

# Welcome to Vejle

## AGMA 14 sep. 2022





Vejle means Ford and the water is a condition! But we need to steer the water – the water should not steer us





**VEJLE**  
- morgendagens  
resiliente by

PIONEERED BY THE  
ROCKEFELLER FOUNDATION

100 RESILIENT CITIES

An aerial photograph of Vejle city at night, showing the city lights and the Vejle River. The city is illuminated with blue and white lights, and the river is visible in the foreground.

*Vejle*  
...med vilje





# Vejle

*Vejle is medium sized Danish city, and with its 113,000 citizens in the greater city area, it is the 6<sup>th</sup> largest municipality in Denmark.*

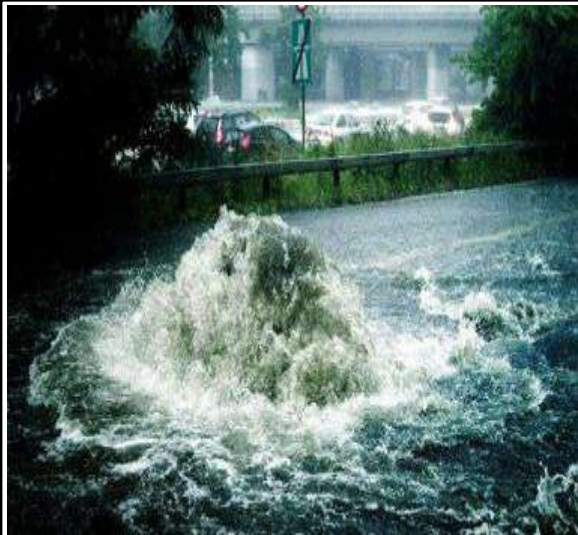
*Part of a larger cluster of cities (1 mill. citizens)*

*Vejle is a Scandinavian modern liberal democracy and values openness, active and involving citizenship, and with high level of public service.*



# Emerging threats:

- Rising sea levels, increasing rainfall and flooding has become an emerging threat
- Impact from post-industrial change
- Regional and local urbanization,
- Demographic changes and immigration pressures:
  - Public welfare services
  - City functions
  - Social cohesion
- The Scandinavian welfare model is potentially vulnerable



# CLIMATE RESILIENCE

## Resilience as a Catalyst

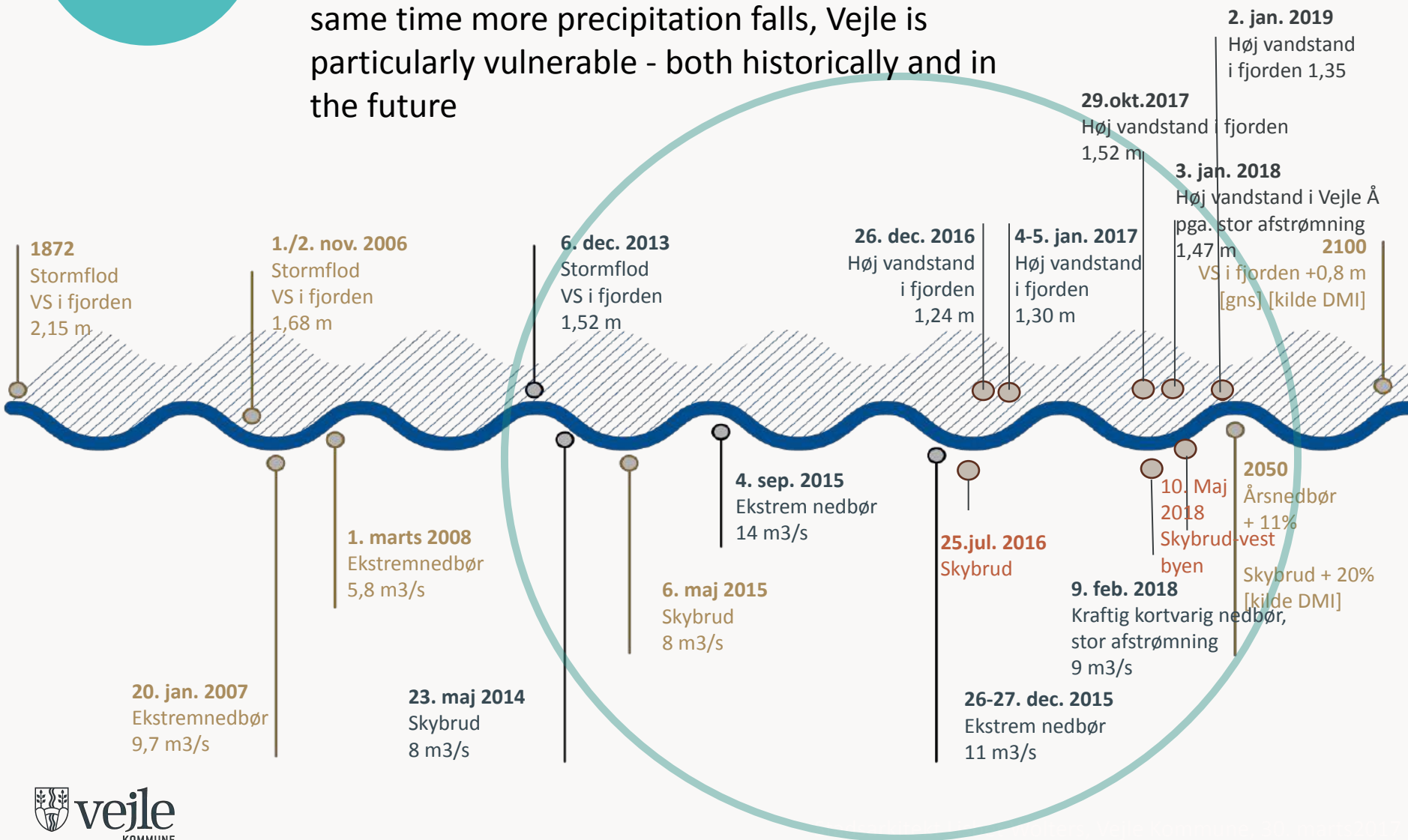
Diagnostic → Catalyst → New insight



- 1) Water is an asset in urban development.
- 2) Fulfill more goals.
- 3) Every individual can contribute.
- 4) Financing and bankability.

# CLIMATE RESILIENCE

When the water in the fjord rises and at the same time more precipitation falls, Vejle is particularly vulnerable - both historically and in the future





# CLIMATE RESILIENCE

## Flooding in Vejle



1947



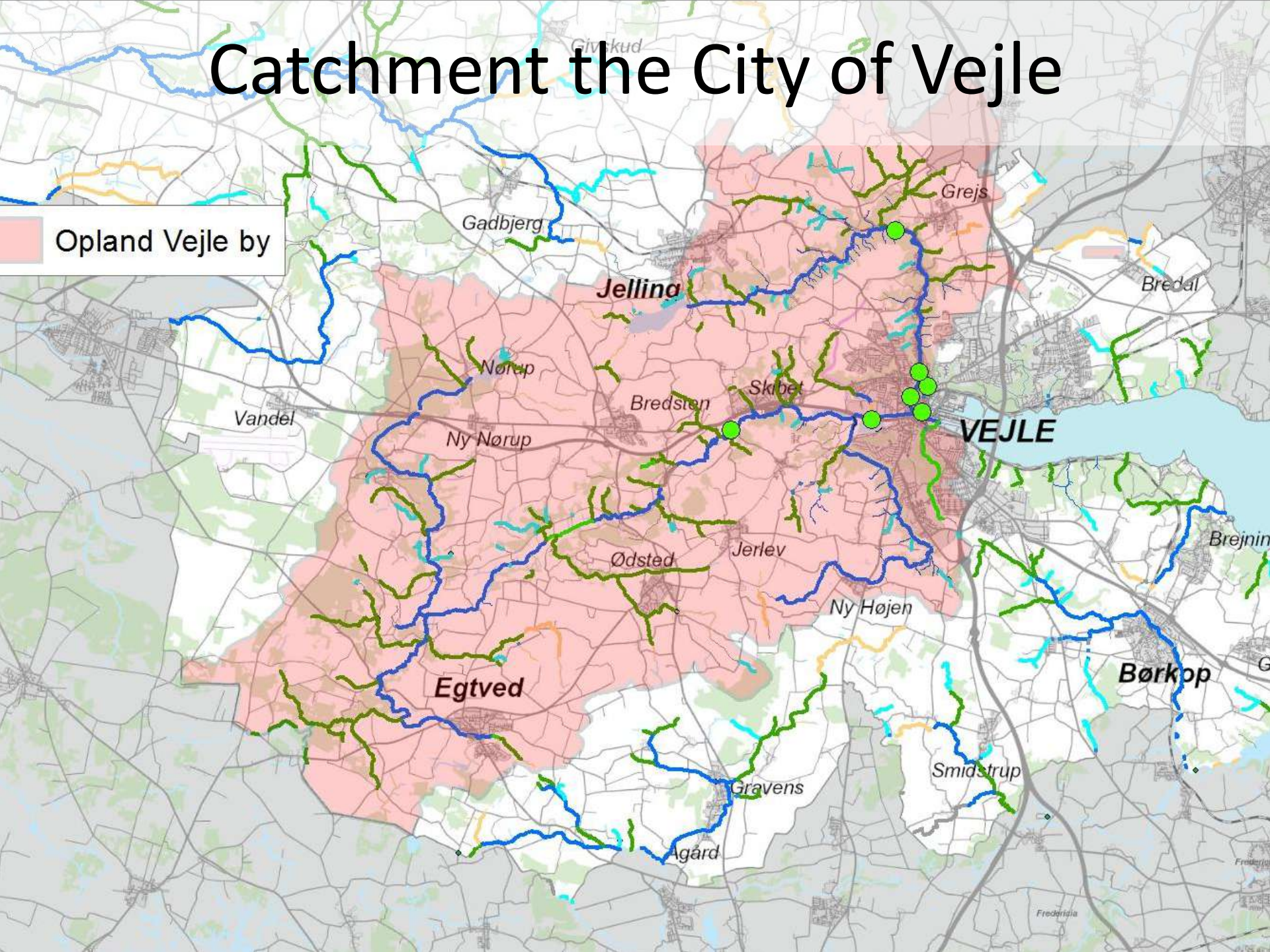
2007

· · · the water ends in the city center. Citizens, settlements and roads are charged



26.12.2015

# Catchment the City of Vejle



Opland Vejle by

**VEJLE**

**Egtved**

**Jellina**

**Børkop**

Gadbjerg

Grejs

Bredal

Nørup

Bredsten

Skibet

Vandel

Ny Nørup

Ødsted

Jerlev

Ny Højen

Gravens

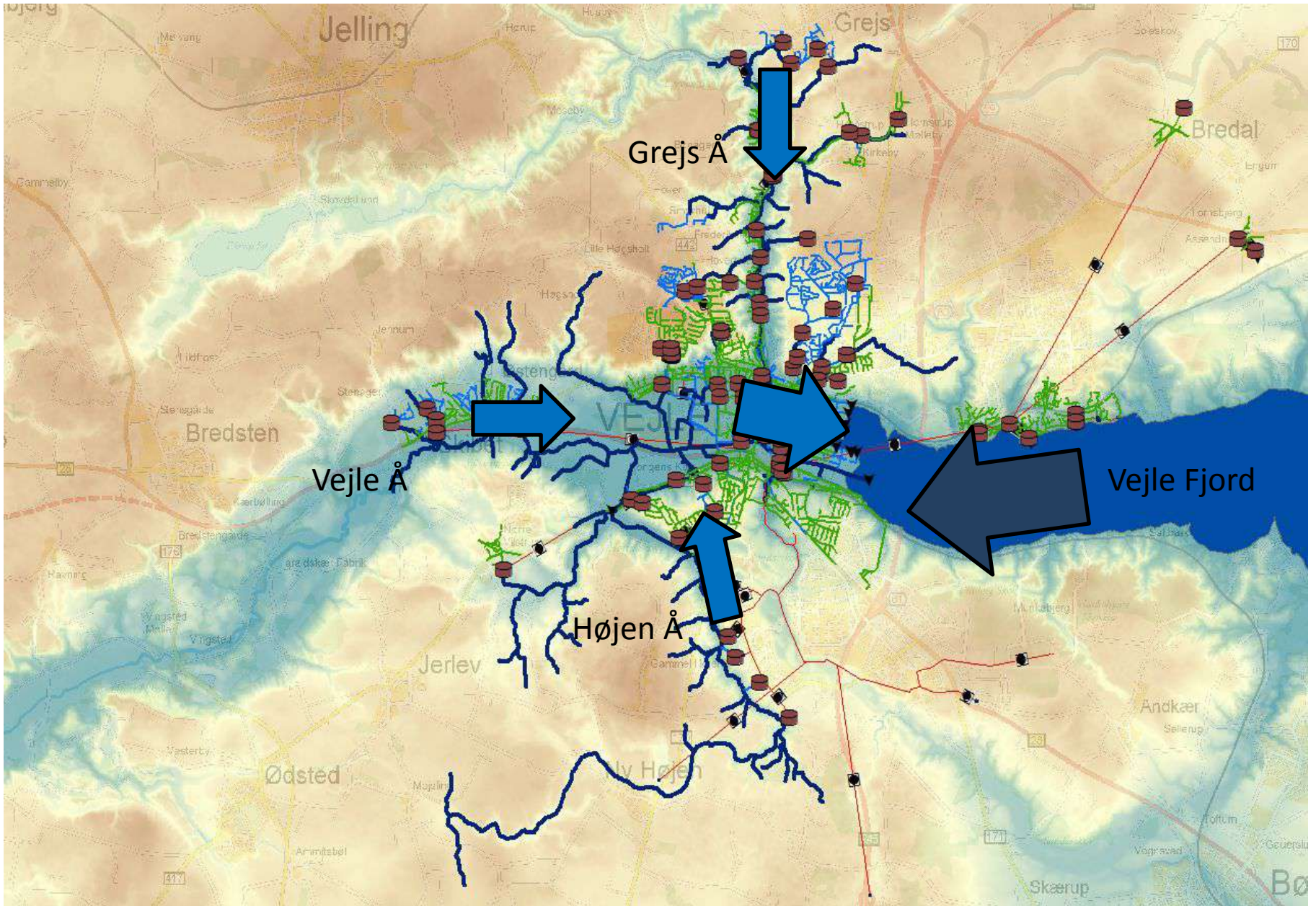
Agård

Smidstrup

Brejnin

Fredensia

# Water Tool - Vejle



# CLIMATE RESILIENCE

## Sluice and pumpstation

45 millioner dyrt anlæg indviet ved Bryggen



vafo.dk

RESILIENT

VEJLE

# CLIMATE RESILIENCE

## SMART Water Vejle

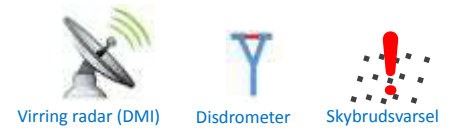
Strategi for spjæld, sluse og pumper



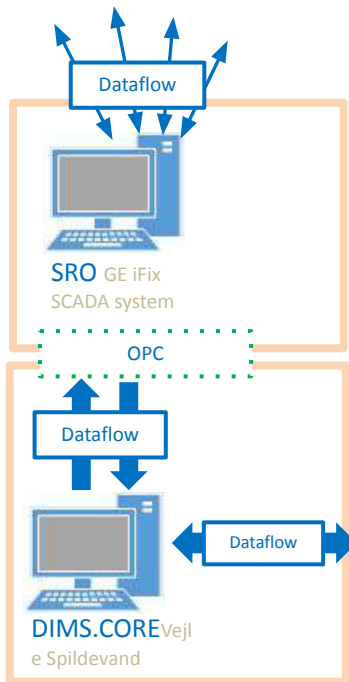
RESILIENT VEJLE

# MUDP-Projekt

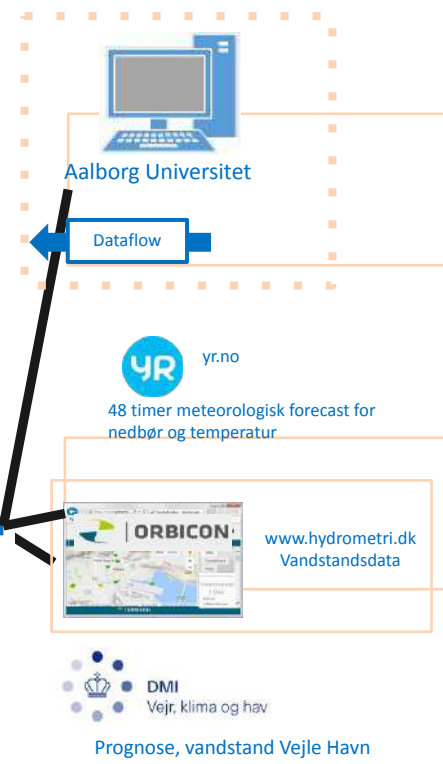
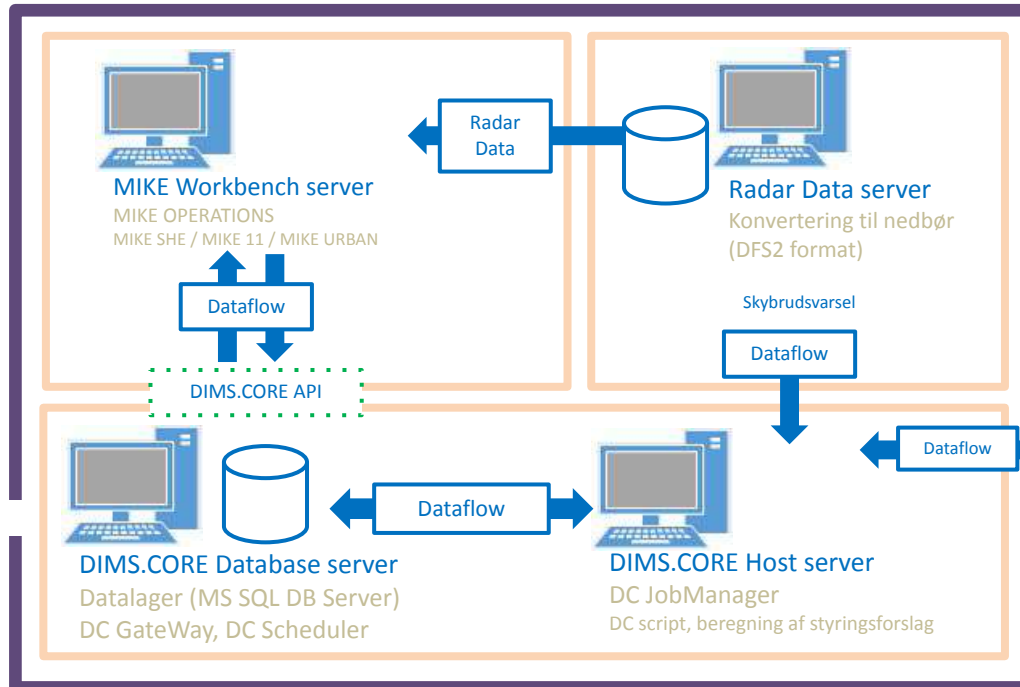
## Miljøteknologisk Udviklings- og Demonstrationsprogram



Sluse / pumper  
/ fordelebygværk / ...

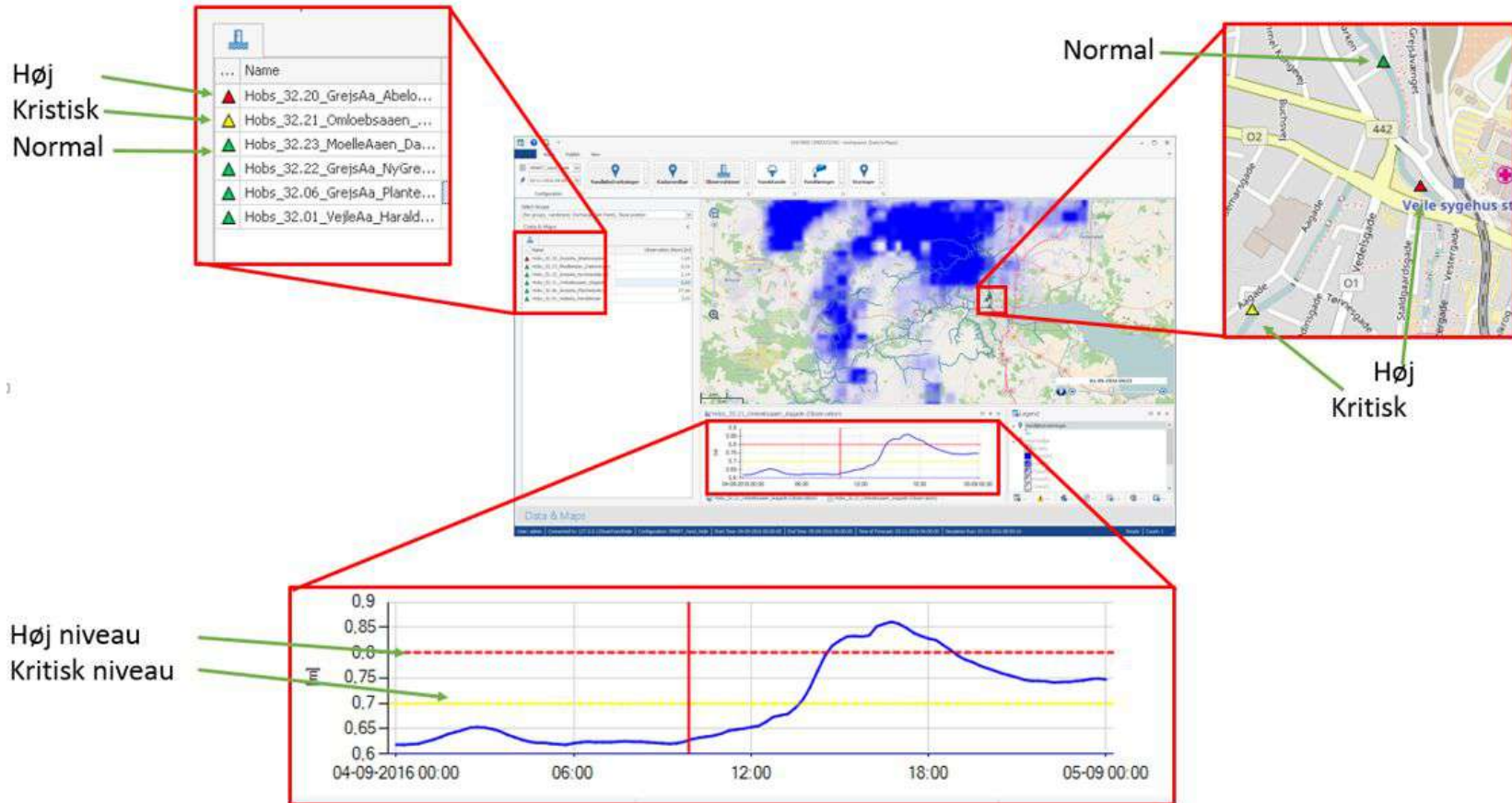


### SMART Vand System

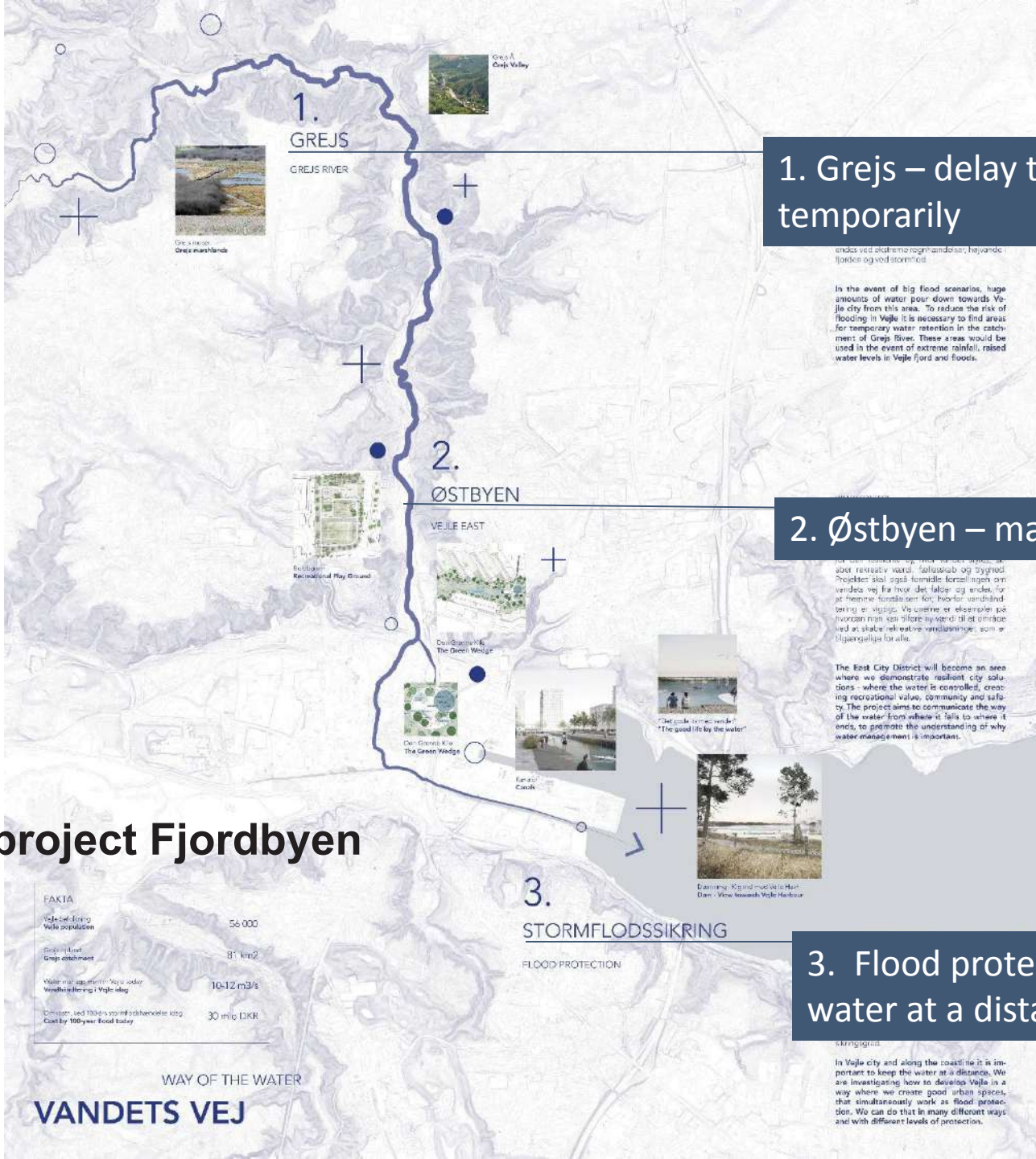


# SMARTVand Vejle – brugerflade

## MIKE Operations







# 1. Grejs – delay the water temporarily

ends ved ekstreme regnmængder, højvande i fjorden og ved stormflod

In the event of big flood scenarios, huge amounts of water pour down towards Vejle city from this area. To reduce the risk of flooding in Vejle it is necessary to find areas for temporary water retention in the catchment of Grejs River. These areas would be used in the event of extreme rainfall, raised water levels in Vejle fjord and floods.

# 2. Østbyen – manage the water

at det kan være en god idé at have etableret vand, solsikler og bygninger. Projekter skal også formidle fordelingen og fordelingen af vej fra hvor det falder og ender, for at kunne forstå den for, hvorfor vandhåndtering er vigtig. Vi ønsker et eksempel på hvordan man kan gøre det godt, så det er integreret i skole, rekreative områder, som er tilgængelige for alle.

The East City District will become an area where we demonstrate resilient city solutions - where the water is controlled, creating recreational value, community and safety. The project aims to communicate the way of the water from where it falls to where it ends, to promote the understanding of why water management is important.

FAKTA	
Vejle belønning Vejle population	56 000
Grejs flodareal Grejs catchment	81 km <sup>2</sup>
Water management Vandhåndtering i Vejle-åb	10-12 m <sup>3</sup> /s
Omkostning ved 100 års stormflodssikring Cost by 100-year flood today	30 mio. DKR

WAY OF THE WATER  
**VANDETS VEJ**

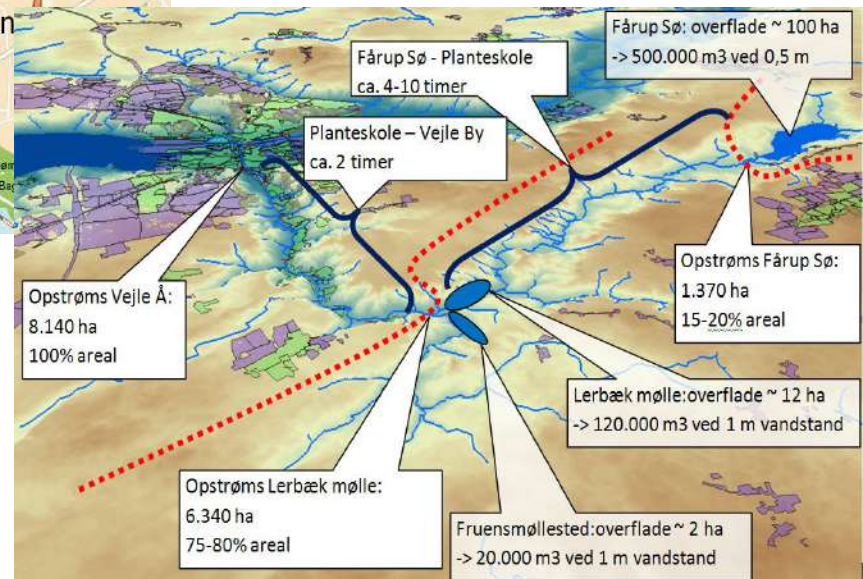
# 3. Flood protection - keep the water at a distance

stormflodssikring

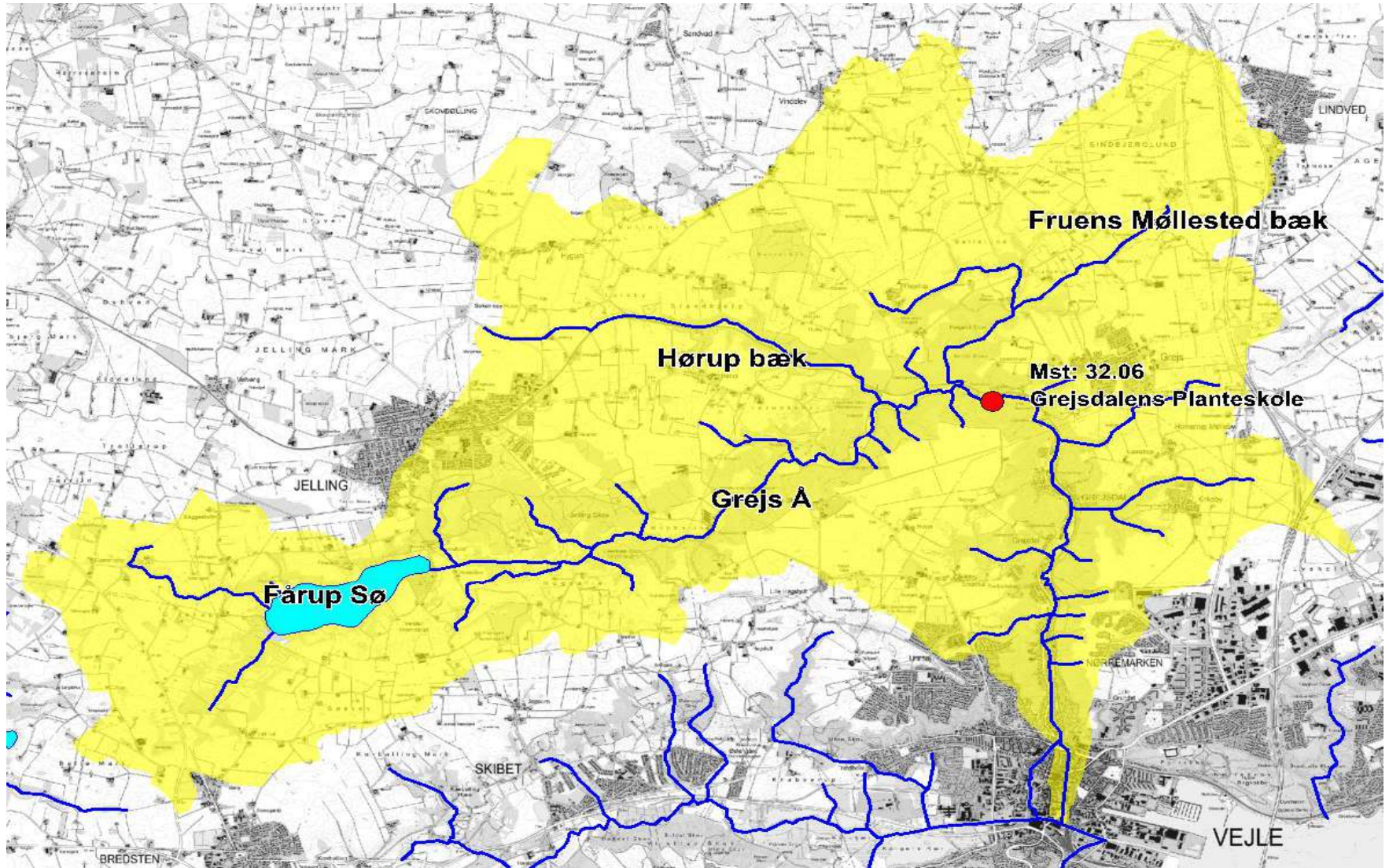
In Vejle city and along the coastline it is important to keep the water at a distance. We are investigating how to develop Vejle in a way where we create good urban spaces, that simultaneously work as flood protection. We can do that in many different ways and with different levels of protection.

## Resiliens project Fjordbyen

# Local delay of water



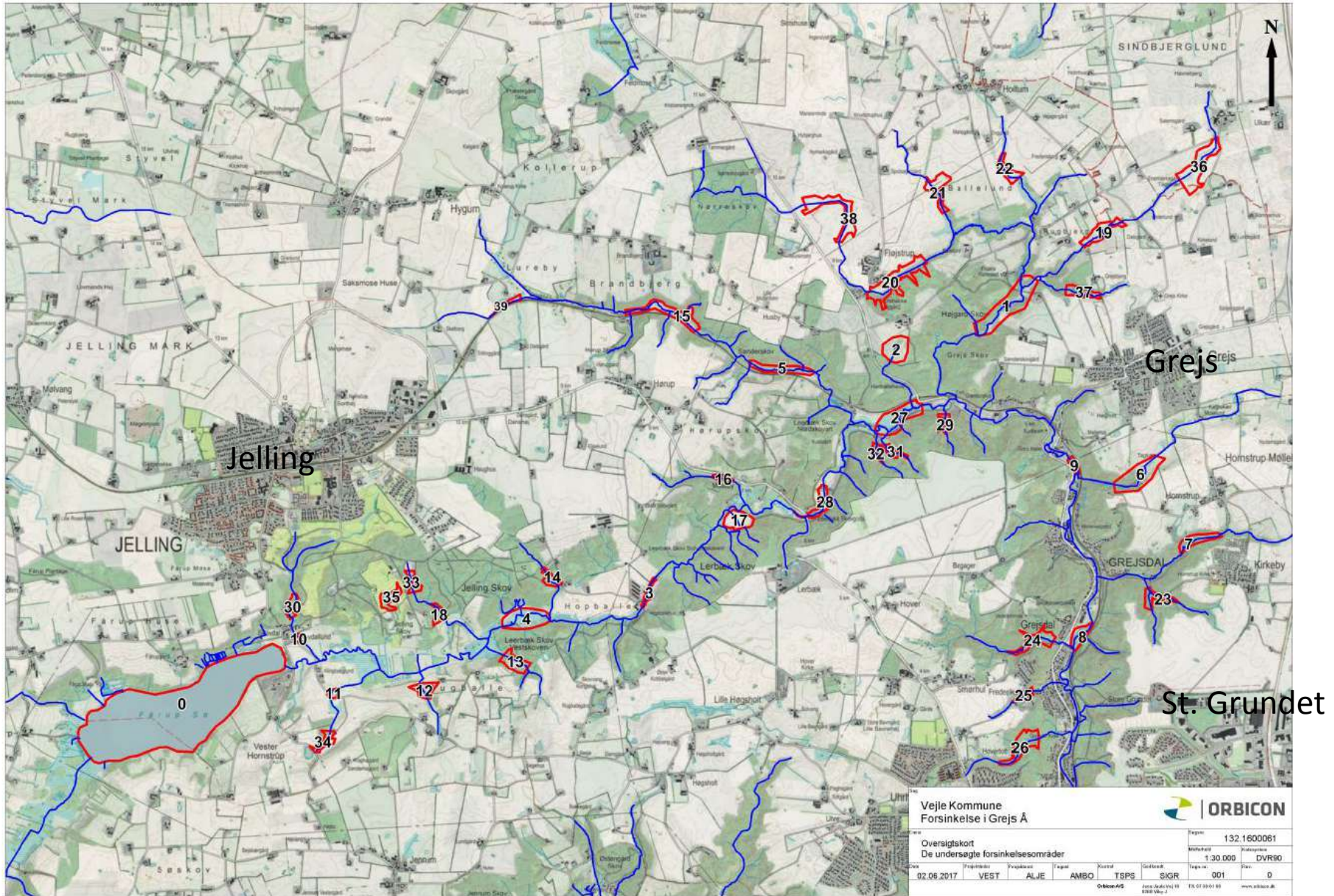
# Catchment Grejs Å's – 81 Km<sup>2</sup>



# Geographically Grejs Valley



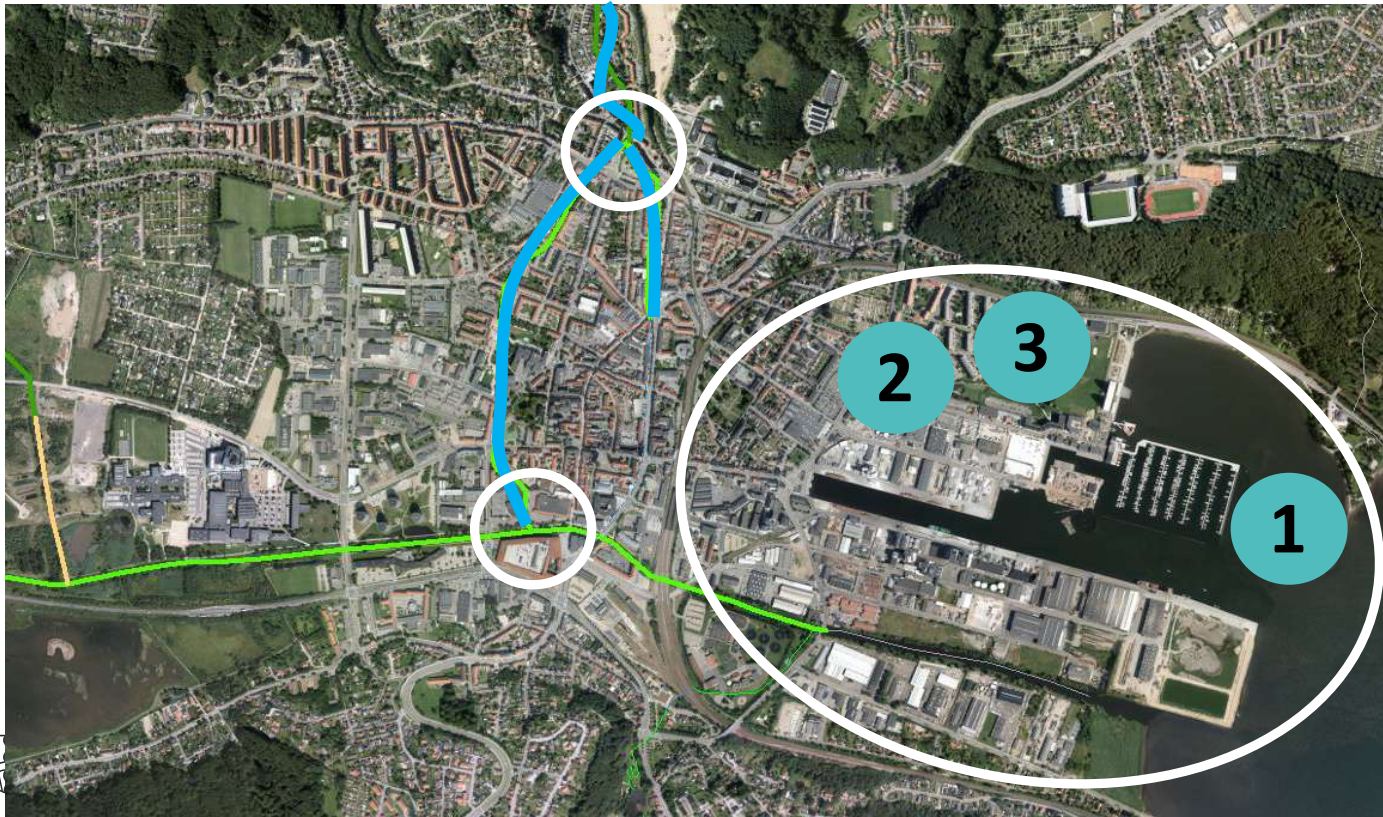
# Potential areas



# CLIMATE RESILIENCE

## “FJORDBYEN” – “The Fjord City”

- a laboratory for climate change adaptation and flood control to improve living with, and alongside water, to promote economic growth whilst simultaneously reducing flood risk.



### 3 climate efforts

- 1) Flood protection
- 2) Cloud bursts
- 3) Separate sewer system

# FJORDBYEN

Efforts:

1) Cloudburst and extreme rain

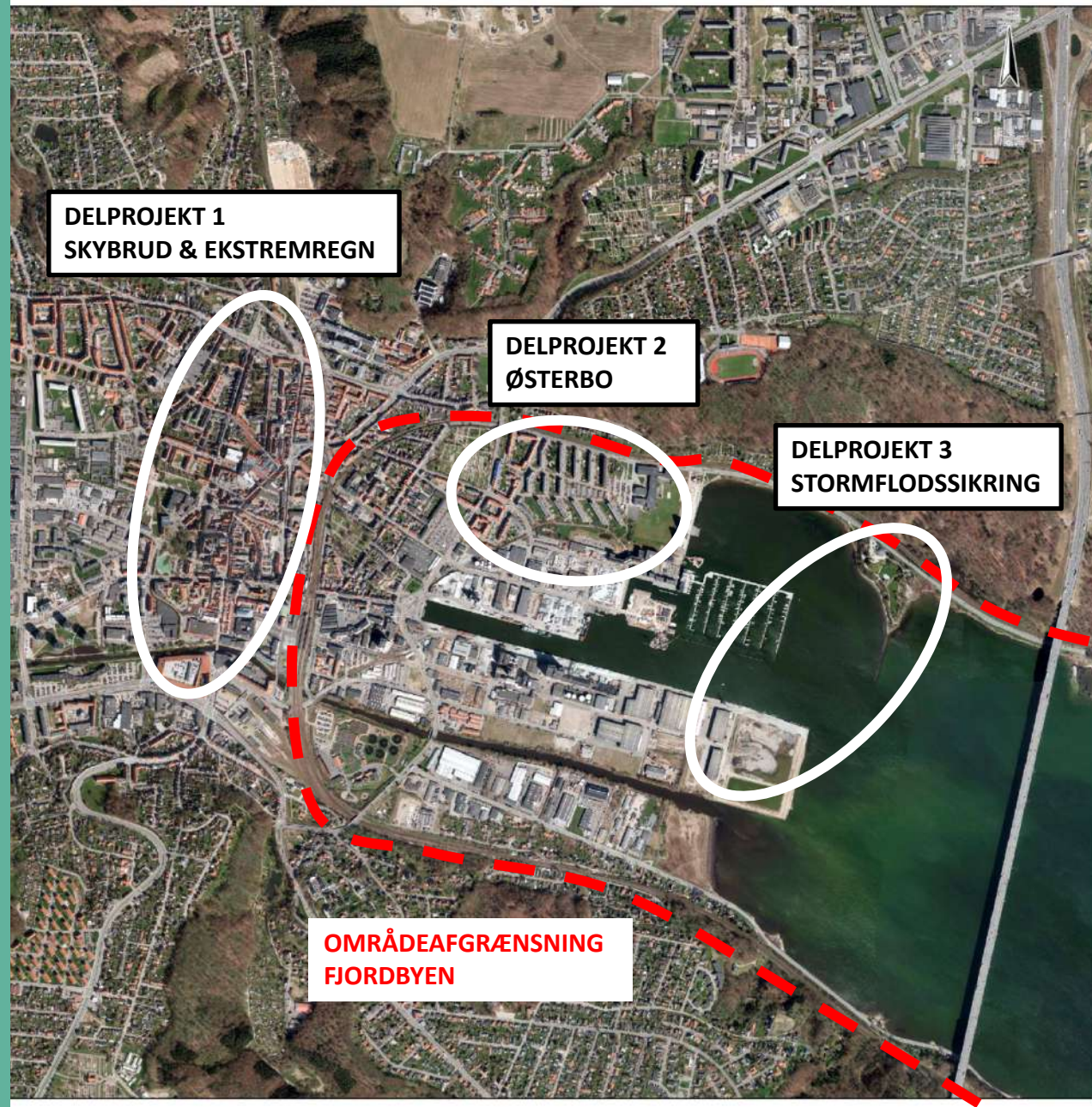
The water is delayed in Grejs Å and the surrounding area.  
Cloudburst Roads in Vejle

2) Østbykvarteret

The water is delayed from Uhrhøj and Horsensvej.  
Recreational rainbeds and waterways in the district

3) Flood Protection

Project development and study of best practice to keep the water at a distance



# CLIMATE RESILIENCE

## ”East City District”

Demonstration area with focus on:

- Management of the water
- A recreational value
- A sense of community
- Safety and security

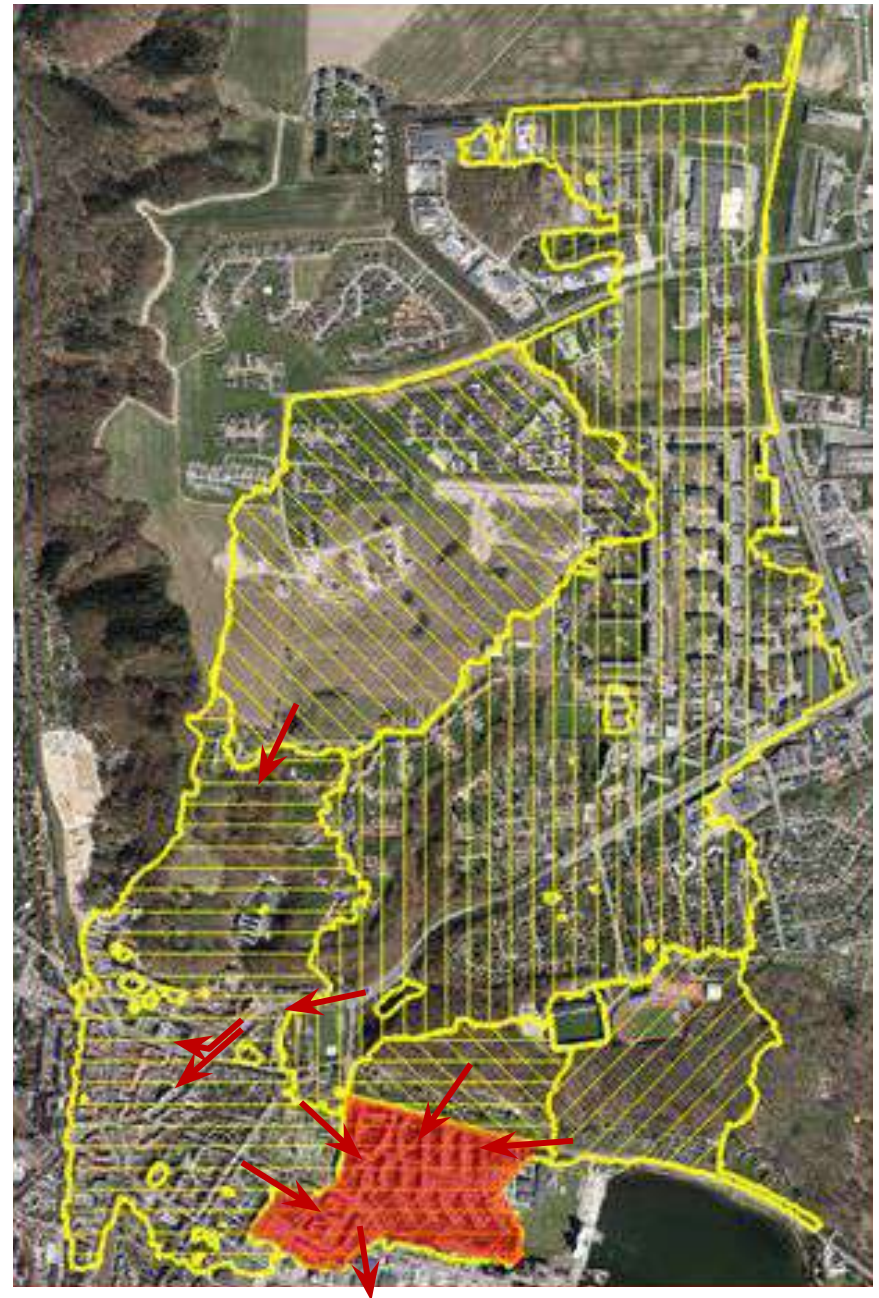


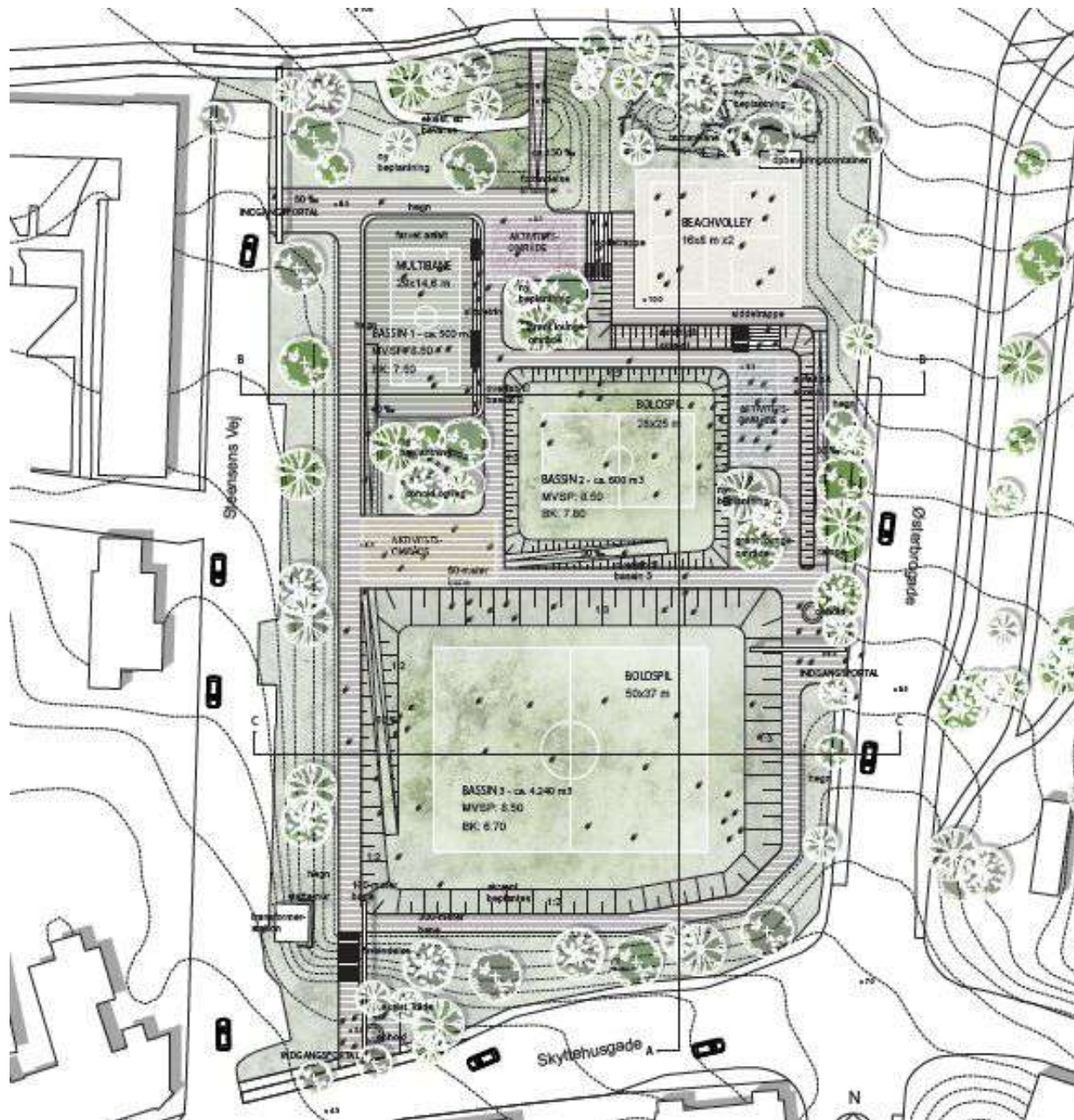
# The Catchment to the "East City District"



Number of residents in the area approx. 2000

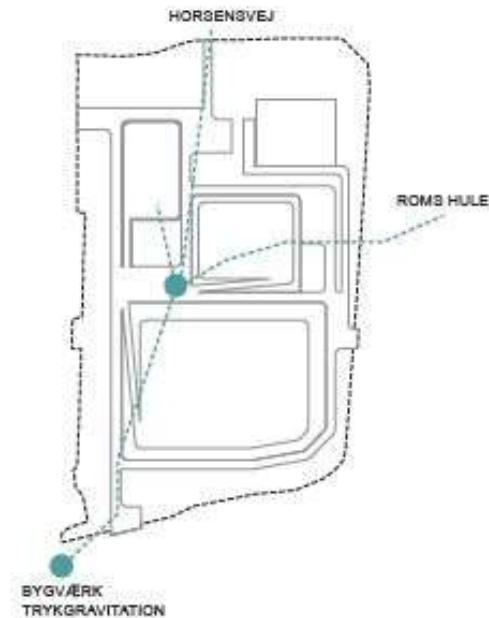
Number of users in the area  $\geq 2000$





# VISIONSPLAN

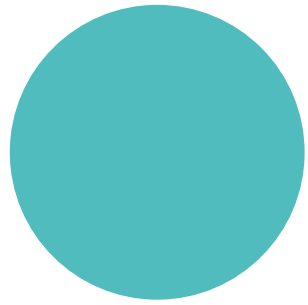
FRA BOLDBANE TIL  
ØSTBYENS PARK



# DEN GRØNNE KILE

## VISIONSPLAN

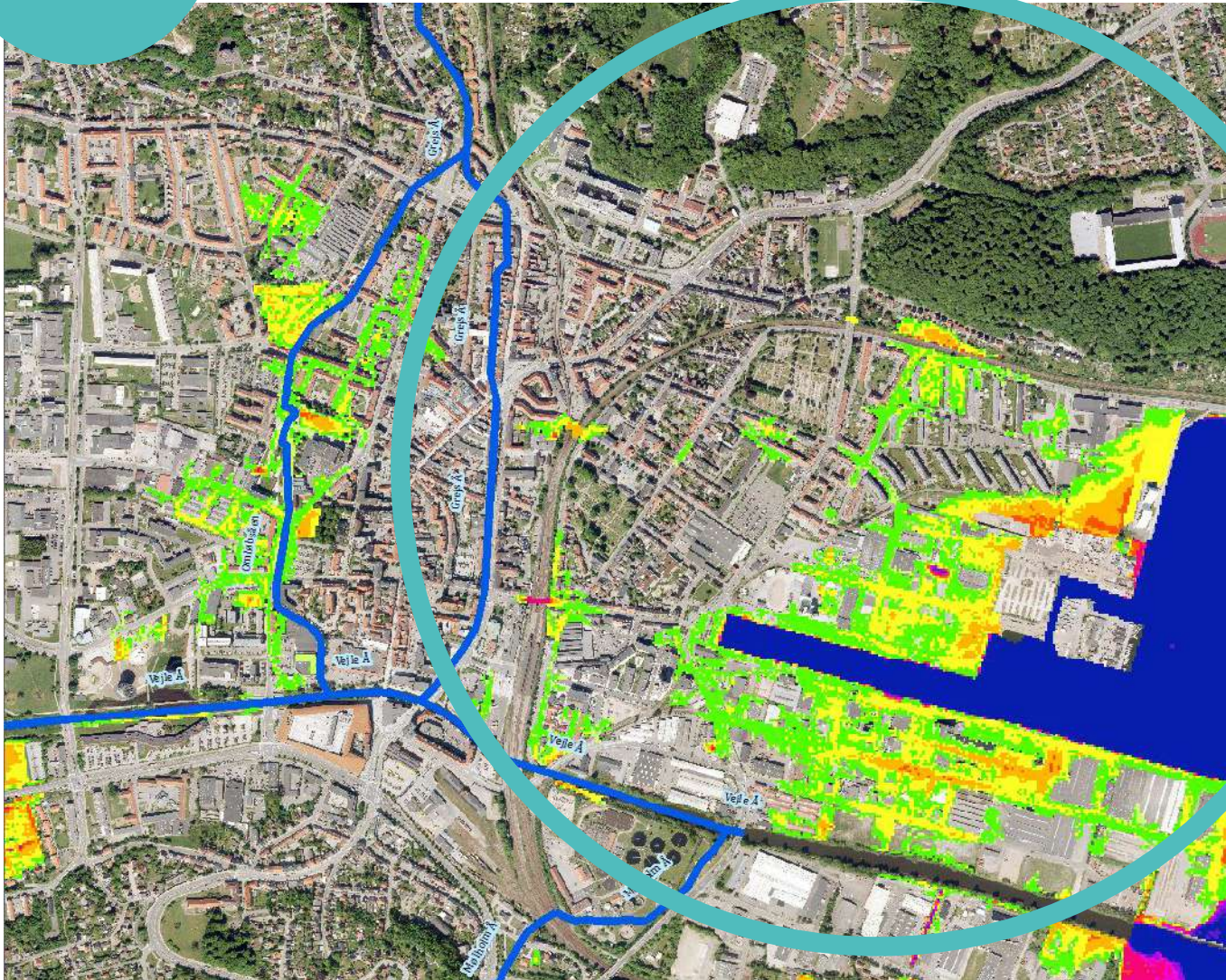




# CLIMATE RESILIENCE

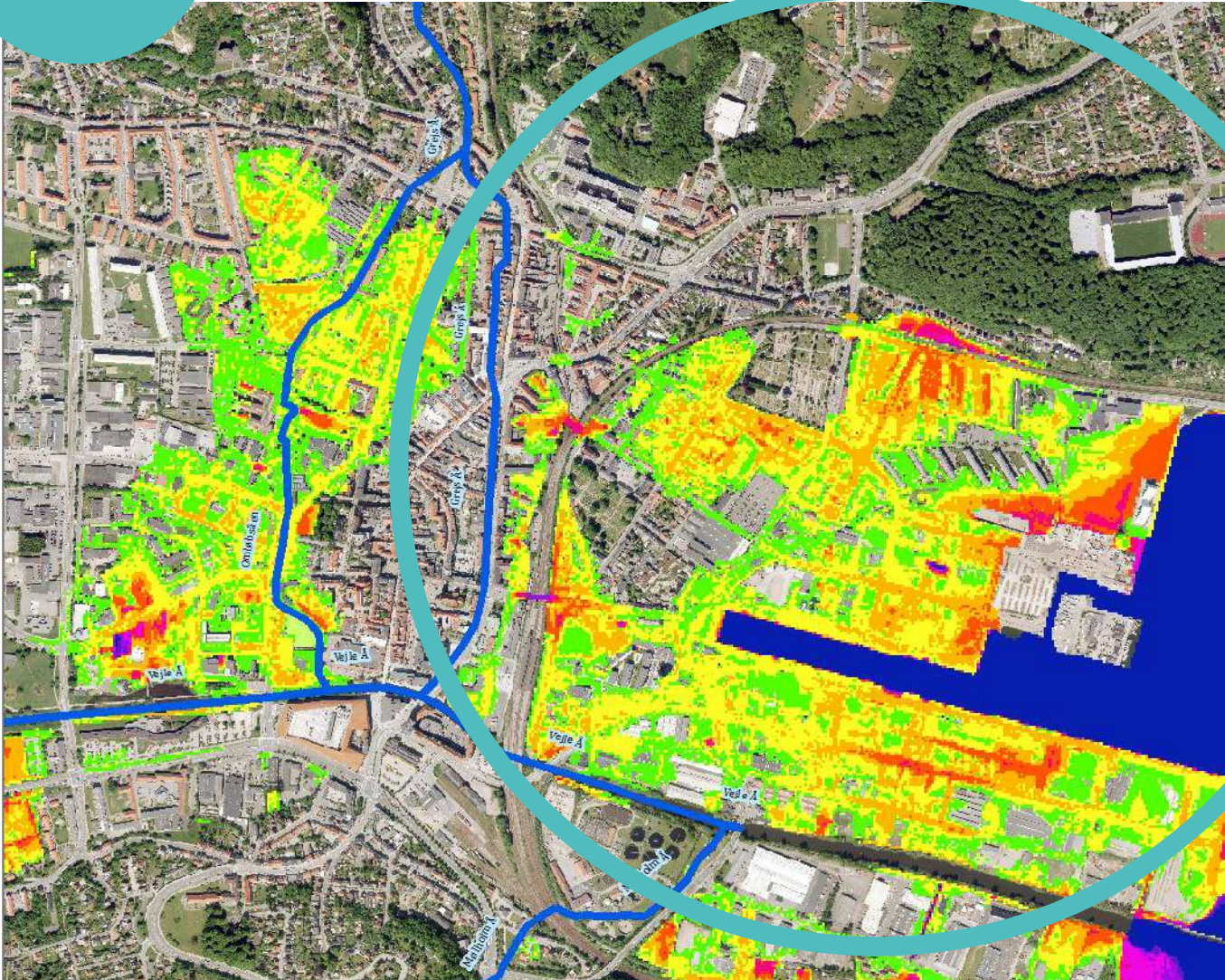
## FLOOD PROTECTION FROM THE FJORD

# STORM SURGE IN 2015 - a one in a 100 years incident. (High water level +175 CM)



**“FJORDBYEN”**  
Existing city area

# STORM SURGE IN 2050 - a one in a 100 years incident. (High water level +200 CM)

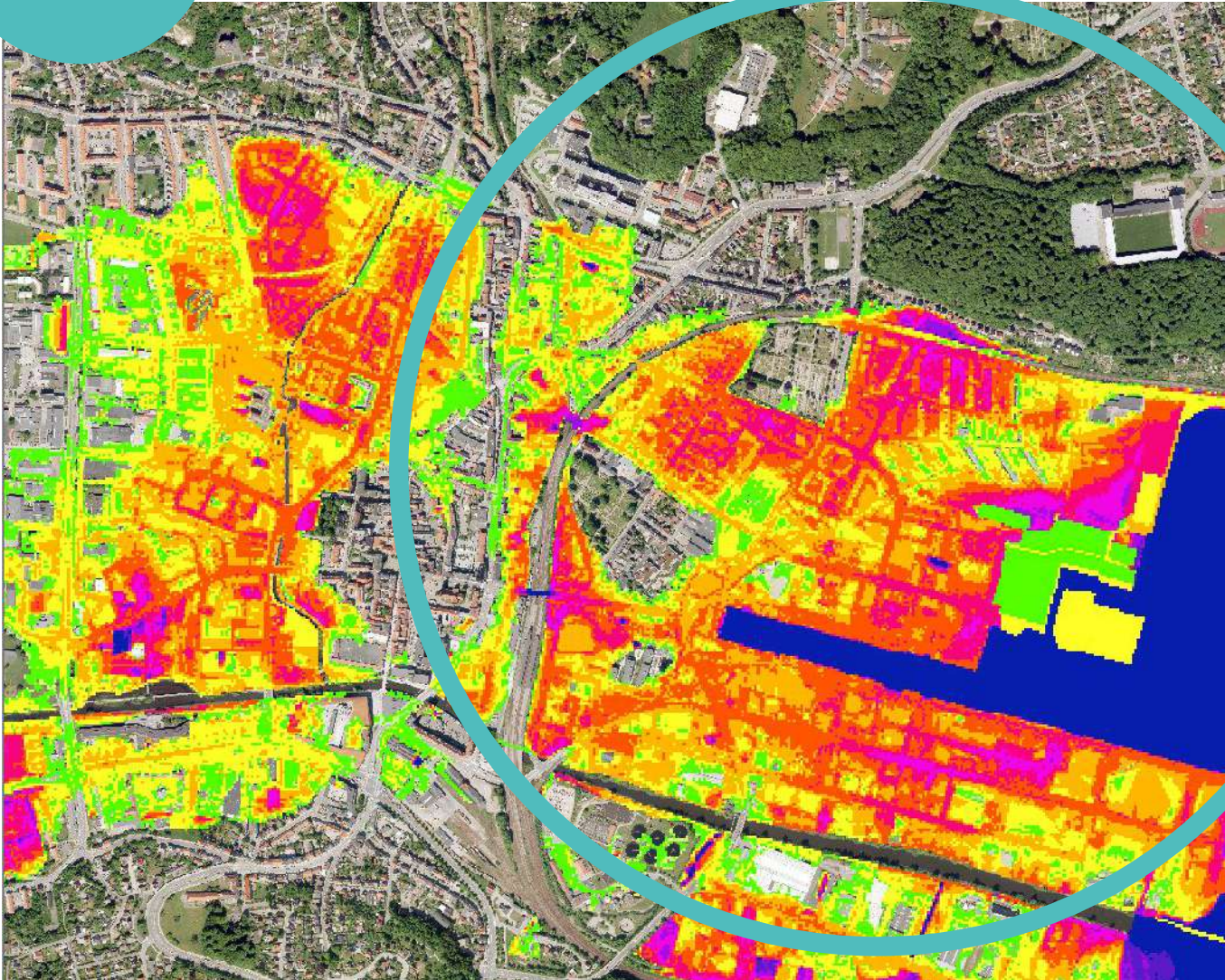


**“FJORDBYEN”**  
Existing city area

RESILIENT

VEJLE

**STORM SURGE IN 2100 - a one in a 100 years incident.  
(High water level +244 CM)**



**“FJORDBYEN”**  
Existing city area

# TRE SCENARIER

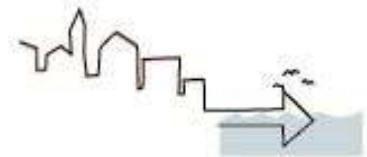
## 1. "MINIMAL LØSNING"



## 2. "KANALBYEN"



## 3. "DÆMNINGEN"



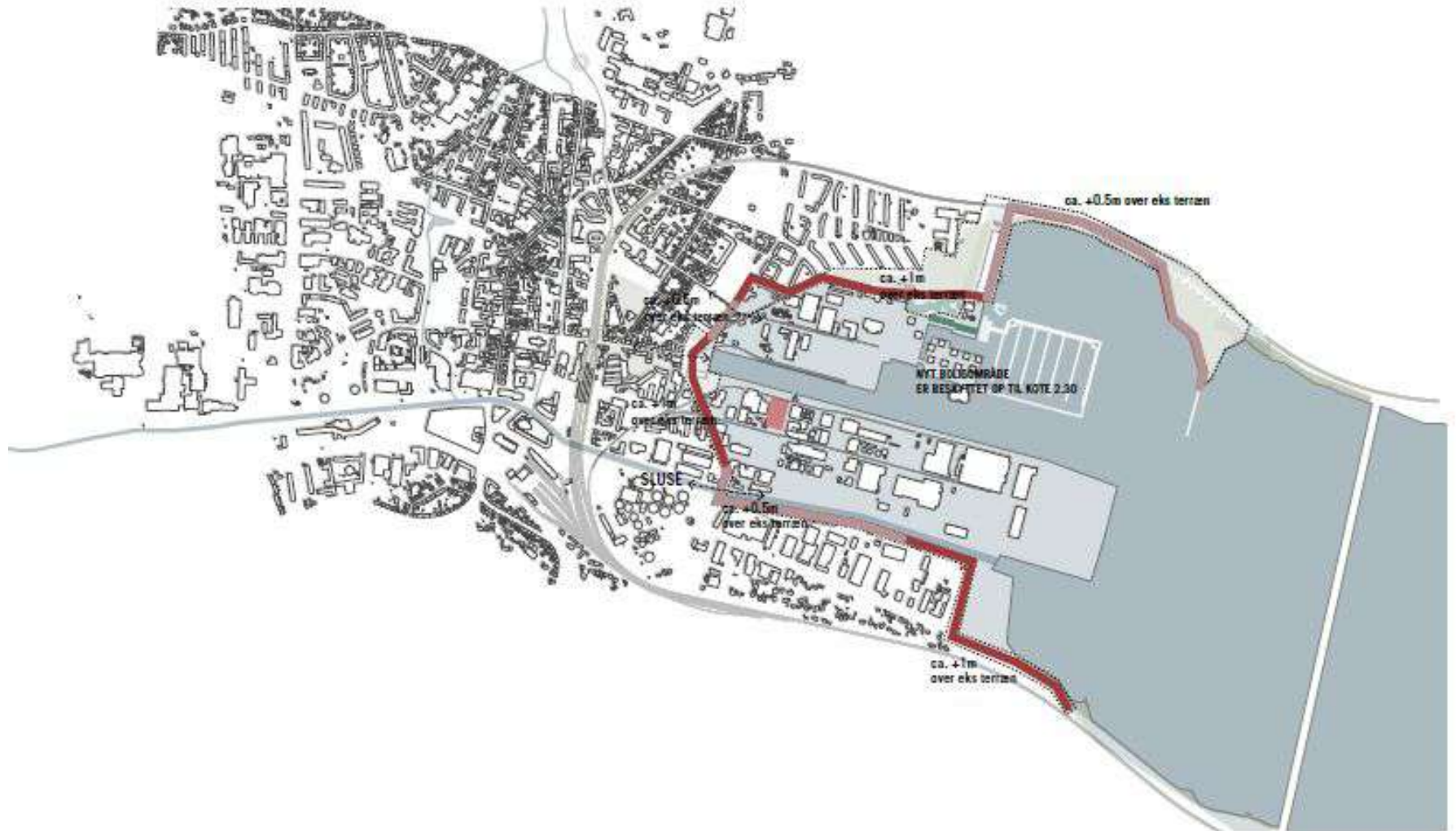




# Scenario 1

## SCENARIO 1

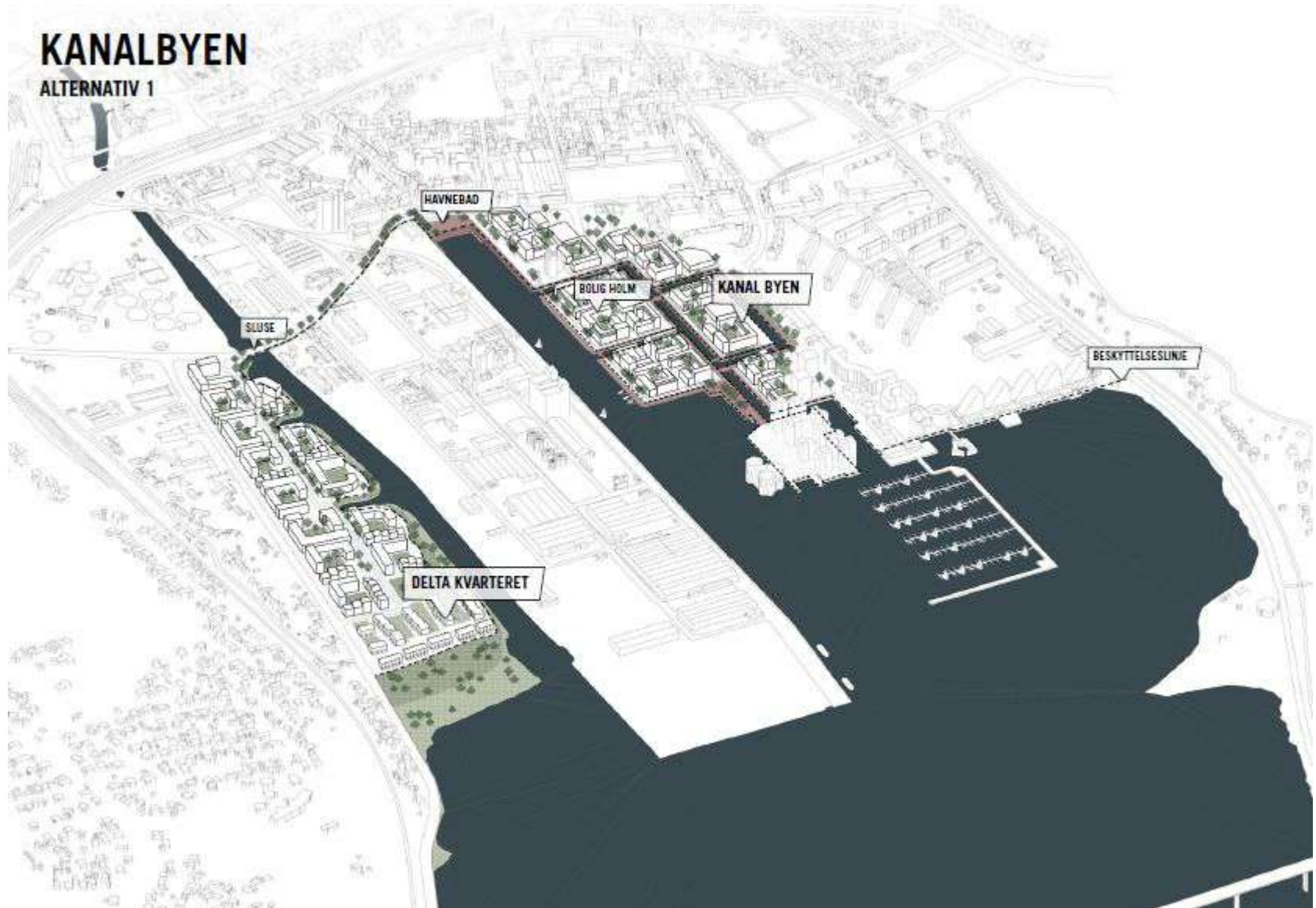
SIKRING VIA EKSISTERENDE INFRASTRUKTUR OP TIL KOTE 2.44



# BYRUMSMØBEL



# Scenario 2



# KAJKANT



# Scenario 3

## DÆMNINGEN

KYSTSIKRING SOM LANDSKABSMODNING



# REKREATIV DÆMNING

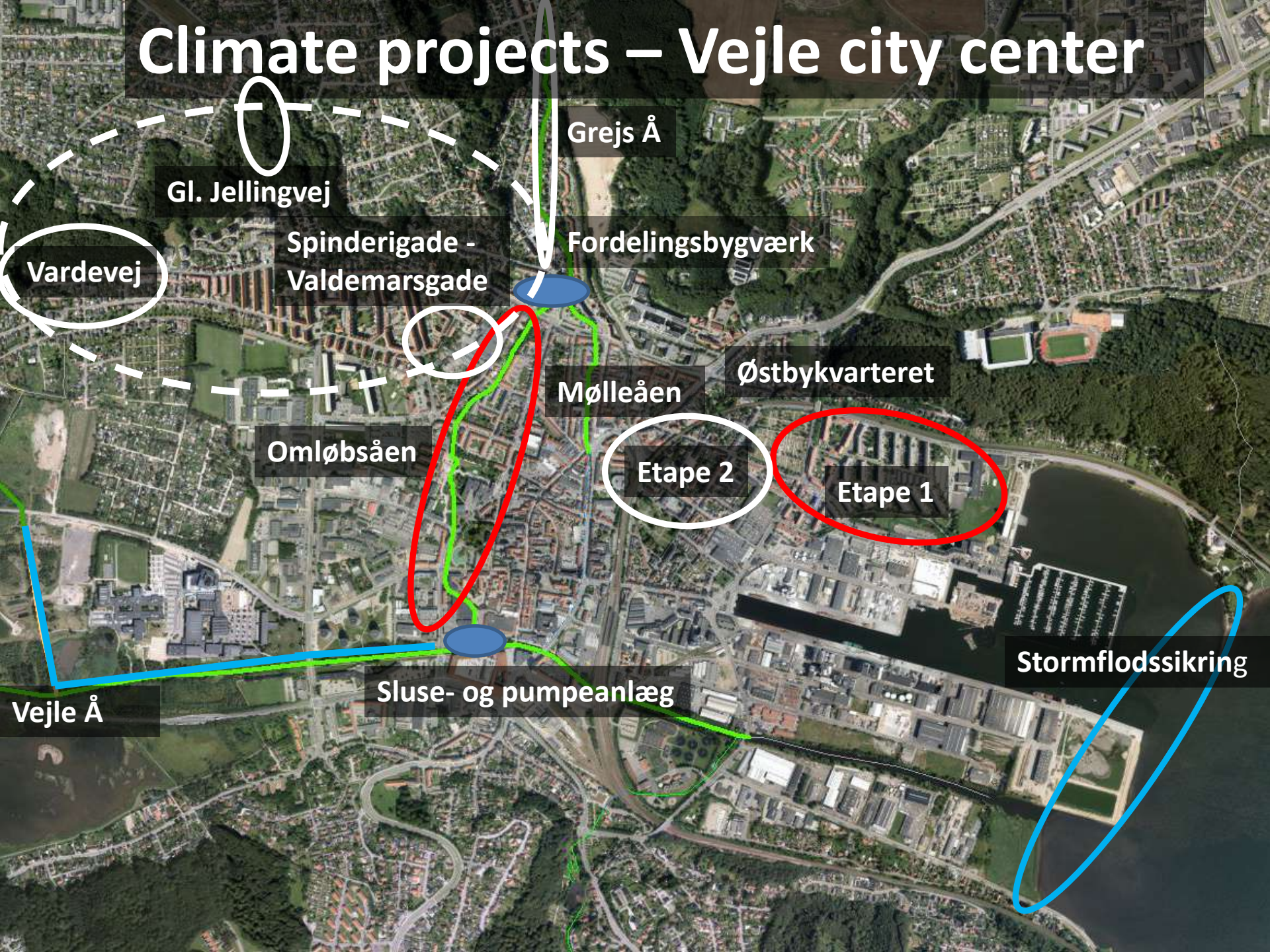


# REKREATIV DÆMNING





# Climate projects – Vejle city center



Gl. Jellingvej

Vardevej

Spinderigade -  
Valdemarsgade

Grejs Å

Fordelingsbygværk

Mølleåen

Østbykvarteret

Omløbsåen

Etape 2

Etape 1

Stormflodssikring

Sluse- og pumpeanlæg

Vejle Å



Thank You for Your Attention  
Questions?