

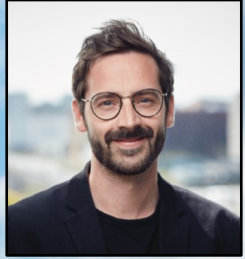
Water as a catalyst for urban planning



The Copenhagen Cloudburst Case.

Lund i ett förändrat klimat– Lunds kommun

Neil Mclean Goring - 5th Nov 2025



Neil Mclean Goring

Landscape Architect in Climate Adaptation

- 15 years of experience (3 in Scotland, 12 in Denmark)
- Specialist in blue-green infrastructure
- Working both nationally and internationally

*Old Man of Storr
Isle of Skye
Scotland*



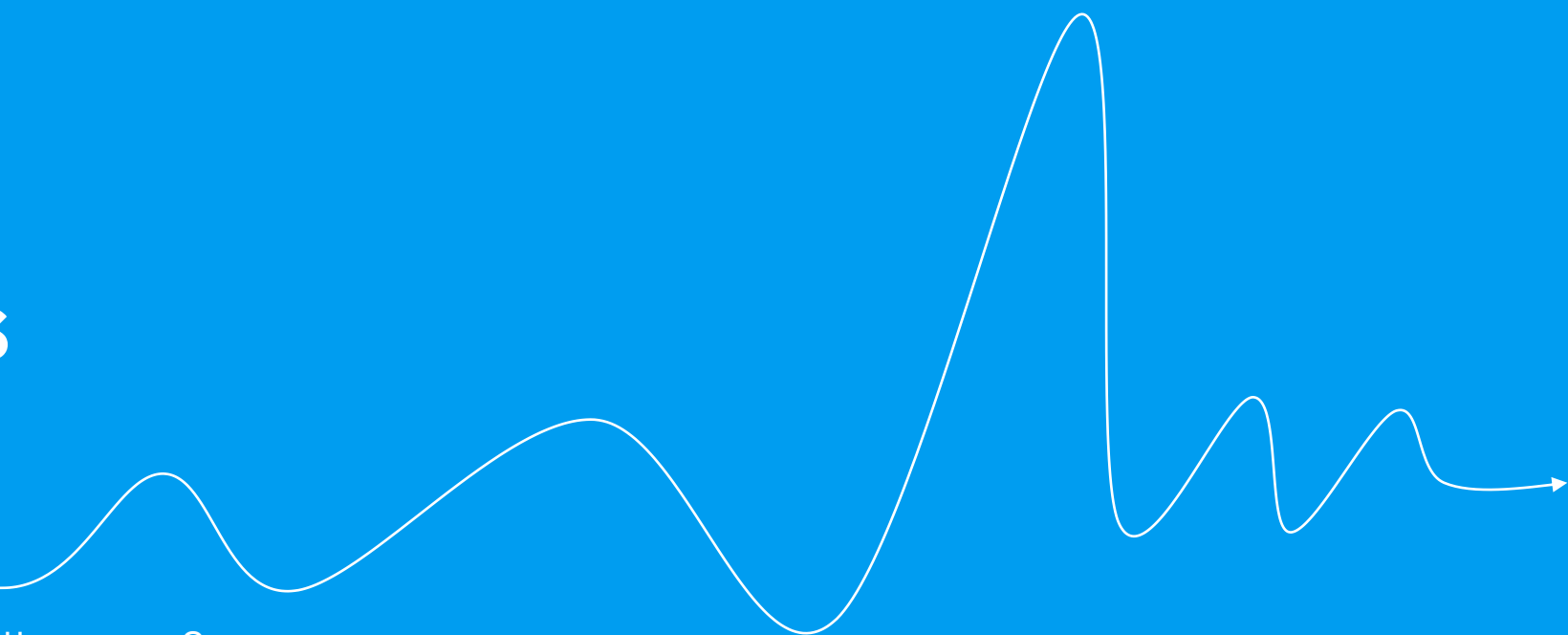
Ramboll in brief

- **Independent** architecture, engineering and management consultancy
- Founded 1945 in Denmark
- **18,000 experts**
- Over 330 offices in 35 countries
- Significant presence in the Nordics, the UK, North America, Continental Europe, and Asia Pacific
- EUR 2.2 billion revenue
- **Owned by Ramboll Foundation**

Services across the markets:

- Buildings
- Environment & Health
- Transport
- Energy
- **Water**
- Management Consulting
- Architecture and Landscape

Megatrends Mindsets & Momentum



Why should water lead the way?



TAKU GLACIER, ALASKA, IS A RIVER OF ICE STRETCHING 270 SQUARE MILES. YET THE PETROLEUM ENERGY HUMBLE SUPPLIES AMERICA COULD MELT IT AT THE RATE OF 7 MILLION TONS A DAY!

EACH DAY HUMBLE SUPPLIES ENOUGH **ENERGY** TO MELT 7 MILLION TONS OF GLACIER!

This giant glacier has remained unmelted for centuries. Yet, the petroleum energy Humble supplies—if converted into heat—could melt it at the rate of 80 tons each second! To meet the nation's growing needs for energy, Humble has applied science to nature's resources to become America's Leading Energy Company. Working wonders with oil through research, Humble provides energy in many forms—to help heat our homes, power our transportation, and to furnish industry with a great variety of versatile chemicals. Stop at a Humble station for new Enco Extra gasoline, and see why the "Happy Motoring" Sign is the World's First Choice!

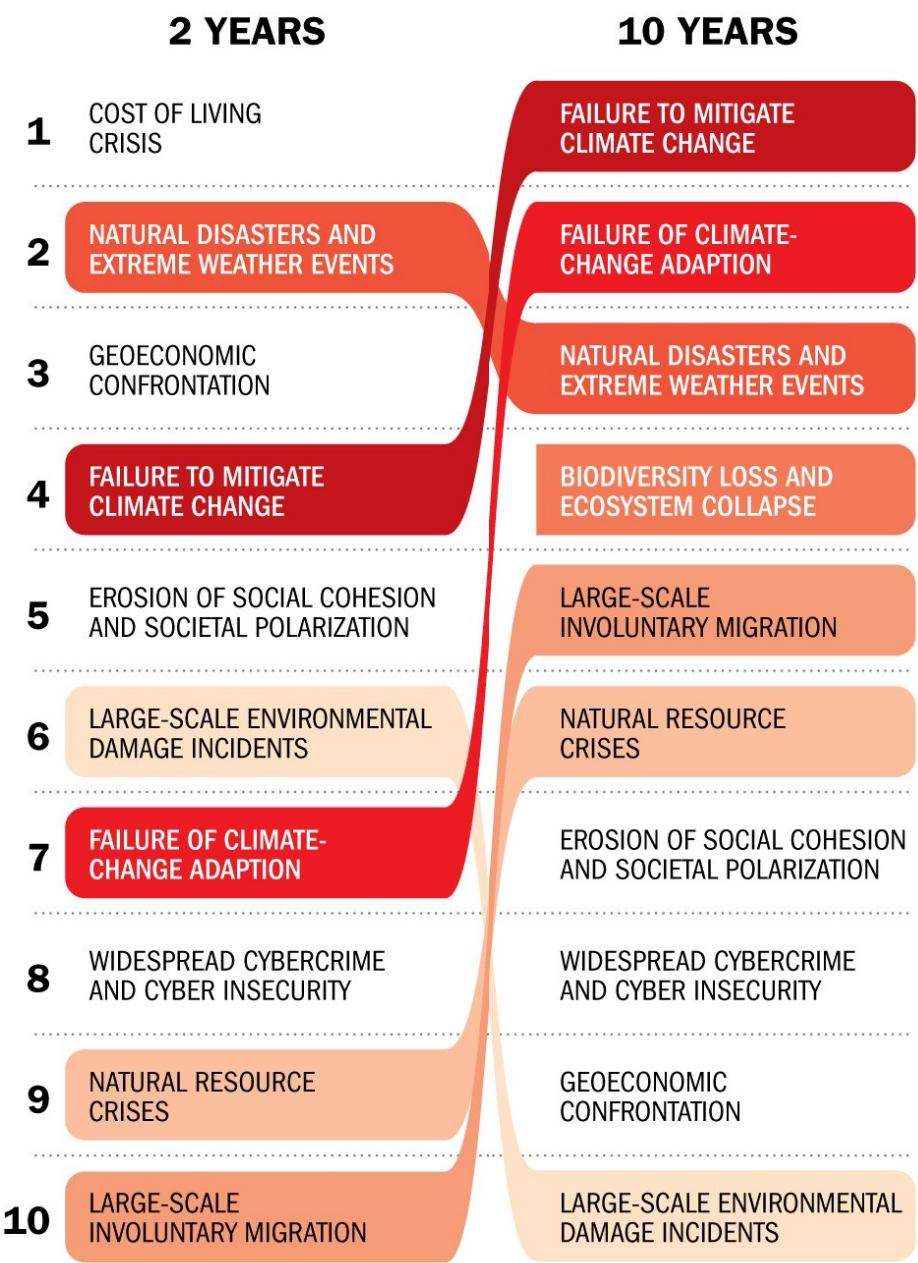
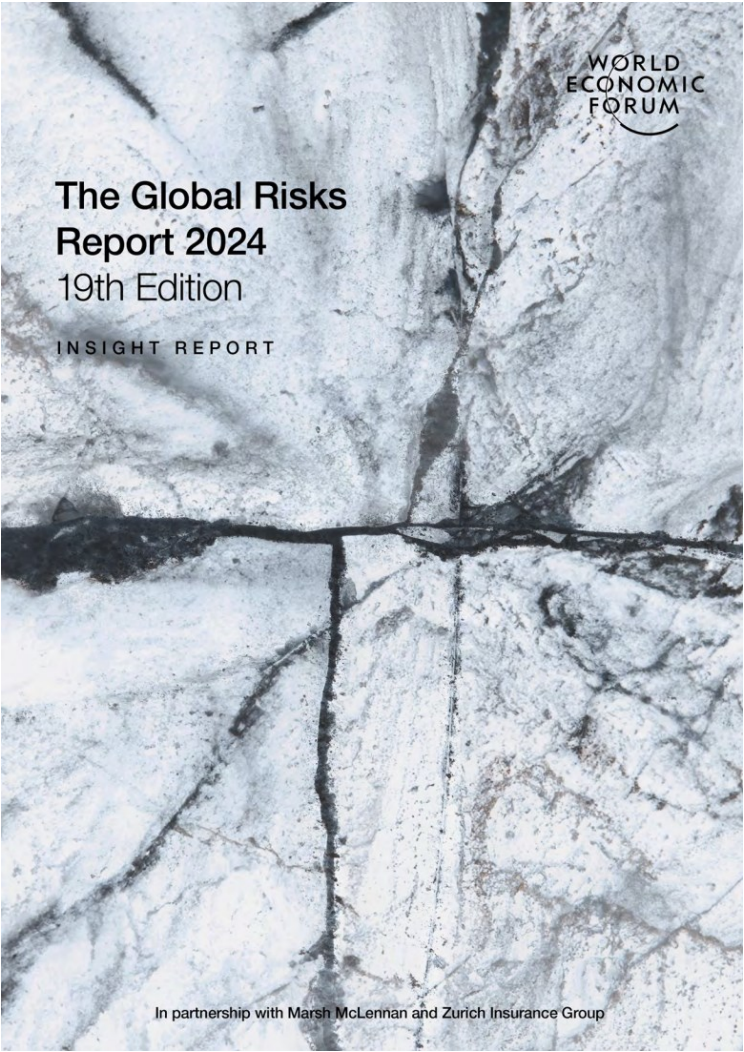
HUMBLE
OIL & REFINING COMPANY

America's Leading **En**ergy **co**mpany



READ ALL ABOUT IT...

[Preface - Global Risks Report 2024 | World Economic Forum \(weforum.org\)](#)



Partner for Regenerative Change

Consultancy

-> *Facilitators of change*

Best practice

-> *Next practice*

Problem-solving

-> *Place-based co-creation*



It's not just
more of the
same

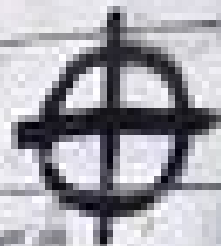


Reframing to create reperception

Source: Copenhagen Institute
for Futures Studies CIFS

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SKOVEN



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BETON

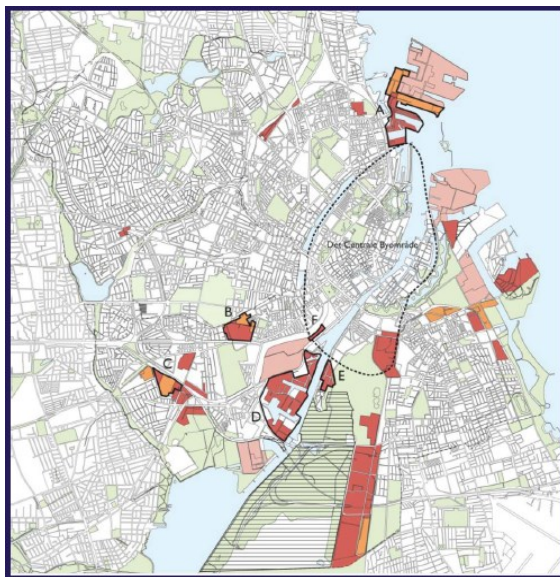
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The Power of Integrated Planning

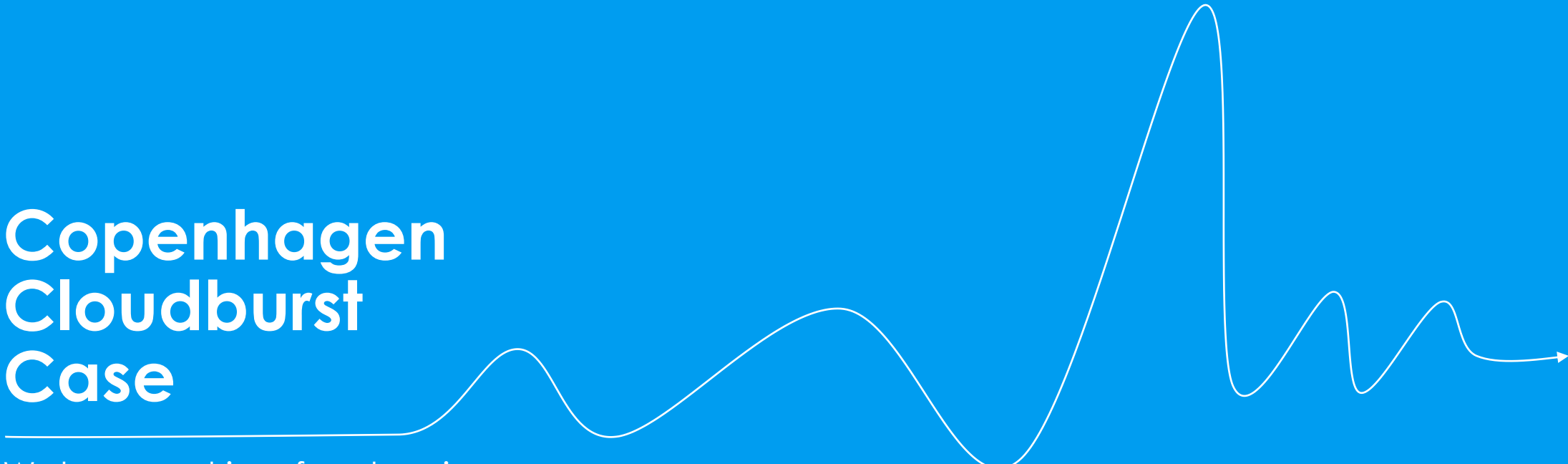








Copenhagen Cloudburst Case



Water as a driver for planning.

BEFORE: Extensive Flooding

02 July 2011: > 150mm
RAIN fell in 2 HOURS.

CLOUDBURST

hits Copenhagen

This is
going to be
expensive...

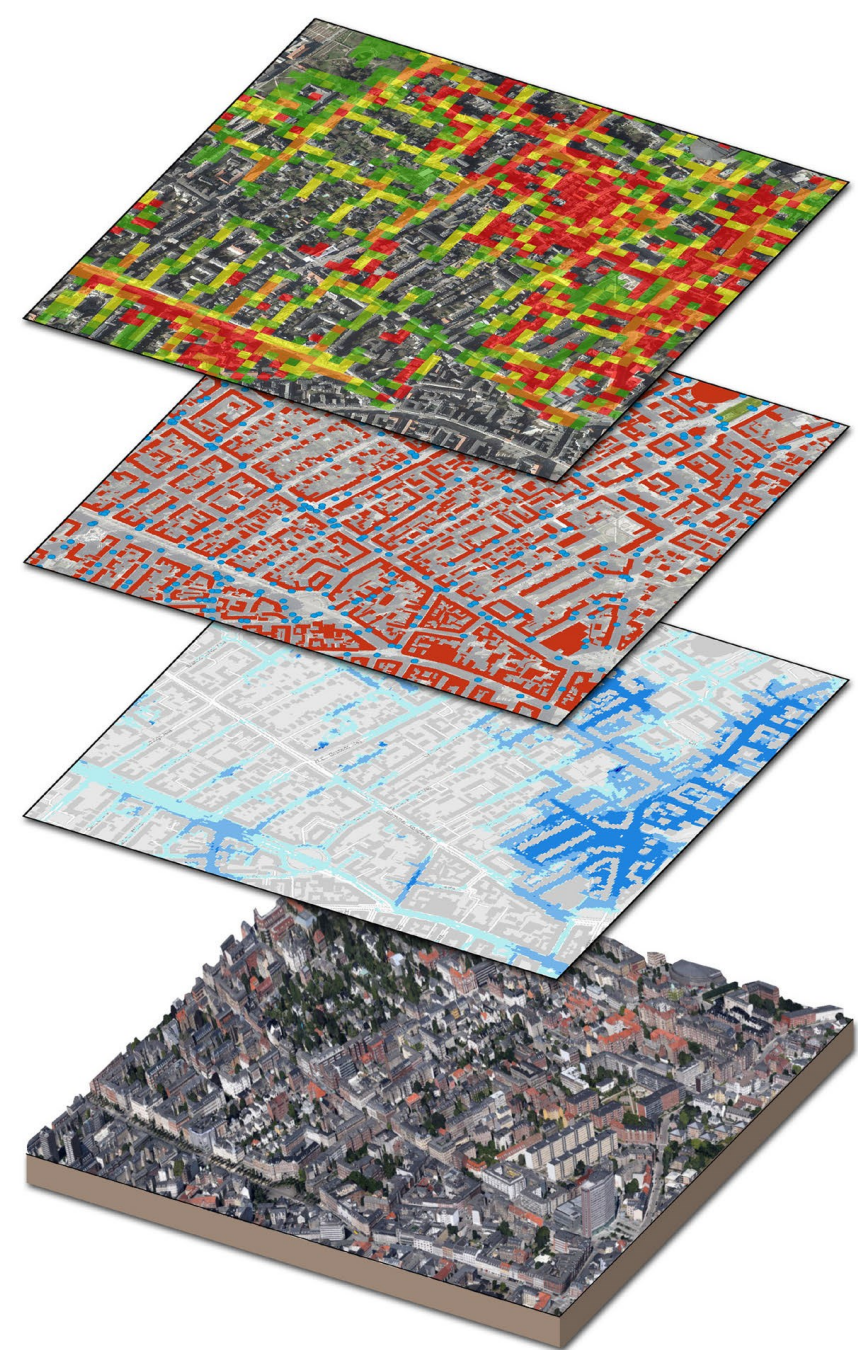
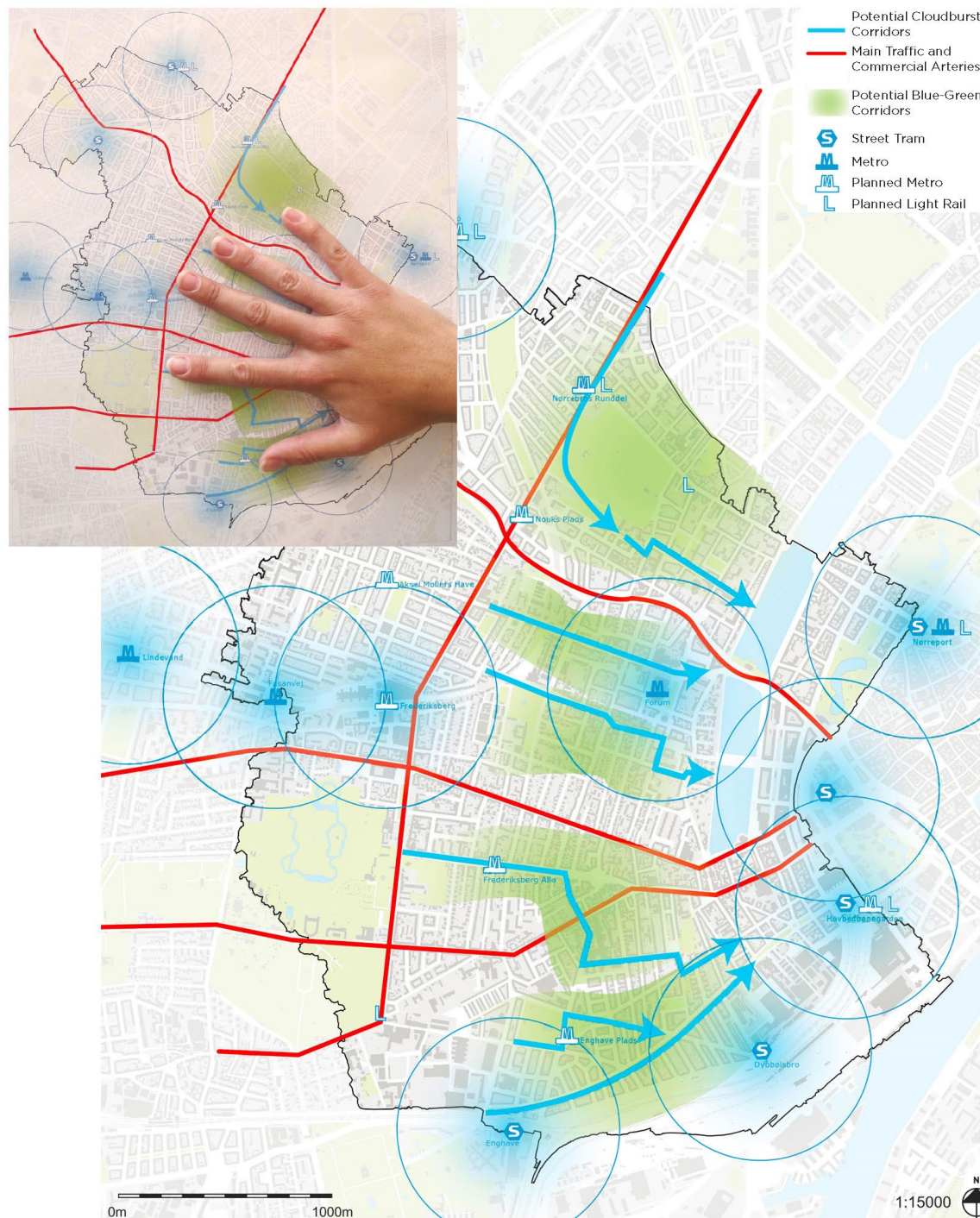
... about
€900
million

Climate

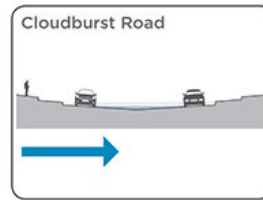
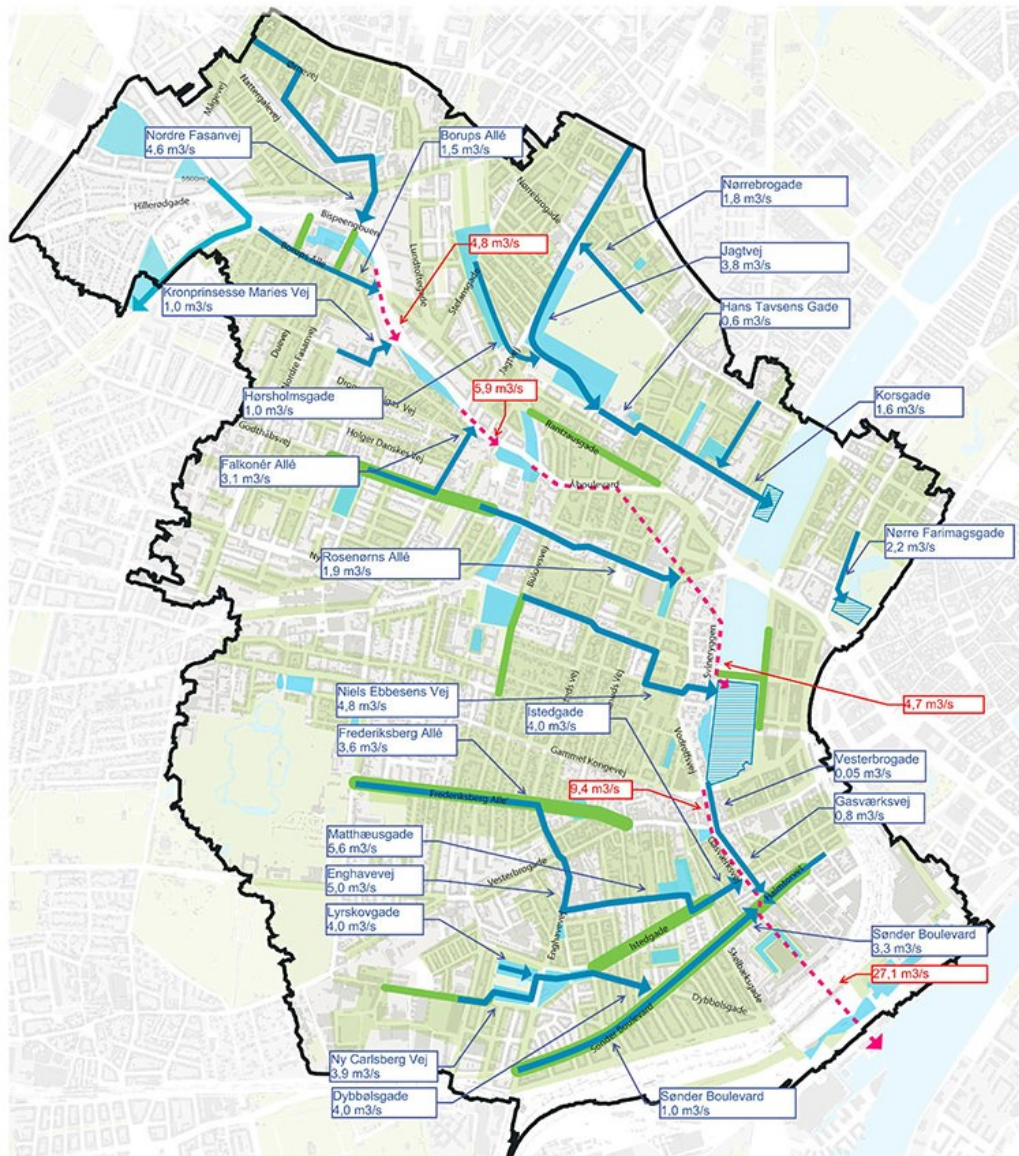
Change

Is

Real

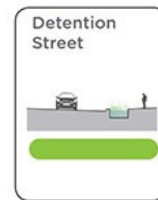


Copenhagen Cloudburst Plan



Cloudburst Road

Cloudburst roads are used to channel and direct cloudburst water. These streets can be formed with a unique V-shaped profile and raised kerbs to ensure water will flow in the middle of the road, away from the buildings - contrary to standard engineering practice. Channels and swales can be established along road edges so that water runs in urban rivers or green strips. Cloudburst roads may also be combined with Cloudburst piping below the surface to create tool synergies.



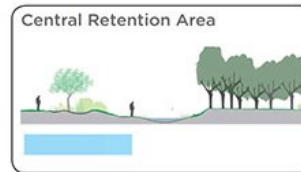
Detention Street

Detention streets are streets that are typically located slightly upstream of vulnerable low-points. In these streets there should be a detention volume established to handle stormwater before reaching the more vulnerable points downstream.



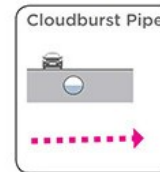
Green Street

Green streets are proposed as upstream connections to all Cloudburst roads. The green streets should be established with a combination of small-scale channels and stormwater planters or permeable paving. Stormwater should be collected, delayed and then channeled towards the Cloudburst roads.



Central Retention Area

Central retention areas are proposed in the squares and parks where it is possible to delay stormwater, so that Cloudburst roads can be established in smaller dimensions. The central retention elements can be, for example, open depressions in the parkland or lowered seating areas. Alternatively, they can be established as underground storage such as soak-away crates or rain gardens. Central retention elements will typically be placed in connection with adjacent Cloudburst roads.

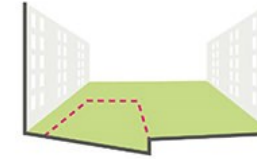


Cloudburst Pipe

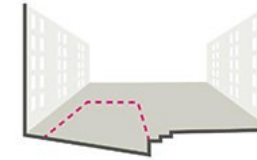
A Cloudburst pipe handles rainwater in the same way as Cloudburst roads. This is placed just below street level to ensure connection to other surface solutions. This solution is used if there is no useable space for aboveground solutions.

CLOUDBURST TOOLBOX

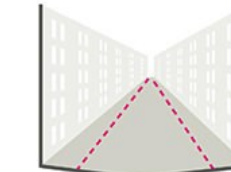
01 Park



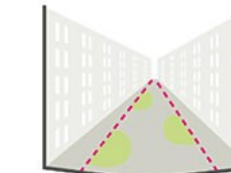
02 Plaza



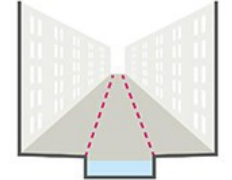
03 Street



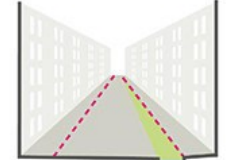
04 Green Street



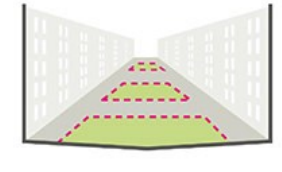
05 Urban Canal



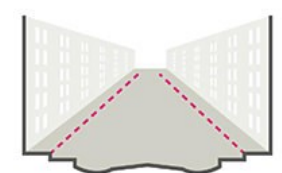
06 Urban Creek



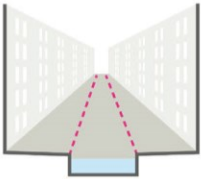
07 Retention Boulevard



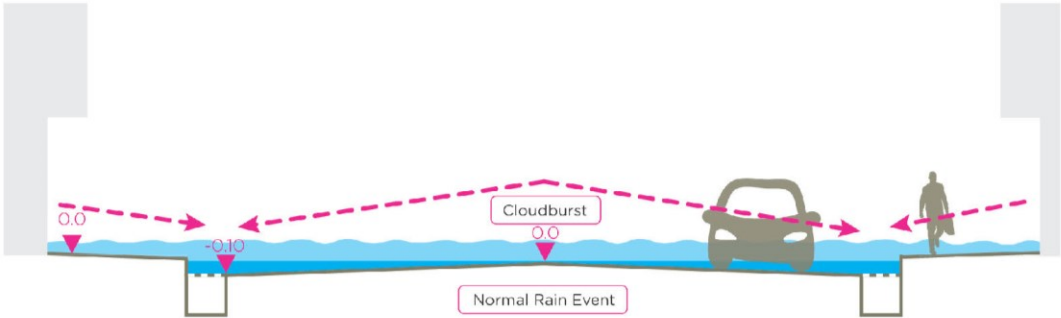
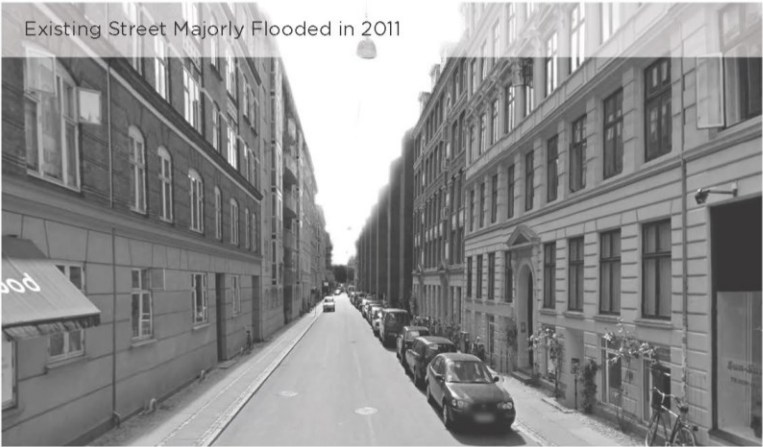
08 Boulevard



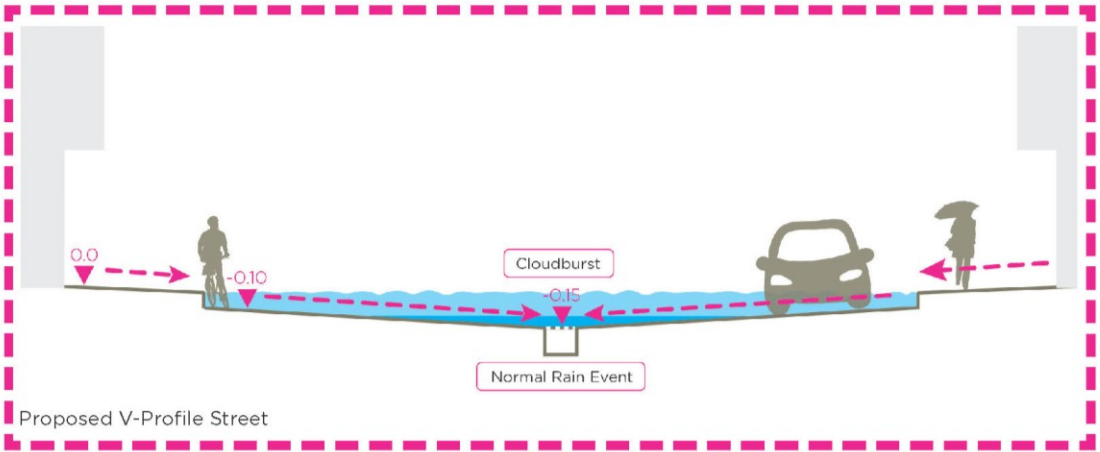
05 Urban Canal



Existing Street Majorly Flooded in 2011



Conventional: Existing Crowned Street



Proposed V-Profile Street

Dry, Normal



Rain Event

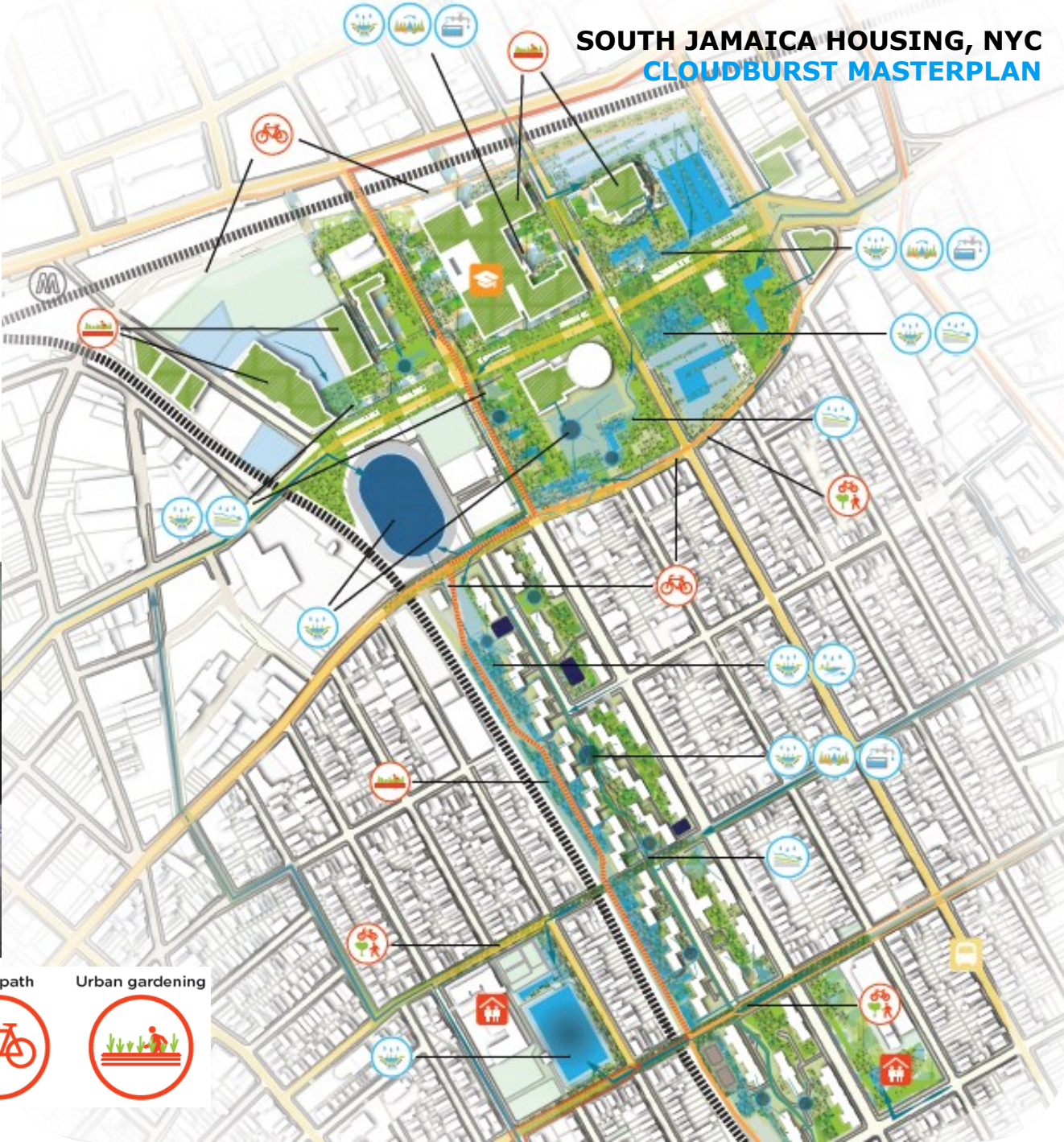


Cloudburst



CITY CLOUDBURST PLANNING

COPENHAGEN/**NYC**/SKIEN



- Infiltration
- Retention
- Cleansing
- Reuse
- Drainage
- Shared space
- Bike path
- Urban gardening

CITY CLOUDBURST PLANNING

COPENHAGEN/NYC/SKIEN

VERKTØY TIL GOD KLIMATILPASNING

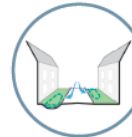
ETABLERING AV FYSISKE TILTAK I BYEN

Skybruddplanen foreslår totalt 113 tiltak inndelt etter tiltakstypene grønne veier, flomveier, lokal fordøyning og sentral fordøyning. Tiltakene vil bidra til å redusere flomskader og gi en grønnere by. Planen legger til rette for flere grønne gater og offentlige rom. En grønnere by bidrar til mer trivsel, muligheter for mer aktivitet og opphold i byen samt økt naturmangfold og CO₂-opptak fra trær og annen beplantning.



1) FLOMVEI

Flomveier er først og fremst veier der det ikke er potensiale for fordøyning av overvann. Avrenningen må derfor ledes til et egnet sted for fordøyning eller til resipient.



2) GRØNN Vei

Grønne veier er småskala fordøyningsløsninger langs gater der det er brukbar plass. Disse løsningene er eksempelvis grønne løsninger langs veier.



3) LOKAL FORDØYNING

Lokale fordøyningsløsninger er utformet for å fordøye overvann fra nærliggende avrenningsflater ved å senke terrenget, og samtidig opprettholde tidligere funksjoner som eksempelvis rekreasjon.



4) SENTRAL FORDØYNING

Sentral fordøyning er i likhet med lokal fordøyning designet for å fordøye store mengder overvann ved å senke terrenget og samtidig opprettholde eksisterende funksjon.

SYNERGIEFFEKTER

Å etablere tiltakene i skybruddplanen sammen med annen utbedring eller utvikling i Skien vil være med på å øke den samfunnsøkonomiske gevinsten av planen.

MULIGHETENE

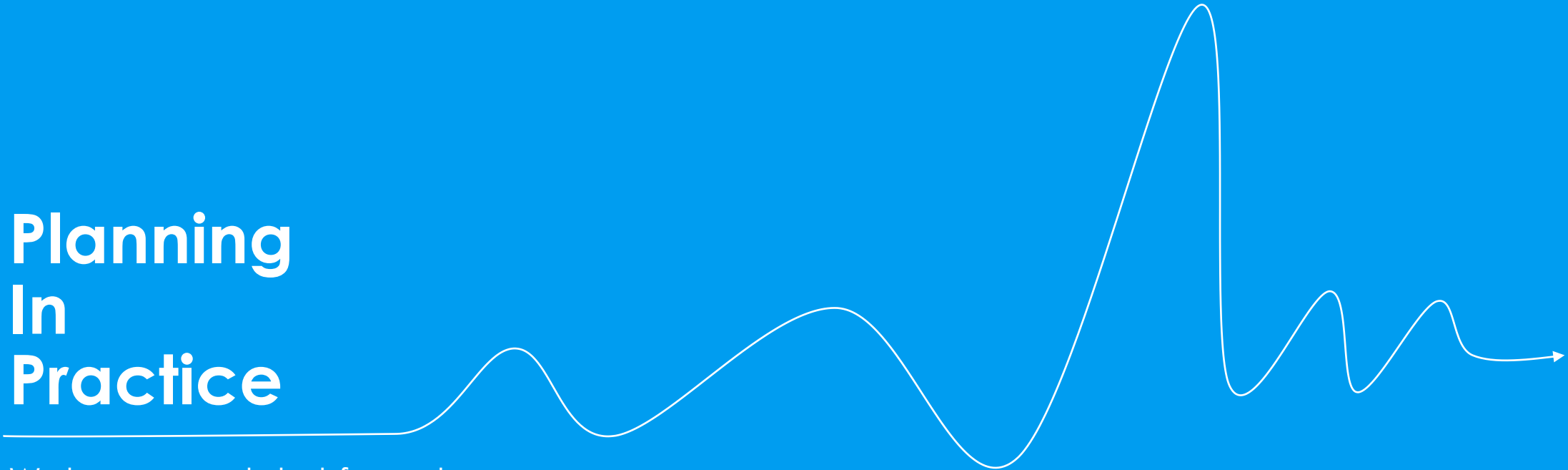
Ved å utnytte mulighetene planen gir vil man sikre kontinuerlig utvikling til et bedre og mer klimarobust Skien sentrum.

VERKTØY FOR SKYBRUDDPLANLEGGING

Skybruddplanen er veiledende for hvilke tiltak som kan anlegges hvor i Skien sentrum. Når man skal bruke bylandskapet som et sted til å håndtere regnvann, må man først vurdere hva slags type løsninger som er rimelige innenfor eksisterende offentlige rom, som parker og gater. Der det er mulig bør det tilstrebes å holde tilbake regnvann. Der det er begrenset med tilgjengelig areal, bør det legges opp til å omdirigere og føre regnvann trygt til større sentrale fordøyningsløsninger. Siden disse løsningene inngår i et sammenhengende system, bør tiltakene som er planlagt for i skybruddplanen sees i sammenheng med andre utviklingsprosjekter i byen.



Planning In Practice



Water as a catalyst for nature

Designing infrastructure to create co-benefits



Keeping temperature cool in the summer



Creating space for learning



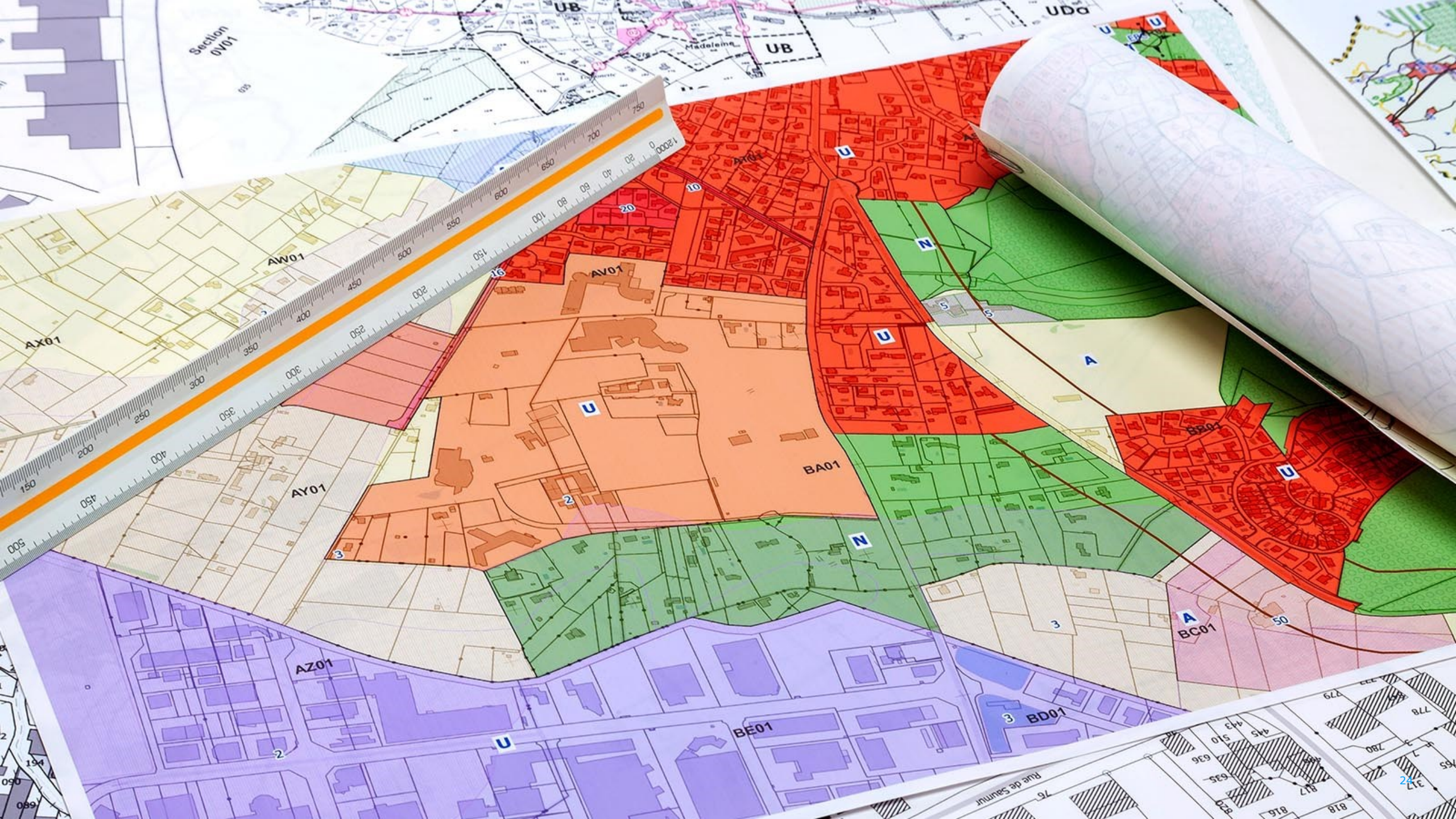
Creating spaces for gathering and community events

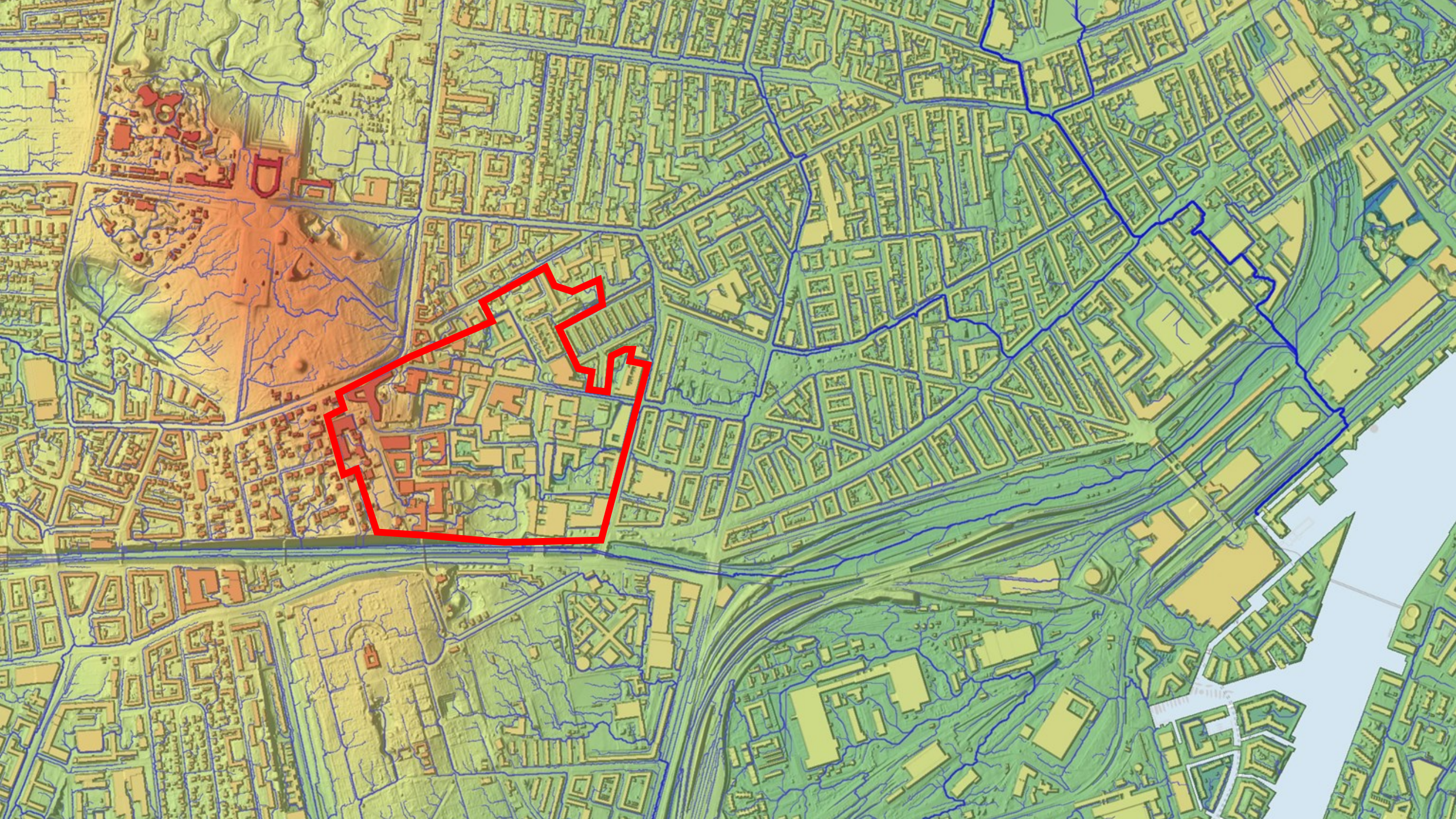


Creating spaces for sport and play

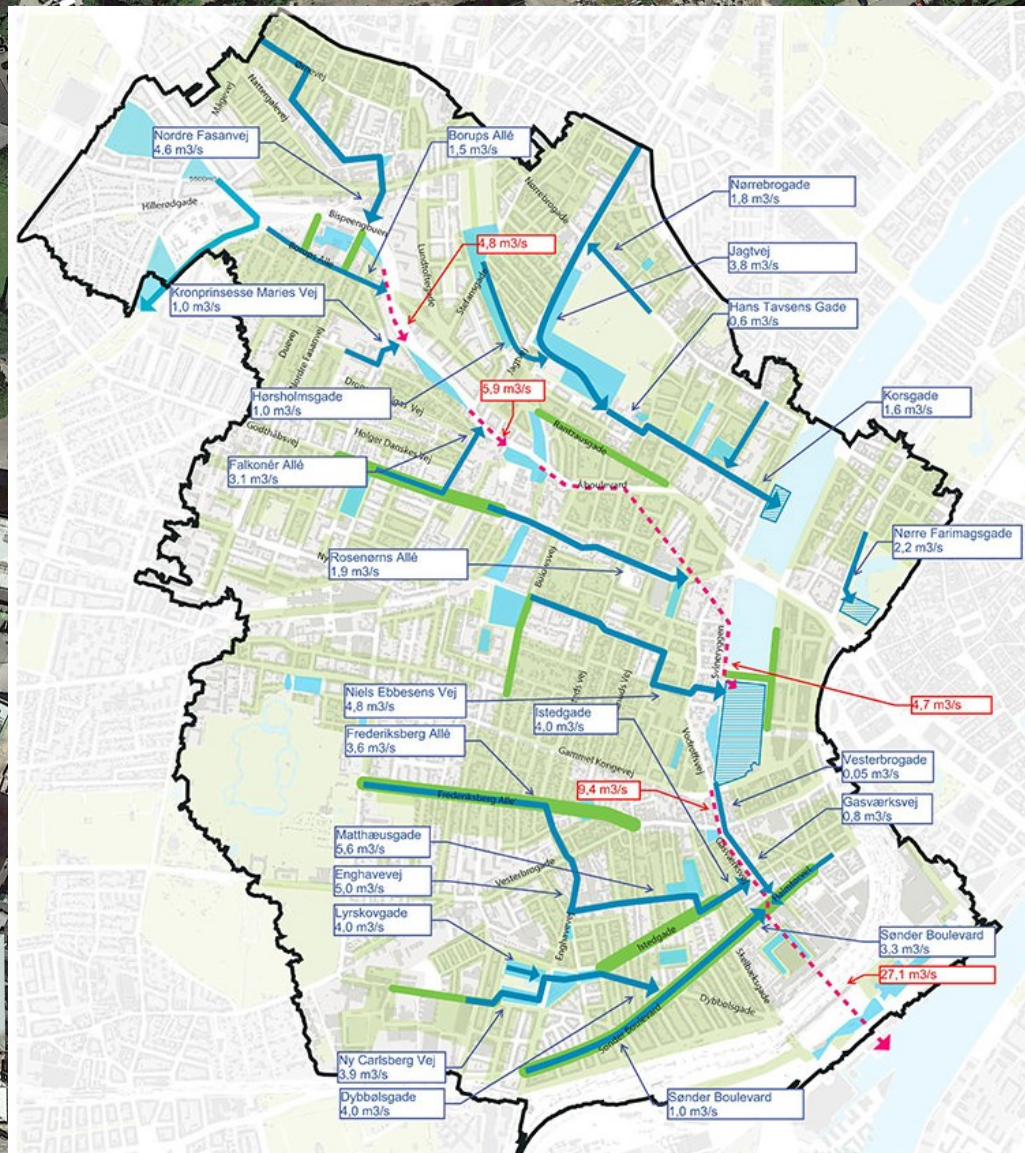


Creating restorative and calm spaces





CARLSBERG CITY

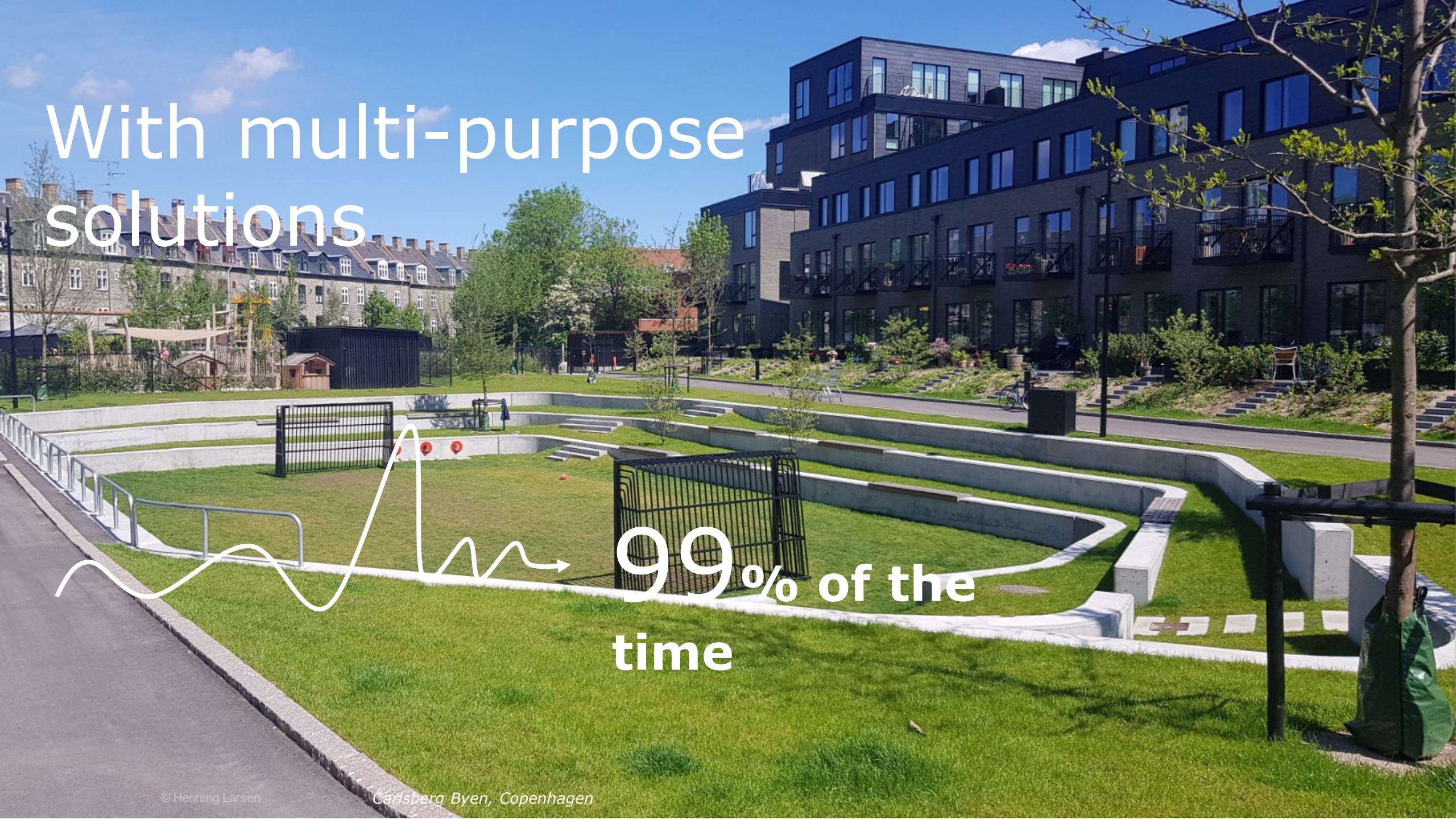




Designing for the extremes



1% of the time



With multi-purpose solutions

99% of the time





SKT. ANNÆ SQUARE





HUNDE MÅ
IKKE
MEDTAGES



ADDITIONAL SPACE FOR LOCAL SHOPS
AND RESTAURANTS



PASSAGE

PROMENADE

LOWERED CENTRAL GREEN AREA
COLLECTS, RETAINS, AND
CONVEYS WATER



Roof Water flows into smaller
separate pipes.

It is collected for irrigation and
use for Water playgrounds.

Roof Water
Pipe



Runoff from roads and general
surface areas discharges into large
pipes, which have an overflow to the
lowered area during extreme events.

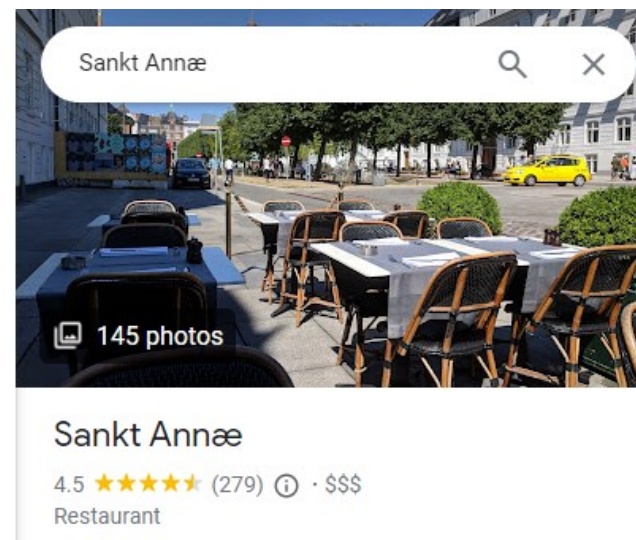
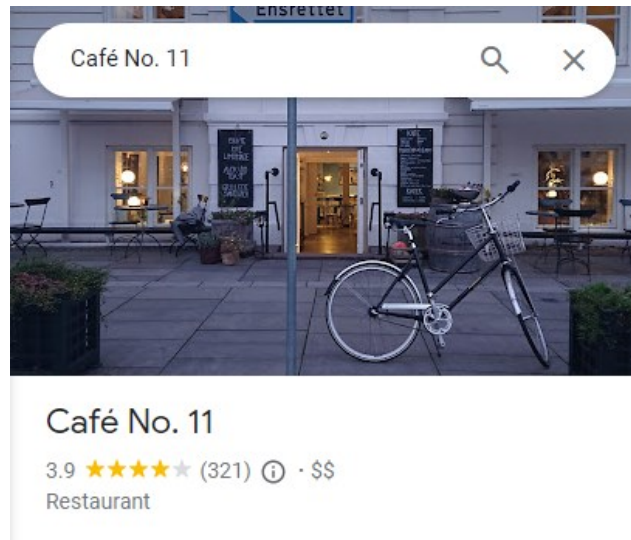
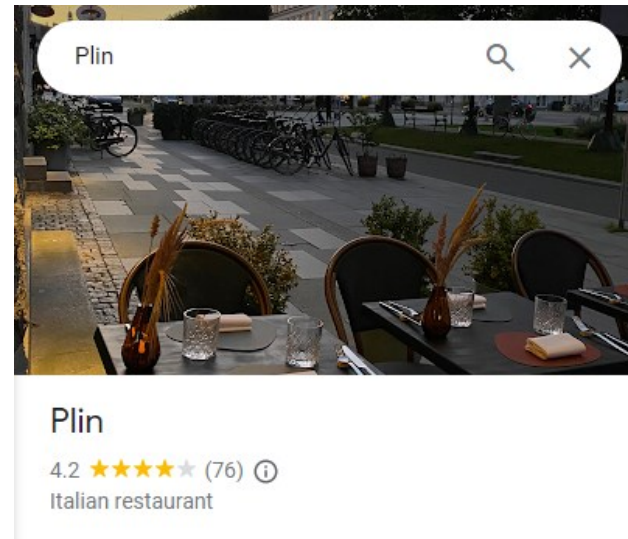
Roof Water
Pipe



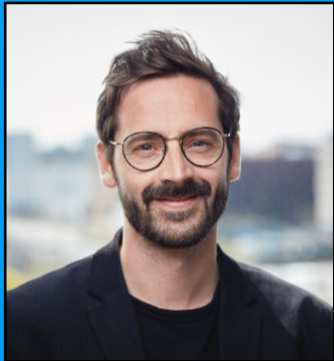




EVERYONE WANTS IN



THANK YOU



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Landscape Architect

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