to CC from

- > Rainfall events intensity
- > River drainage
- > Sea level rise



**Continuos growth
and high city density**

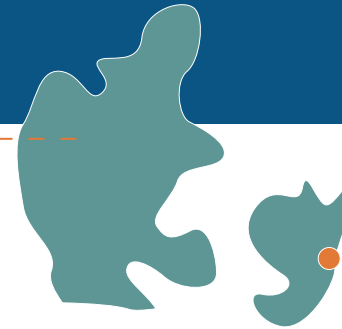
Increase of RISKS

**Need of a Holistic vision of water management
and new measures**

Water Plan (2001), the Water City 2035 Vision (2005), the transformation to the second integrated Water Plan (2007), the Rotterdam Climate Proof Programme (2008), the Rotterdam Adaptation Strategy (2013), Resilience Programme (2014) and the Water Sensitive Rotterdam Programme (2015).



1 Copenhagen City challenges



Copenhagen

example of best practice of planning
for THE FINGERS PLAN and the
regenerative projects

Threaten from CC

4 major rainfall events in the past years.

The largest, in 2011, caused damage totalling more a billion dollars.

Primary challenge > Increase of more and heavier downpours,
> More intense rain events



Subsequent flooding + Overwhelm existing sewage and runoff systems



Need of a Holistic vision and integrated plan

2. COPENHAGEN BEST PRACTICES

Green Streets & Green Alleys

1. Sankt Annæ Plads | The St. Ann Square project

2. Bülow'svej - Ordinary maintenance

Green roofs

3. The City Dune + The new National Archives + TCC

Urban Park & Neighborhood

4. ENGHAVEPARKEN | ENGHAVE park

5. KlimaKvarter | Climate neighborhood

2. COPENHAGEN BEST PRACTICES

The St. ANN Square project Green Streets & Green Alleys



DELAY



FLOW OF AIR



REDUCE
LATENT HEAT

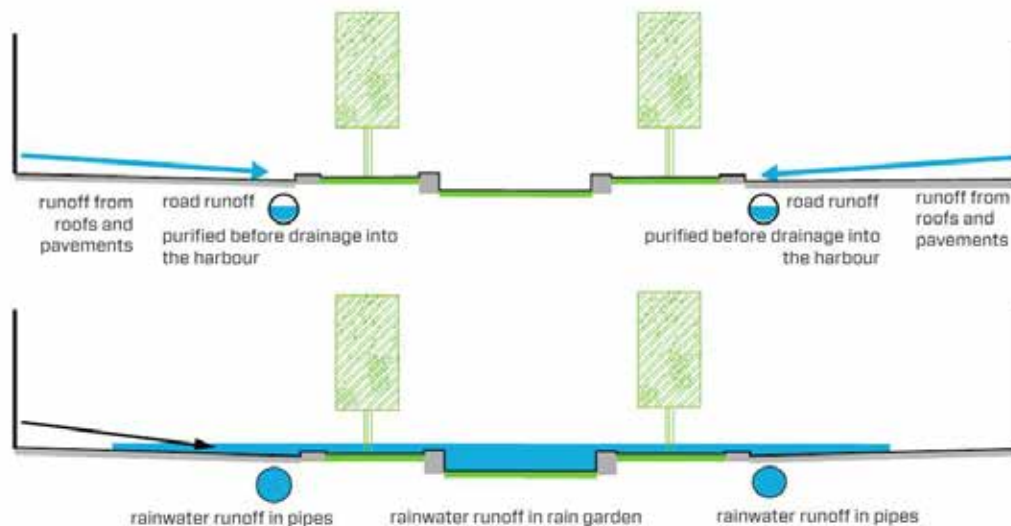


SOCIAL IMPACT

The renovation historic square create a green area that have the capacity to hold 21 million litres of water.

New underground “rainpipes”, the area will be able to manage 2,100 litres of rain a second.

A green area that delays the water and a “rainpipes” guide the water into the harbour.



2. COPENHAGEN BEST PRACTICES

Bulowsvej Green Streets & Green Alleys

BEFORE



AFTER



STORE

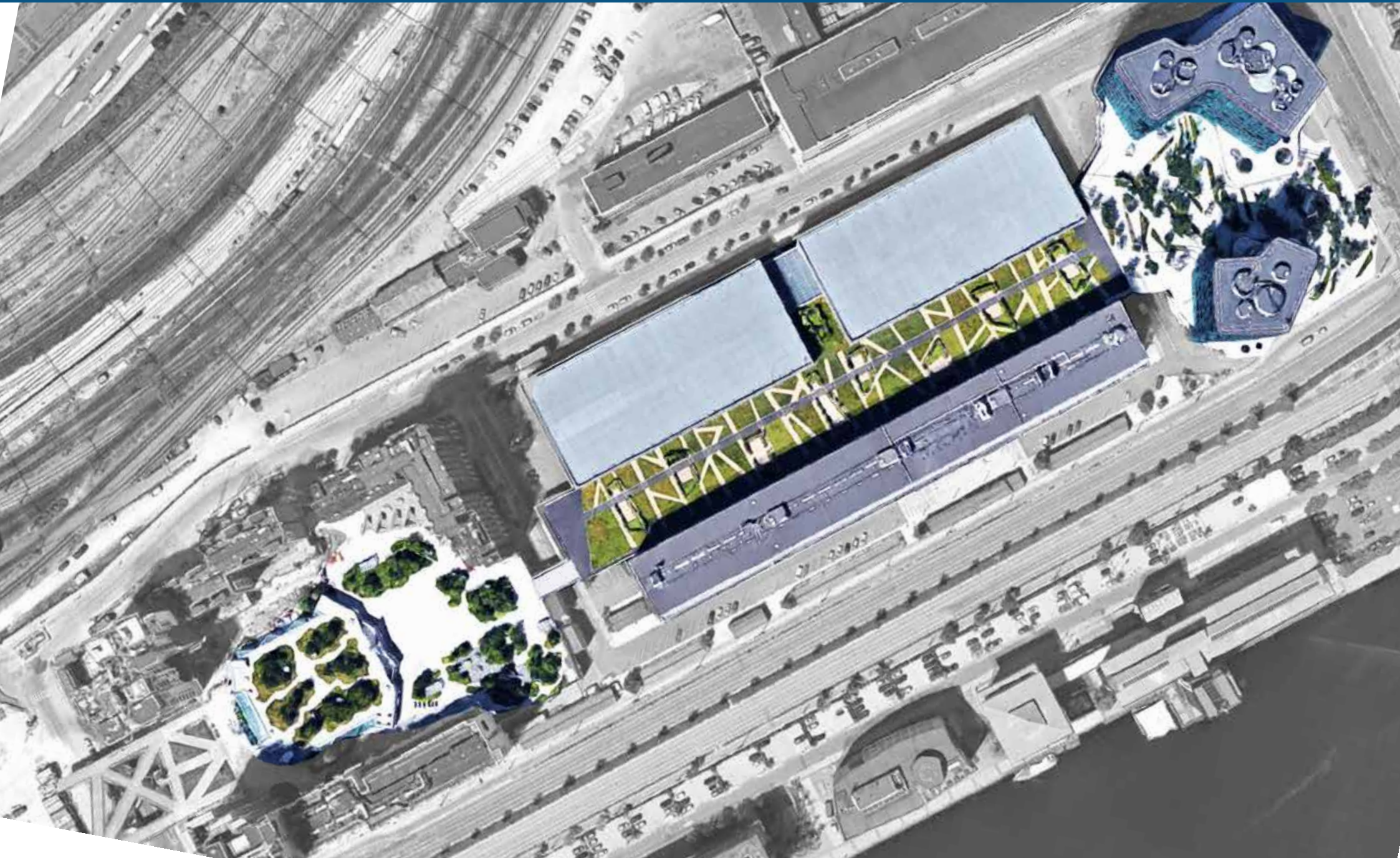


DELAY



2. COPENHAGEN BEST PRACTICES

City Dune + National Archives + TCC
Green roofs



2. COPENHAGEN BEST PRACTICES

The City Dune Green roofs



DELAY



REDUCE
LATENT HEAT



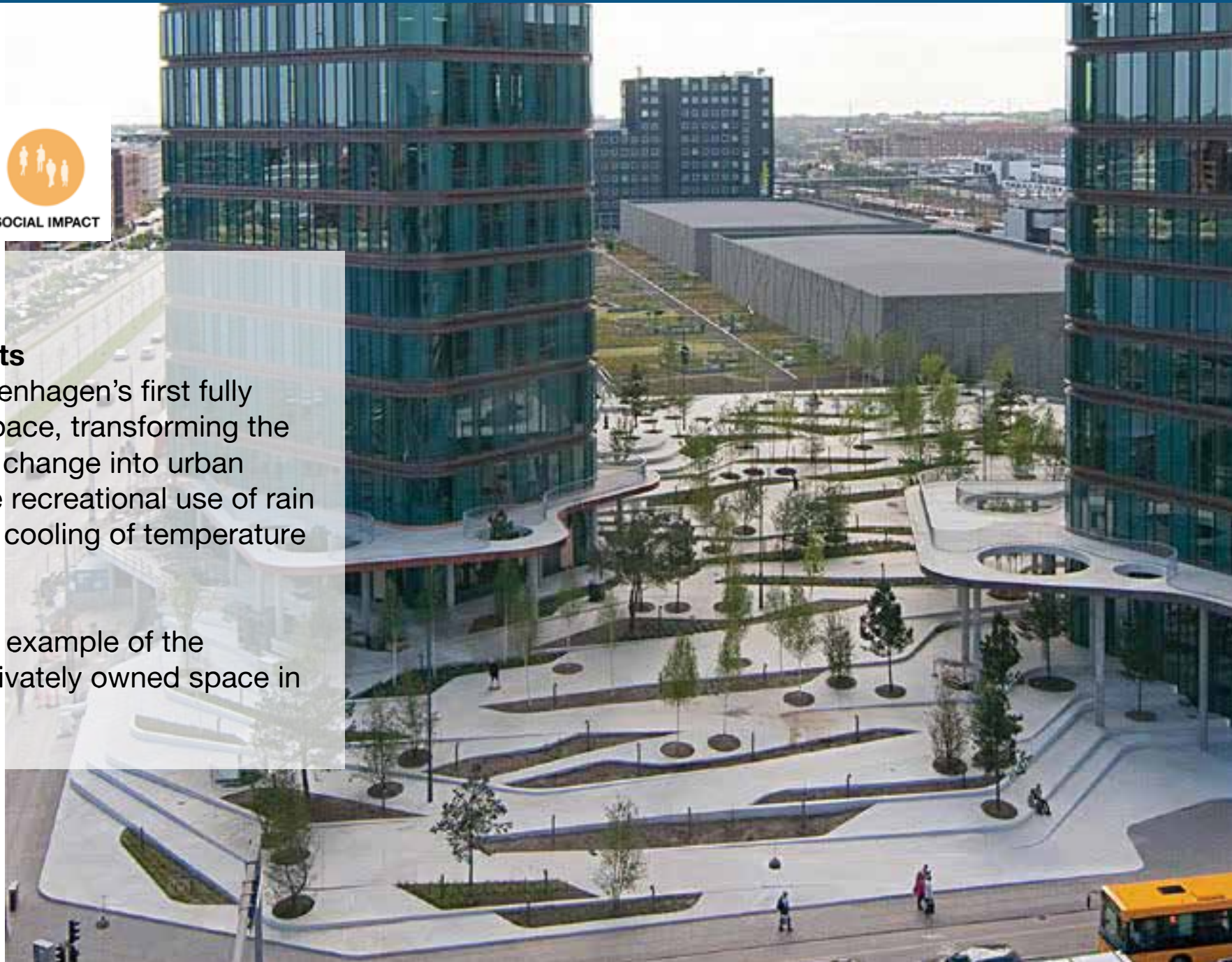
SOCIAL IMPACT

THE CITY DUNE

Development benefits

The City Dune is Copenhagen's first fully acclimatized urban space, transforming the challenges of climate change into urban amenities such as the recreational use of rain water and the natural cooling of temperature rises.

The project is also an example of the democratization of privately owned space in cities



2. COPENHAGEN BEST PRACTICES

The New National Archives Green roofs



THE NEW NATIONAL ARCHIVES

Development benefits

Technically **the roof garden** has been constructed in a way that **leads all precipitation water** through the growth media and the reservoir plates, **before the excess water reaches the drainage system**. These technical solutions optimize the reservoir effect and **hold back up to 70% of the water** on an annual basis and increase natural evaporation. The roof garden **increases biodiversity, collects rainwater** and **helps stabilize the temperature of the archive buildings**.



2. COPENHAGEN BEST PRACTICES

TCC - Hotel and Public roof garden Green roofs



STORE



RE-USE



SOCIAL IMPACT

TCC - Hotel and Public Roof Garden

Development benefits

Beneficial to hotel guests and locals.
Great diversity - large trees and a fertile bottom vegetation.

All rainwater is collected and reused for watering plants, thus supporting the city's sewer system.



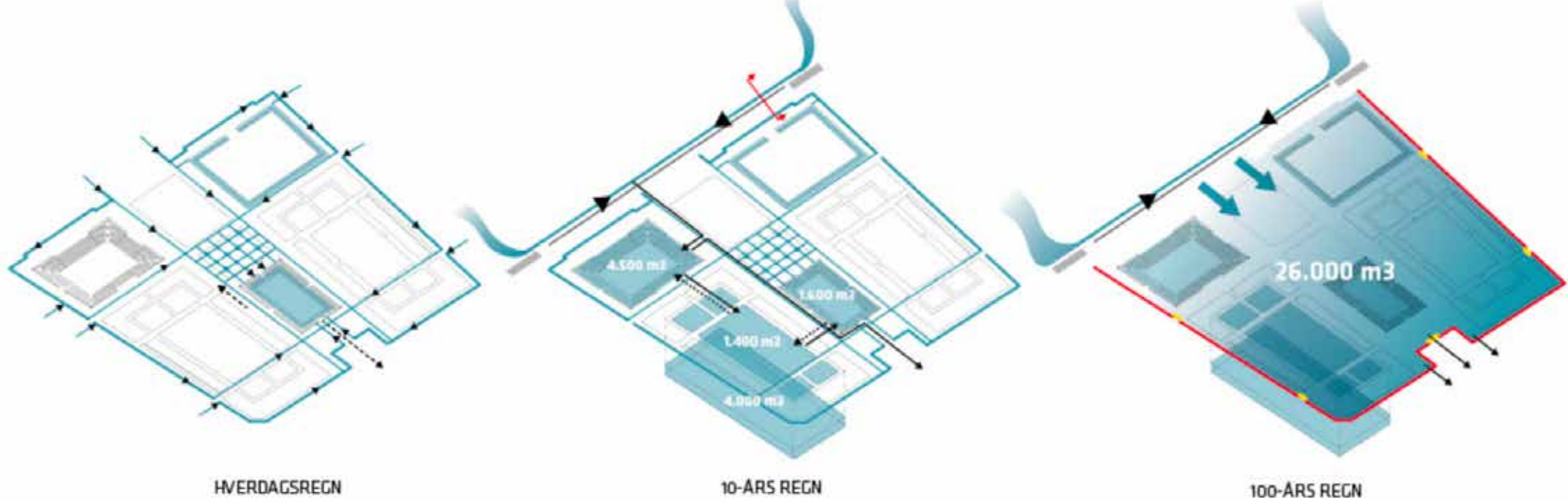
2. COPENHAGEN BEST PRACTICES

Enghave PARK Urban Park & Neighborhood



2. COPENHAGEN BEST PRACTICES

Enghave PARK Urban Park & Neighborhood



2. COPENHAGEN BEST PRACTICES

Clima neighborhood Urban Park & Neighborhood



2. COPENHAGEN BEST PRACTICES

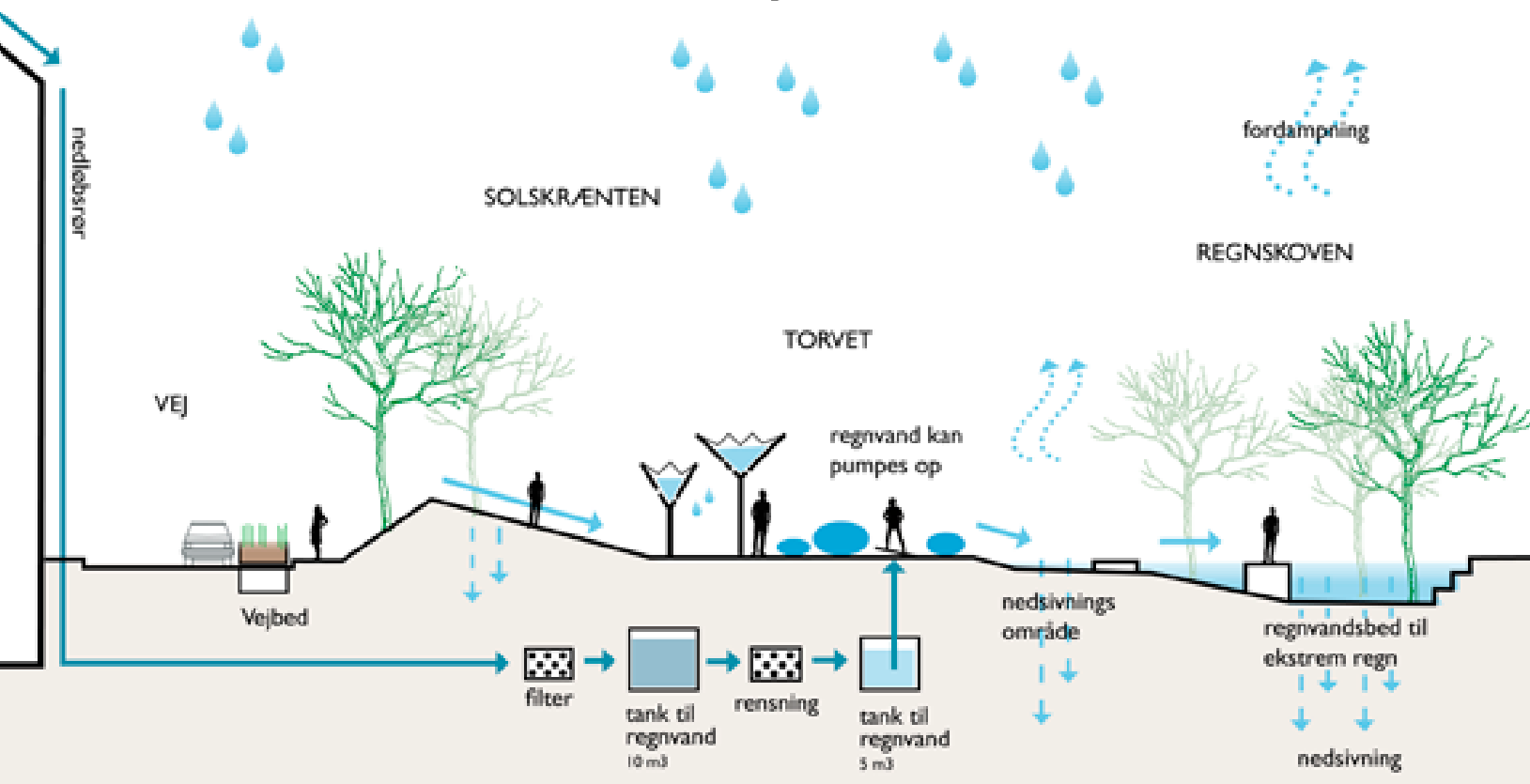
Clima neighborhood Urban Park & Neighborhood

Tåsinge Plads can therefore receive large quantities of rainwater. **The rain bed on the square will be filled up to 10% during rain events that occur once every year, 30% during rain events that occur once every 25 years and 40% in rain events that occur once every 100 years.**

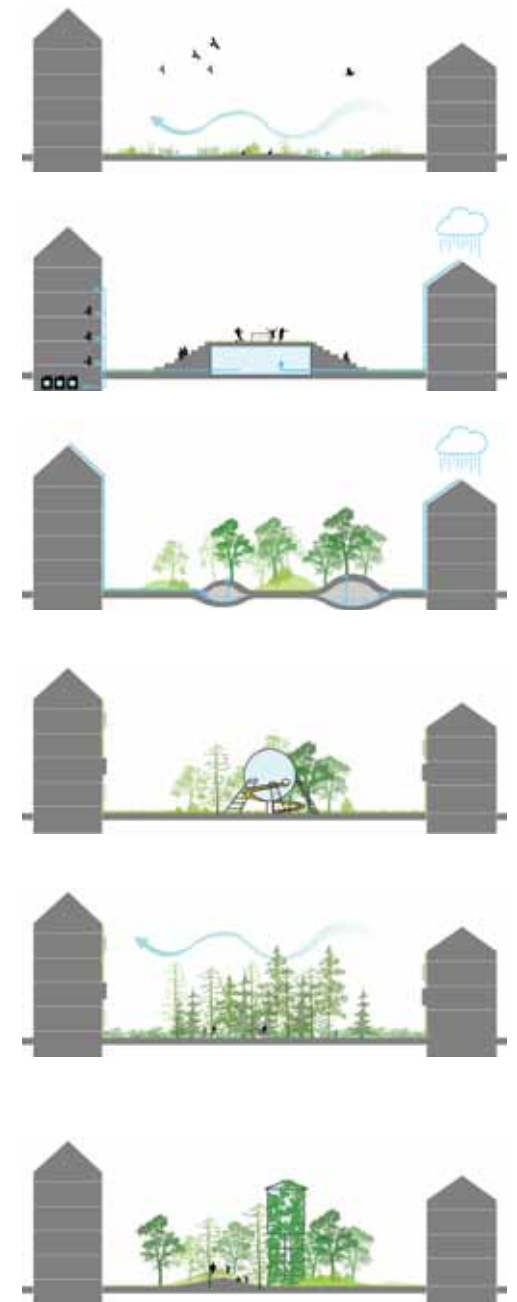


2. COPENHAGEN BEST PRACTICES

Clima neighborhood Urban Park & Neighborhood



Involvement of private citizens is a regular based approach used from the municipality of Copenhagen.



3. ROTTERDAM BEST PRACTICES

Allotment gardens

1. Green verges examples

Green roofs

2. Dakakker rooftop field

Water square & Neighborhood

3. Water Square Benthemplein

4. Zomerhofkwartier | Climate Proof Zomerhof neighborhood

3. ROTTERDAM BEST PRACTICES

Green verges Allotment gardens

The strategy now is to take measures on a small scale that will increase the city's ability to absorb water and at the same time improve outdoor public spaces with more green and projects to removing paving



DELAY



SOCIAL IMPACT

3. ROTTERDAM BEST PRACTICES

Dakakker rooftop field Green roofs



DakAkker rooftop farm **growing fruits, vegetables, herbs and housing bee hives.**

Rotterdam currently has > **200,000 m2 green roofs**, many of which are **multifunctional** and allow rooftop **farming and gardening**, such as DakAkkers, the first harvestable roof (800 m2) on top of the Schieblock building.

3. ROTTERDAM BEST PRACTICES

Water Square BENTHEMPLEIN Water square & Neighborhood



STORE



DELAY



SOCIAL IMPACT

Sunny day >

a dynamic place for the youth with lots of space to play, including a sports theater, a skate area.



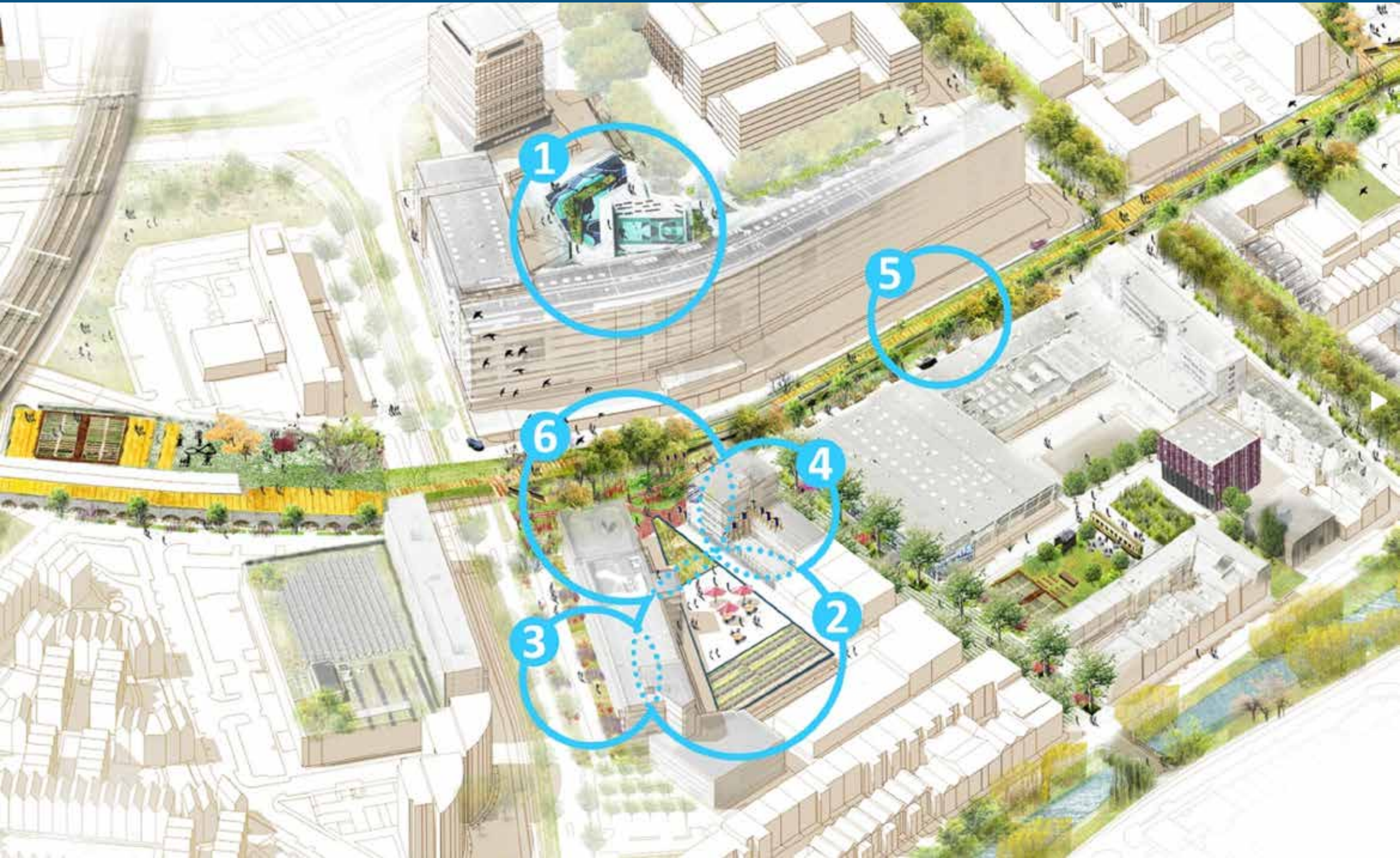
Rain day >

the water runs via large stainless steel gutters into **three basins**:
2 shallow basins for the immediate surroundings
1 deeper basin that receives water only during a cloudburst from a larger area around the square.



3. ROTTERDAM BEST PRACTICES

Climate Proof Zomerhof neighborhood Water square & Neighborhood



3. ROTTERDAM BEST PRACTICES



The **Zomerhofkwartier** an intense **participatory process** combining **slow urban transformation** is aiming to **transform the public space**.

A collection of visionary resiliency measure that together will perform an upgraded urban framework for the **first climate district in Rotterdam**.

Climate Proof Zomerhof neighborhood Water square & Neighborhood



4. THINGS TO REMEMBER

- **Green infrastructure solutions should be design in a systemic perspective**
- **Green infrastructure solutions should maximize co-benefits**
- **Local characteristics are important**
- **Several techniques can often be combined**
- **Involving citizens/communities while developing a climate solution**
- **Monitoring the solutions to implement them**