



OpSkaLAR - trykksatte blågrønne løsninger bygget med «kortreiste» materialer

Emilia D. Lausen & Marina B. Jensen, KU

emze@ign.ku.dk; mbj@ign.ku.dk

SPARE-konference, 25.2.2026

Blågrønn infrastruktur i byen – sammen om mer naturmangfold, bedre overvannshåndtering og trivsel

KØBENHAVNS UNIVERSITET

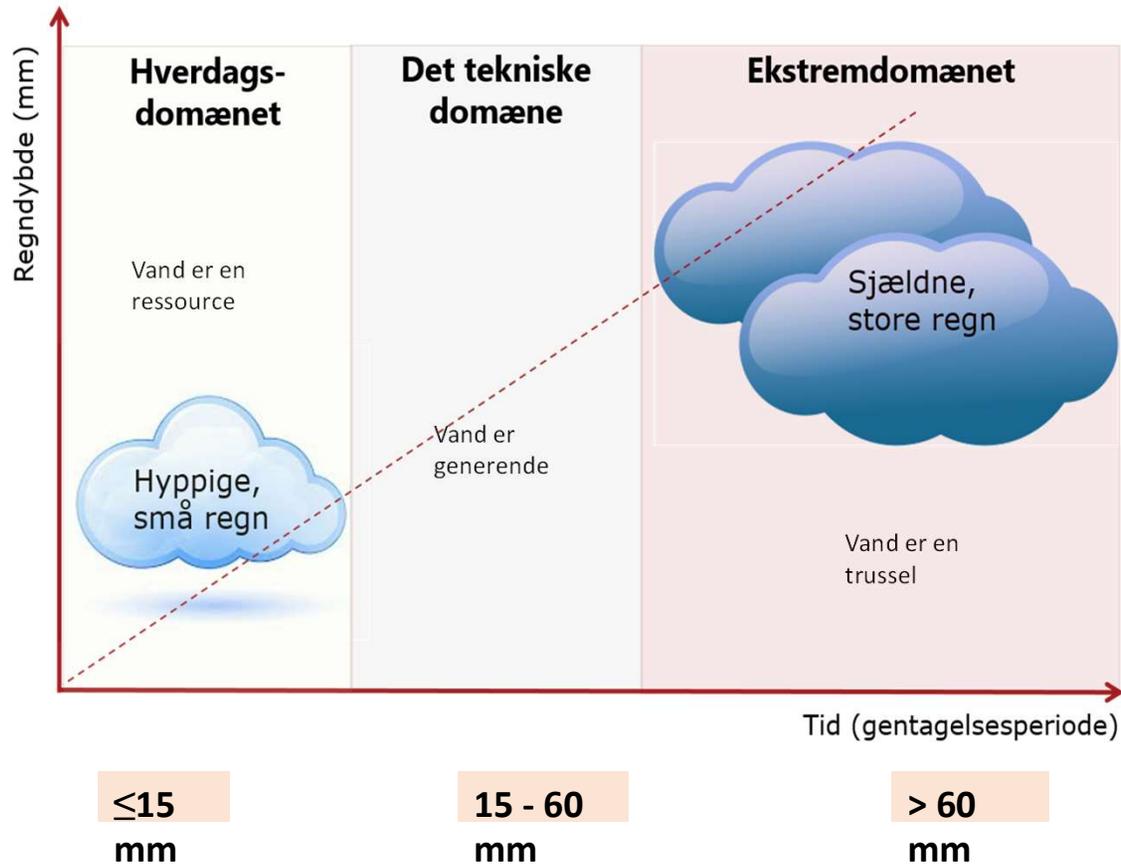


Contents

Part 1, Emilka: What did we learn from SPARE?

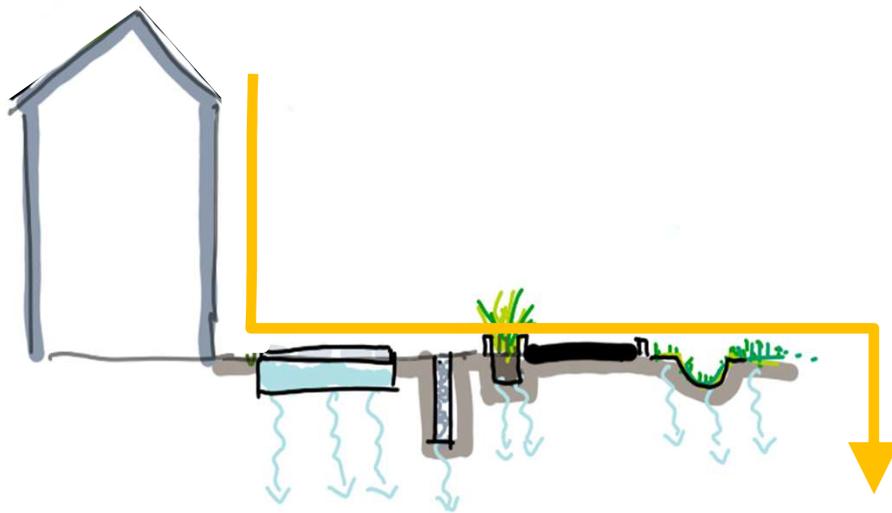
Part 2, Marina: Recent findings from OpSkaLAR

Three points approach (3PA)-> Three steps method

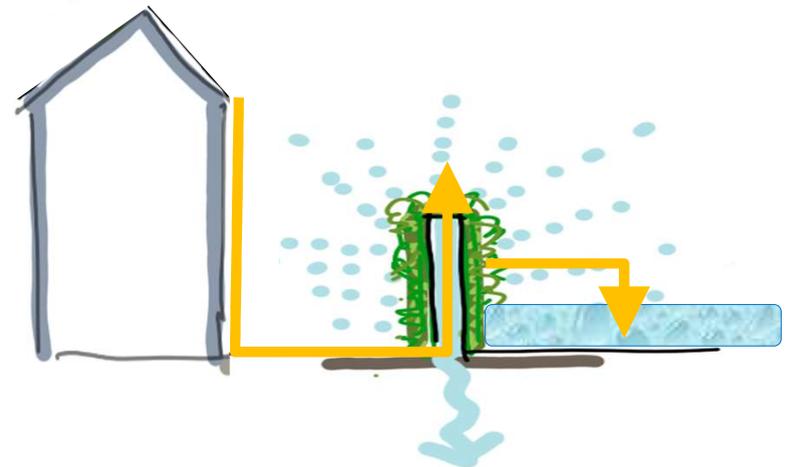


Innovative technology: Pressurized stormwater-NbS (Trykksatte blågrønne løsninger)

Classical NBSsw
(horizontal storage)

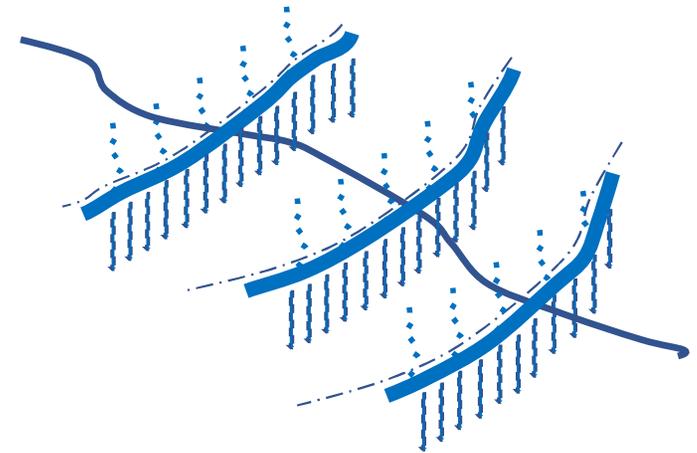
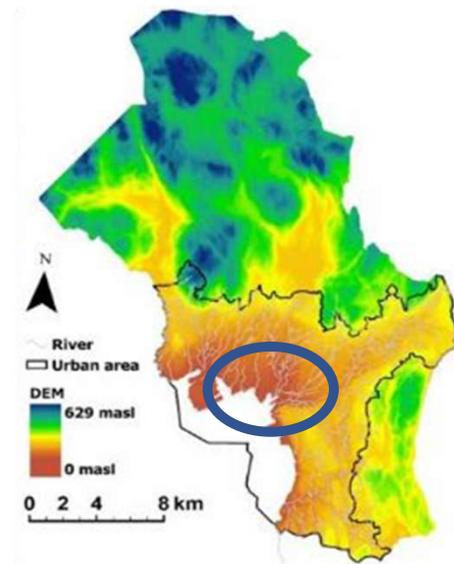


Pressurized NBSsw (Trykksat løsning)
(vertical storage)

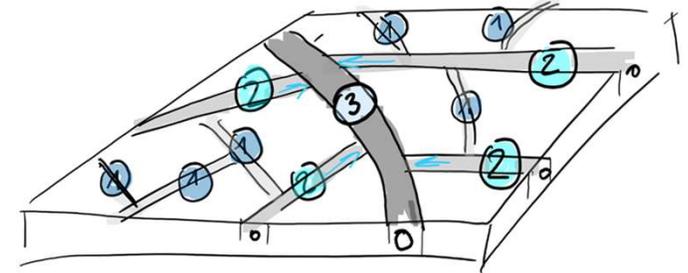


Little space requirement
No soil removal
Improved urban water balance: focus on ET

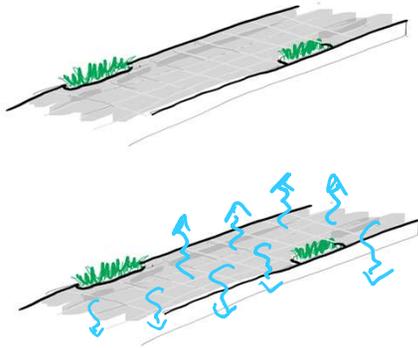
SPARE Work Package 2.3: Stormwater management of streets



Road system as a stormwater system

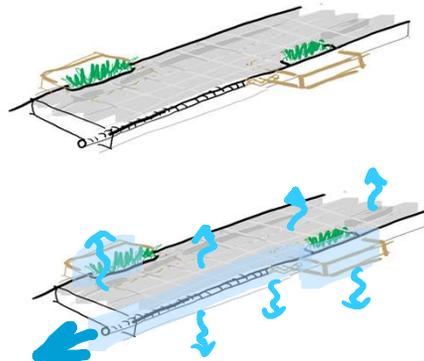


Step 1: < 15 mm
Infiltration +
evapotranspiration



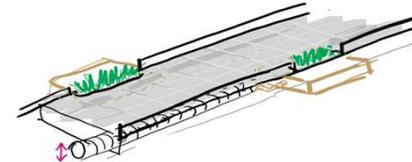
- Rain gardens
- Permeable pavements

Step 2: 15 – 60 mm
Delay



- infiltration crates (boxes)
- storage within the pavement base layer

Step 3: > 60 mm
Safe discharge



- The road profile functions wholly or partly as a conveyance route
- Critical entrances, utilities, etc. are elevated

Large scale mapping

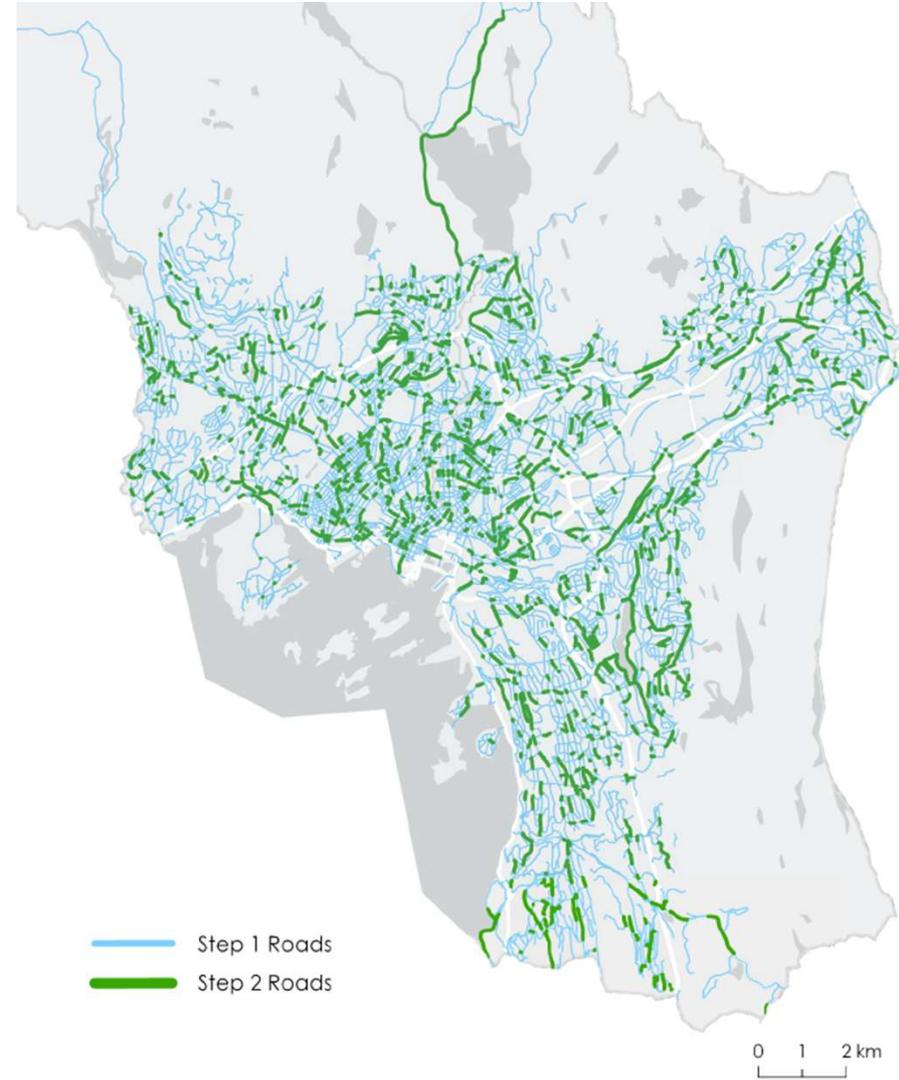
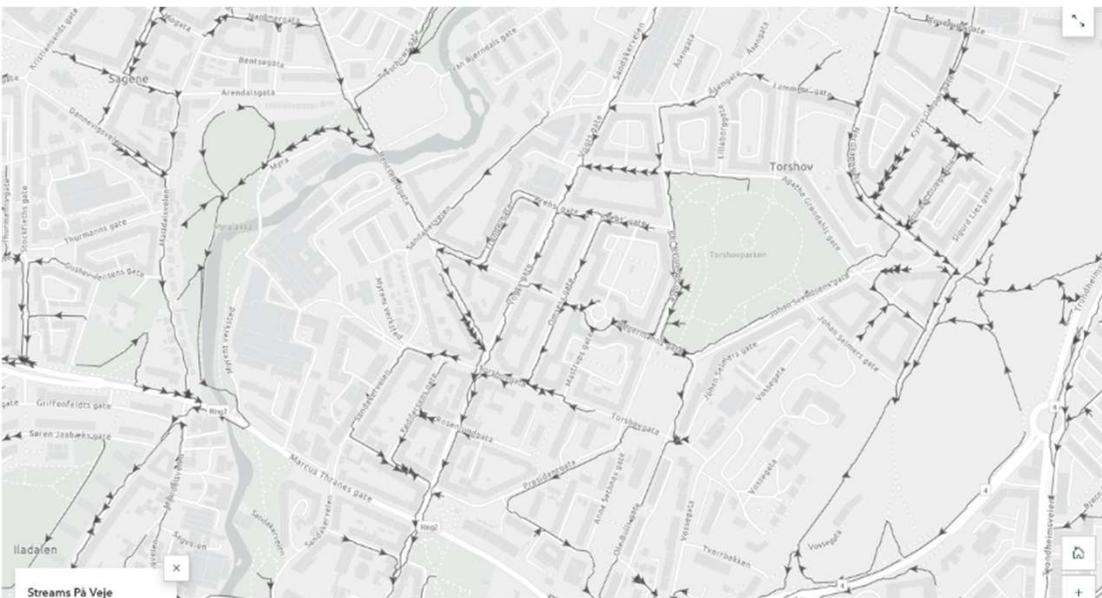
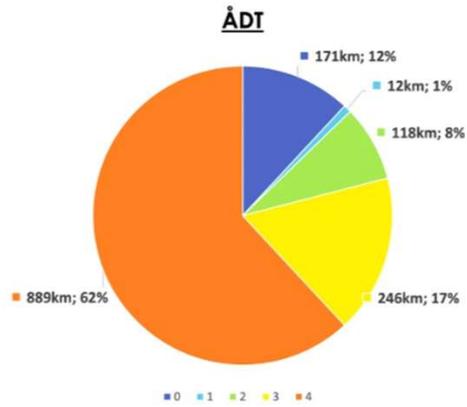
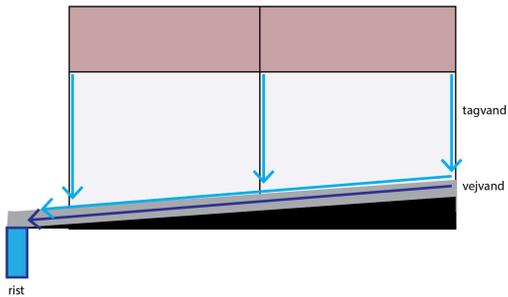
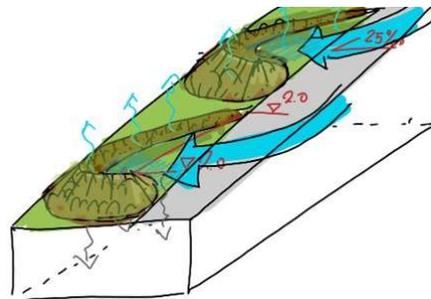
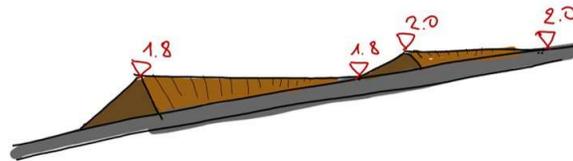
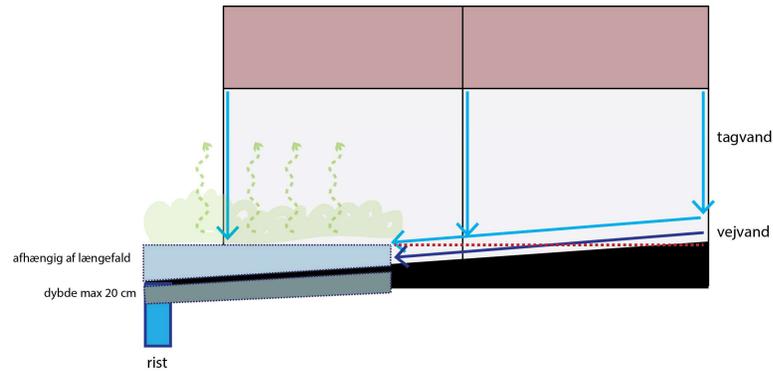
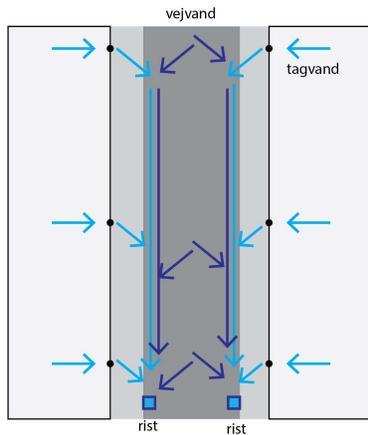


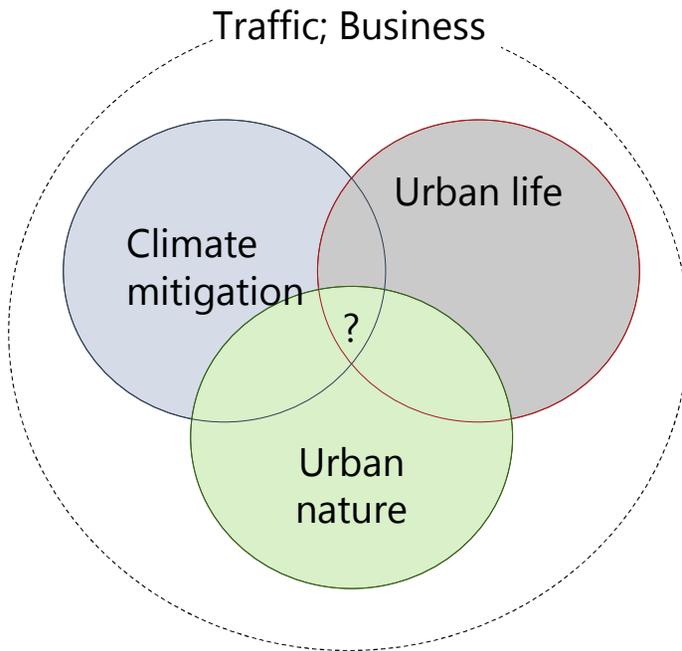
Figure 7.1 Step 1 and step 2 roads designed by the manual approach based on a 20 mm precipitation event.

Initial solutions' screening workshop

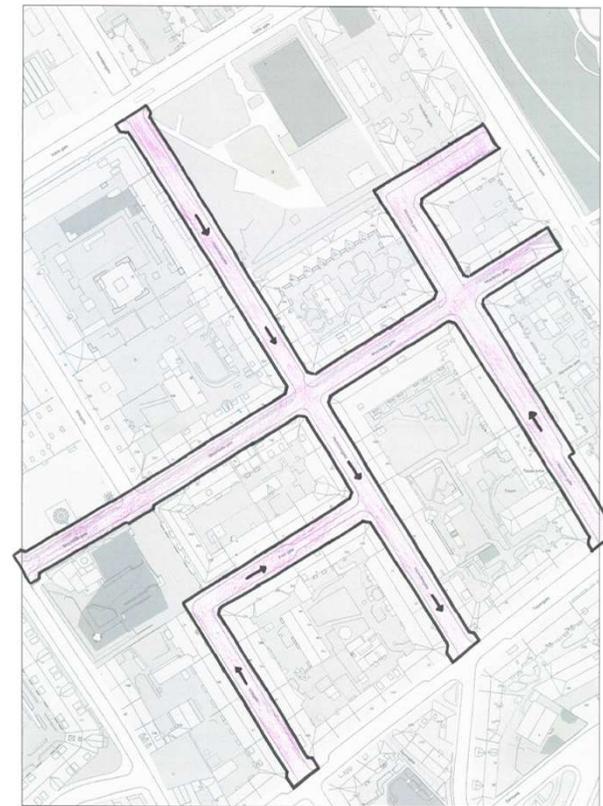
Existing situation



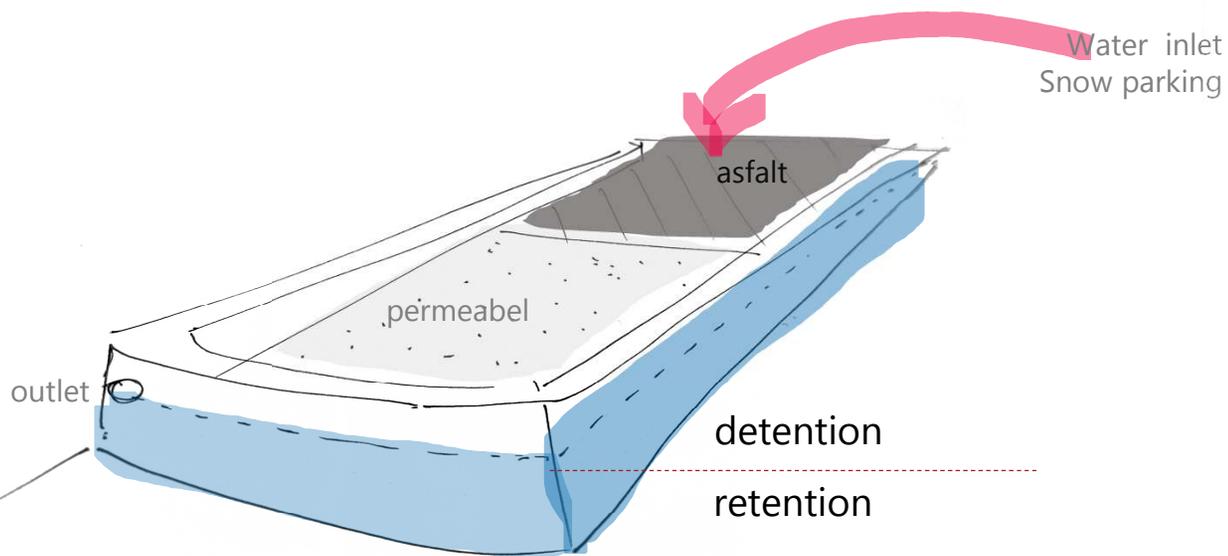
Vann-Gatatur: Concept testing in collaboration with BYM and others



Urban life – Shared space

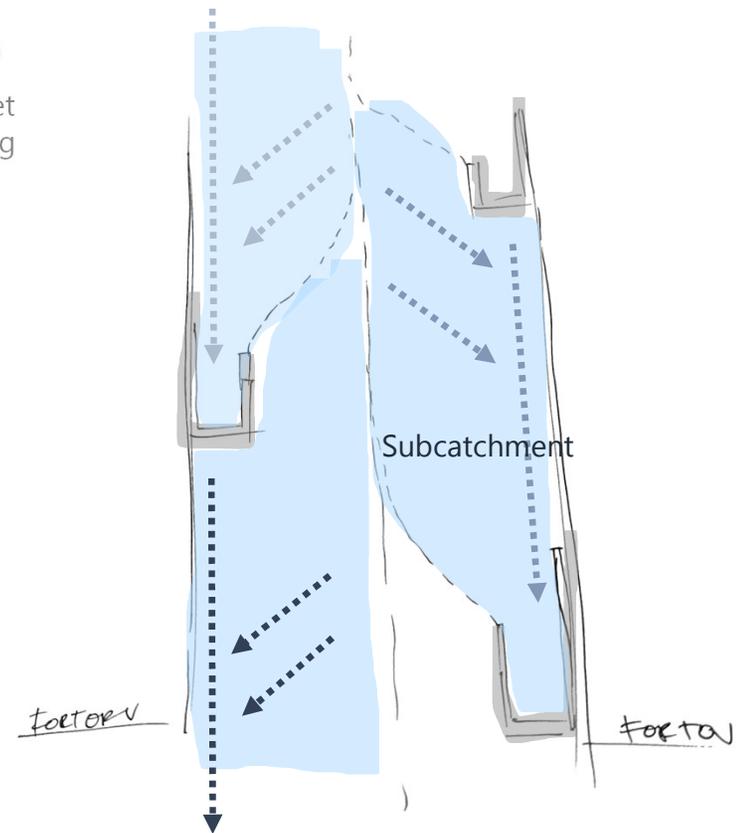


Vann-Gatetun basis element

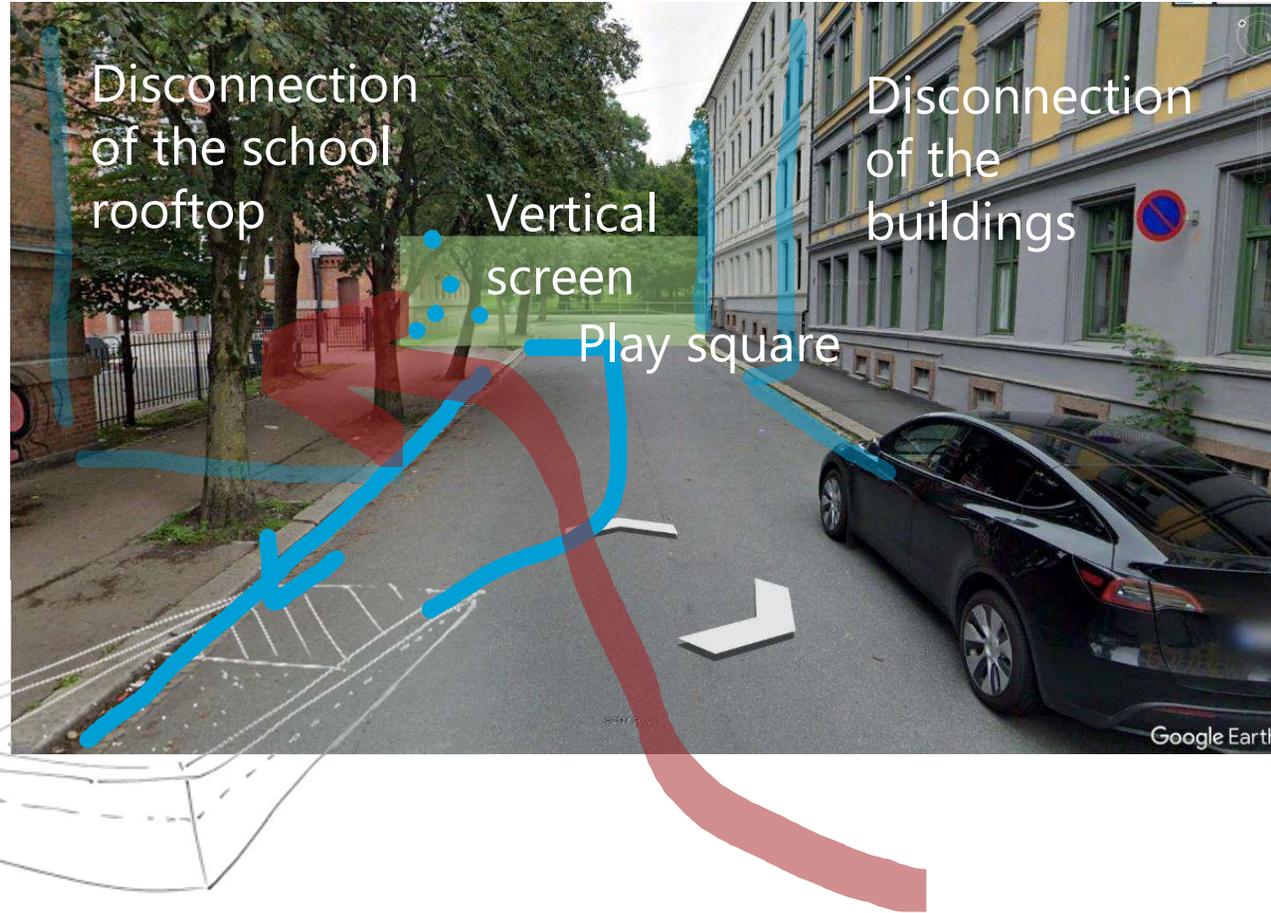


Volume/unit: $10 \text{ m} \times 3 \text{ m} \times 0,4 \text{ m} = 12 \text{ m}^3$

To detain 83 m^3 we need 7 units per 100 m of road

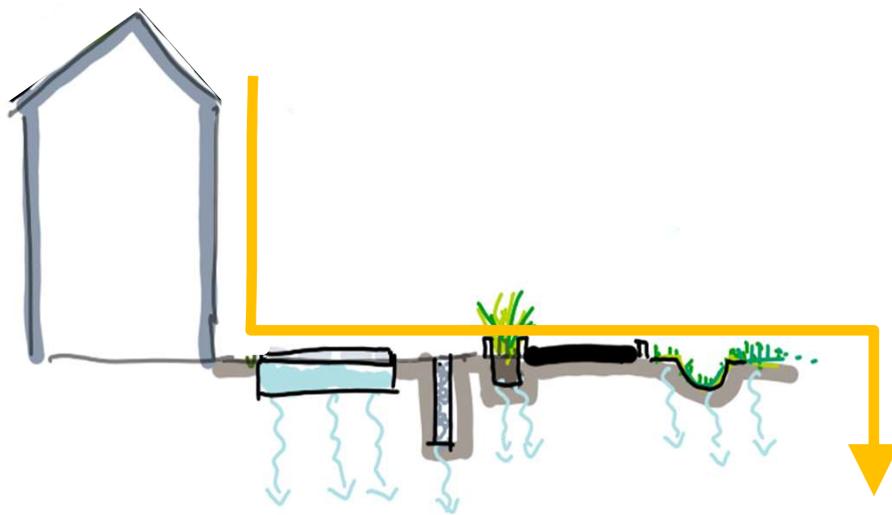


Pilot on Herslebsgate

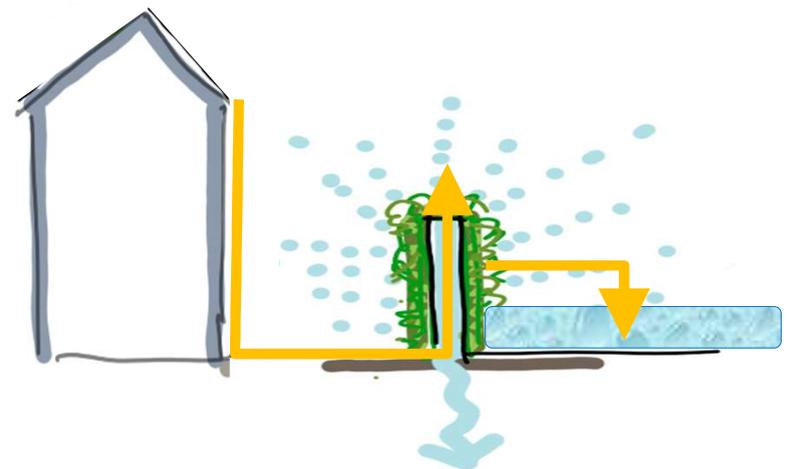


Innovative technology: Pressurized stormwater-NbS (Trykksatte blågrønne løsninger)

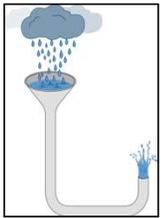
Classical NBSsw

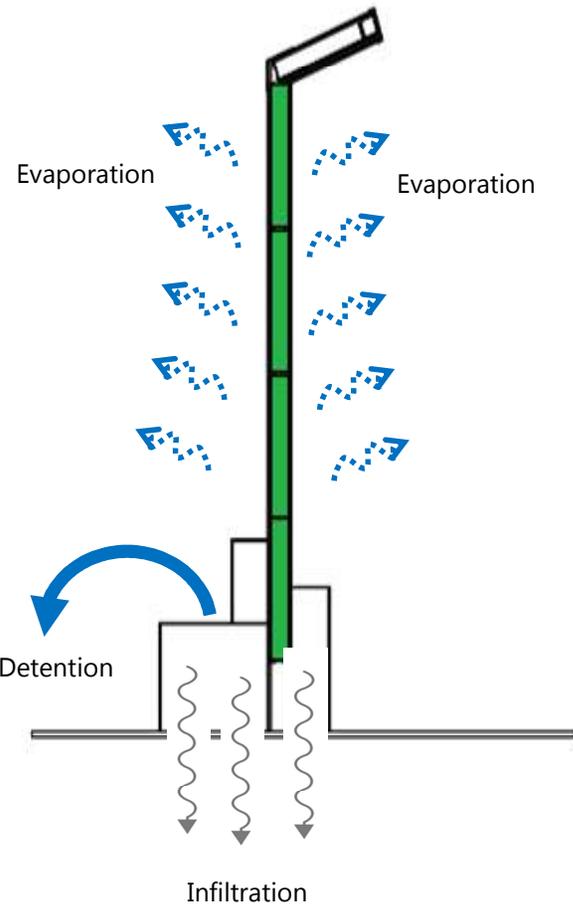


**Pressurized NBSsw
(Trykksat løsning)**

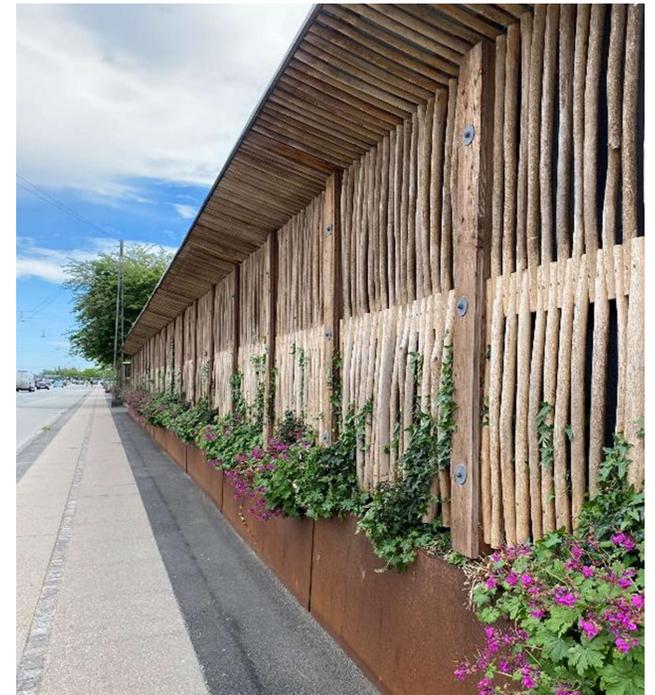


Proof of concept: The Green Climate Screen

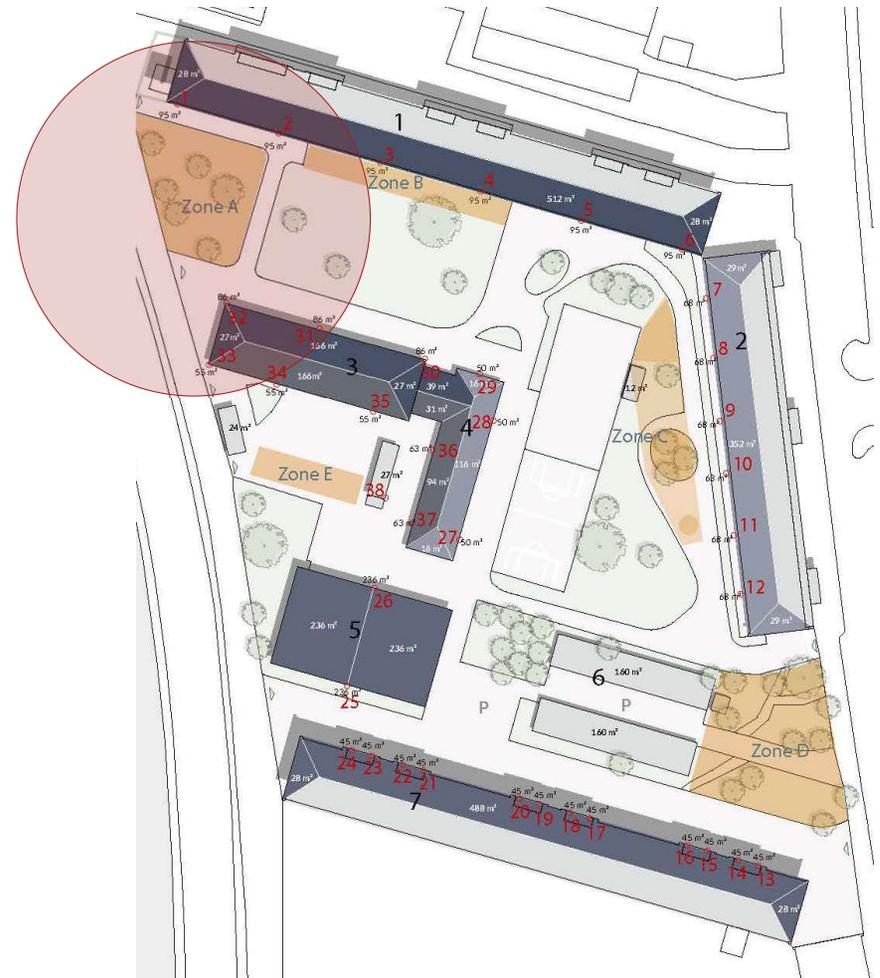




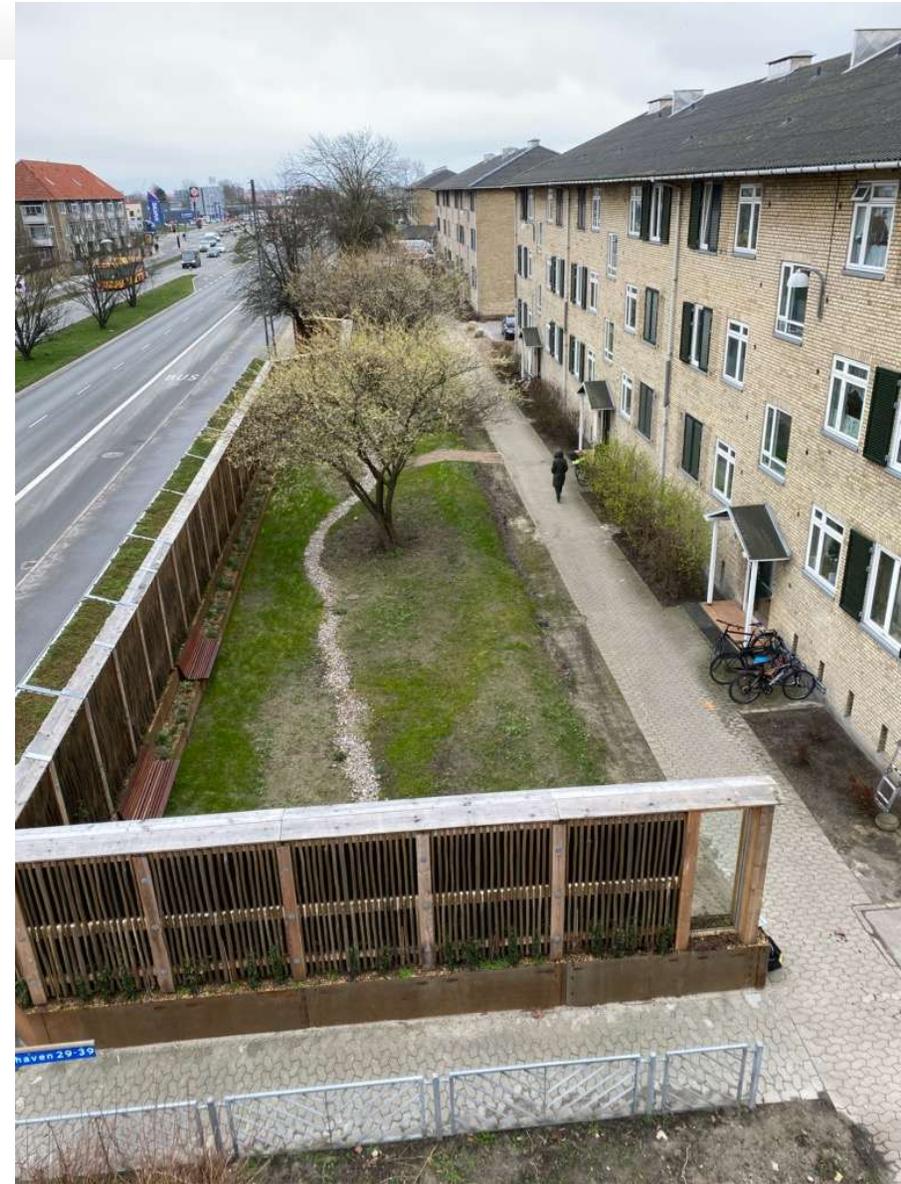
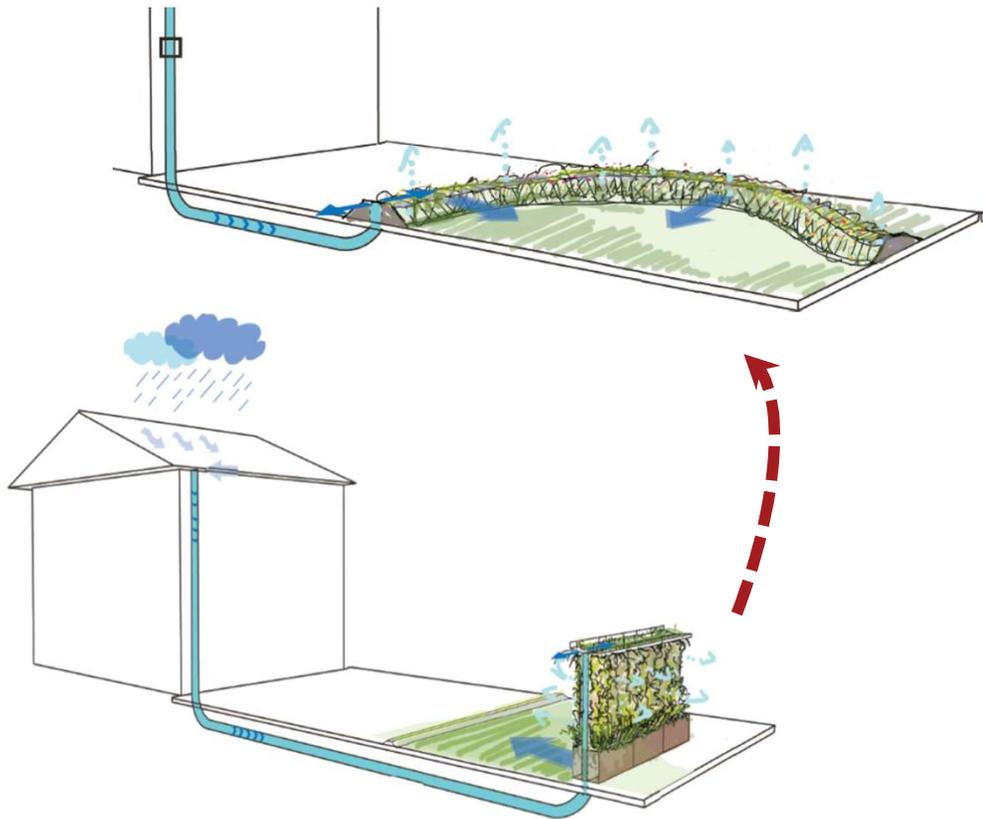
Green Climate Screen in Asker Kommune? (next presentation)

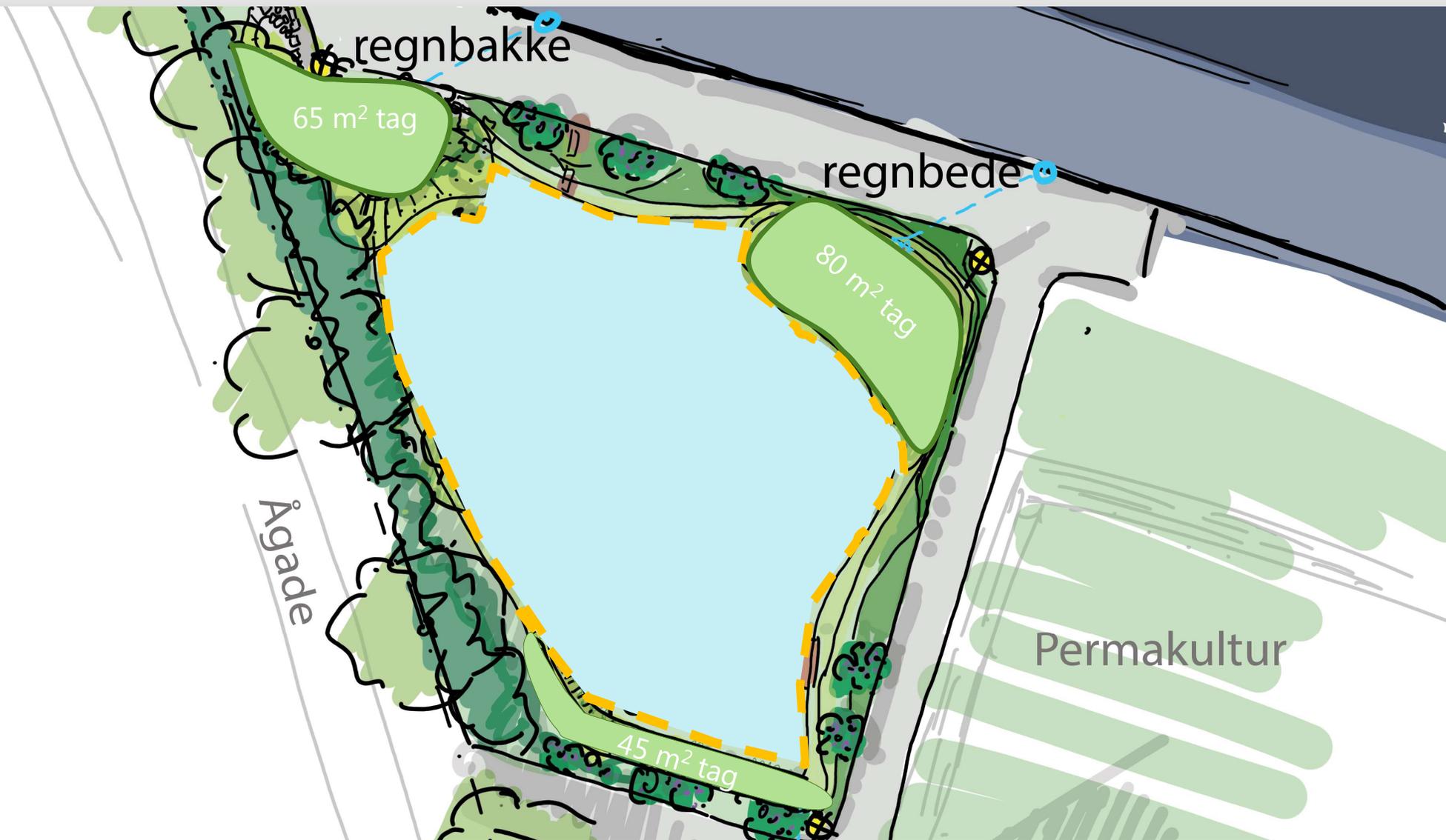


Ongoing research: "Demonstratorium" at AKB-Lundtoftegade, Copenhagen (OpSkaLAR, 2024-2027)

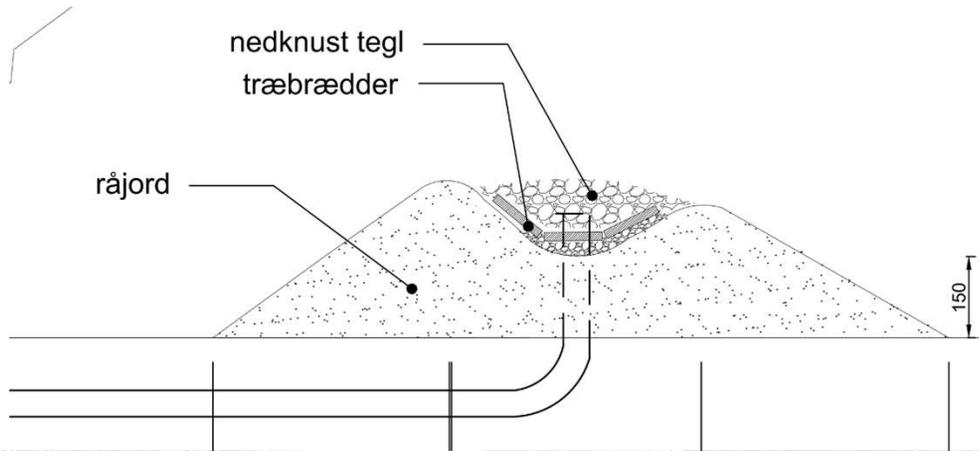


Zone A-idea: simple version possible?
(cheap in: DKK, CO2 and Material footprint, but same hydraulic capacity)



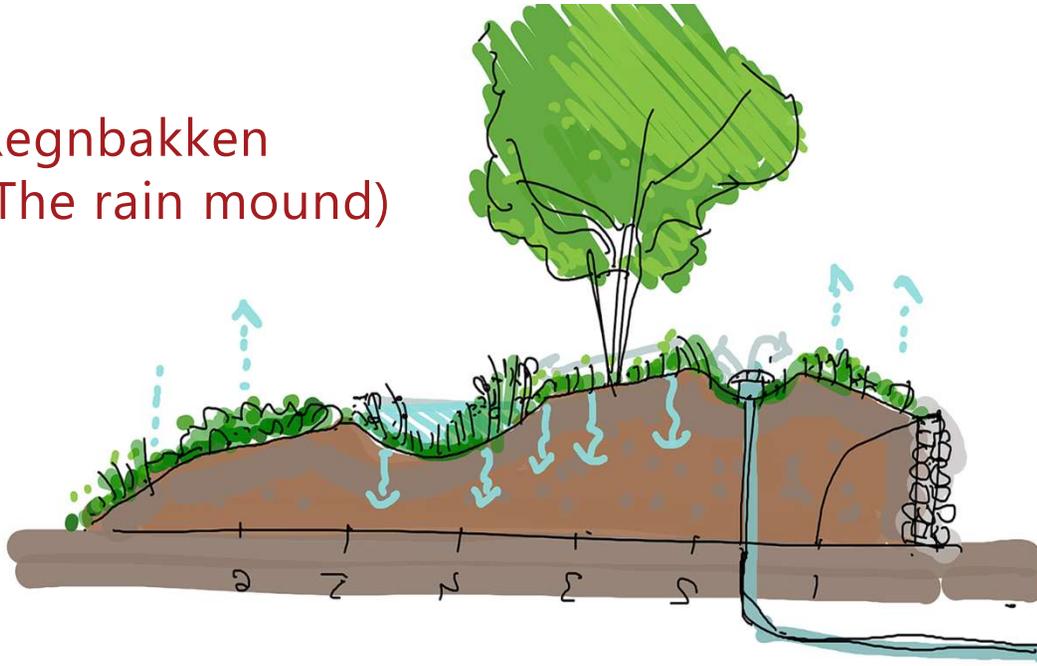


Regndiget (The Raindike)

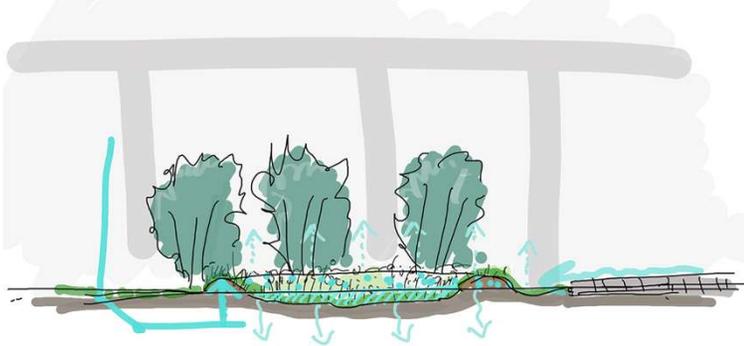




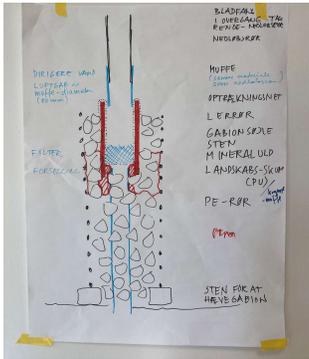
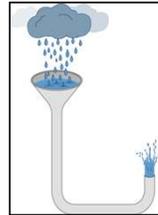
Regnbakken (The rain mound)



Det hævede regnbed (The raised raingarden)



Pressurized conveyance (Trykksat transport)



The "beer bong"



Lessons learned Technological breakthroughs

- Soil is a good medium for absorbing water
- With the suspended rain bed, we have developed a NBS with full soil balance and full capacity (T = 10 years).
- The “Beer Bong” / “Up-Pipe” / “Pressurized Conveyance” is a breakthrough in terms of frost protection, clogging prevention, and cost. And it has an acceptable aesthetic.



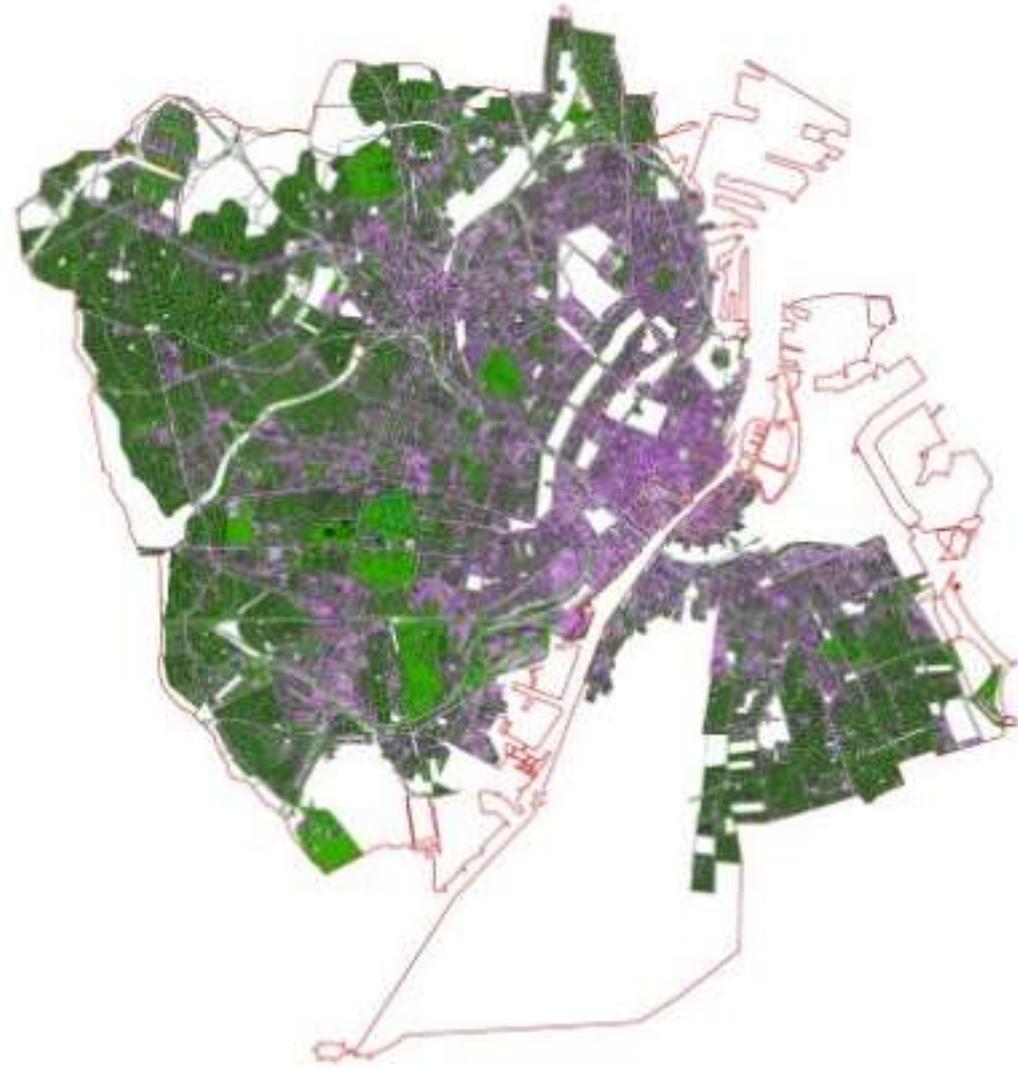
Lessons learned context experiences

- Pressurized NBSw can be carried out by small contractors, using small machinery and few people, but requires clear instructions
- Universal access (the ramp) is important for passing of perimeter-dike
- Open questions remain regarding robustness and operation



Scaling-up potential assessed with GIS

- Combined sewered: 6000 ha
- Sealed surfaces: 4000 ha,
including 1500 ha roofs
- 30 % disconnection ~ 1200 ha



Future designs

