

TAL TECH

INTEGRATED PLANNING SUPPORT SYSTEM EWL

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NOAH

 **Interreg**
Baltic Sea Region



EUROPEAN UNION
EUROPEAN
REGIONAL
DEVELOPMENT
FUND

KK
ENVIRONMENTAL INVESTMENT
CENTRE

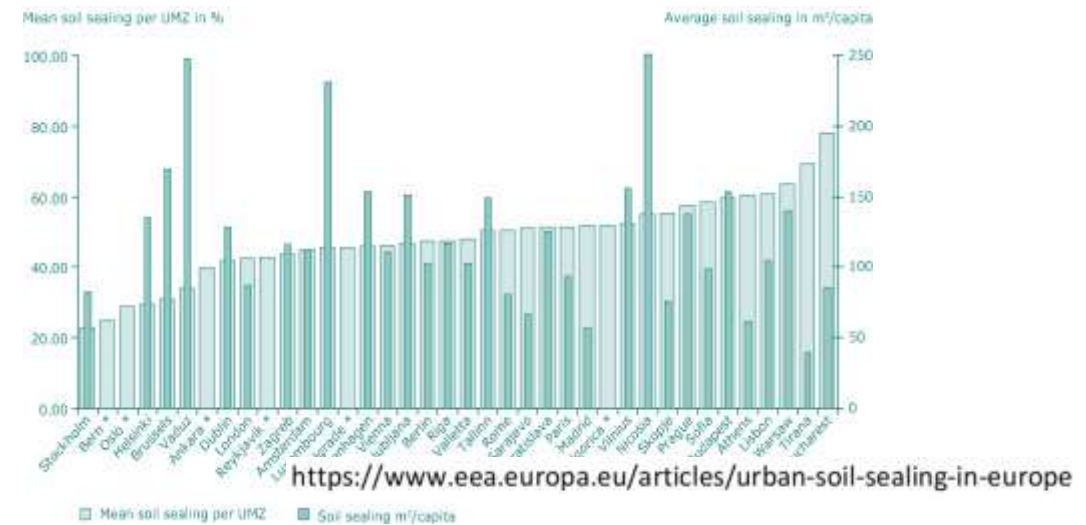
INTRODUCTION

- Background and motivation
- What is Integrated planning support system EWL?
- Examples of EWL
- Beyond the scope of EWL



GLOBAL PLAYERS

- Urbanization - densification
- Climate change
- Ageing infrastructure



Boreal region

- Increase in heavy precipitation events
- Decrease in snow, lake and river ice cover
- Increase in precipitation and river flows
- Increasing potential for forest growth and increasing risk of forest pests
- Increasing damage risk from winter storms
- Increase in crop yields
- Decrease in energy demand for heating
- Increase in hydropower potential
- Increase in summer tourism

Continental region

- Increase in heat extremes
- Decrease in summer precipitation
- Increasing risk of river floods
- Increasing risk of forest fires
- Decrease in economic value of forests
- Increase in energy demand for cooling

<https://www.eea.europa.eu/publications/urban-adaptation-in-europe>

CONSEQUENCES

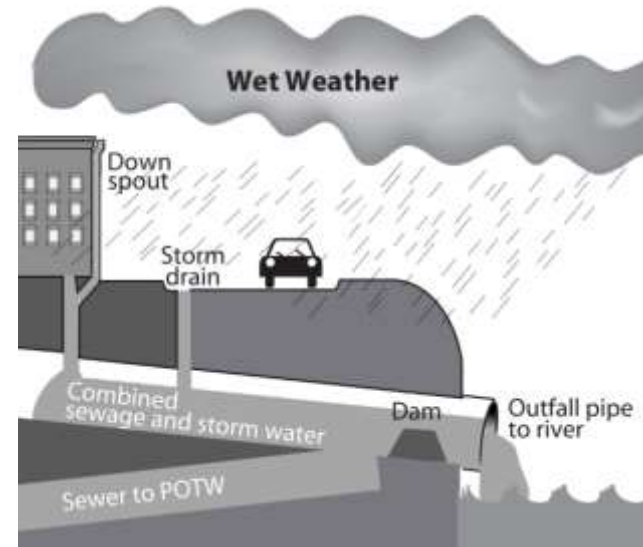
- Combined Sewer Overflows
 - 12% N_{tot}
 - 24% P_{tot}
 - 64% Haz.Subs (Copenhagen) COHIBA 2012
- Economic loss (M EUR / year):

HELCOM 2018



COHIBA 2012

Finland	83
Sweden	440
Denmark	50
Germany	2000
Poland	650
Estonia	14
Latvia	83
Lithuania	36
Russia	3600
Total	6956



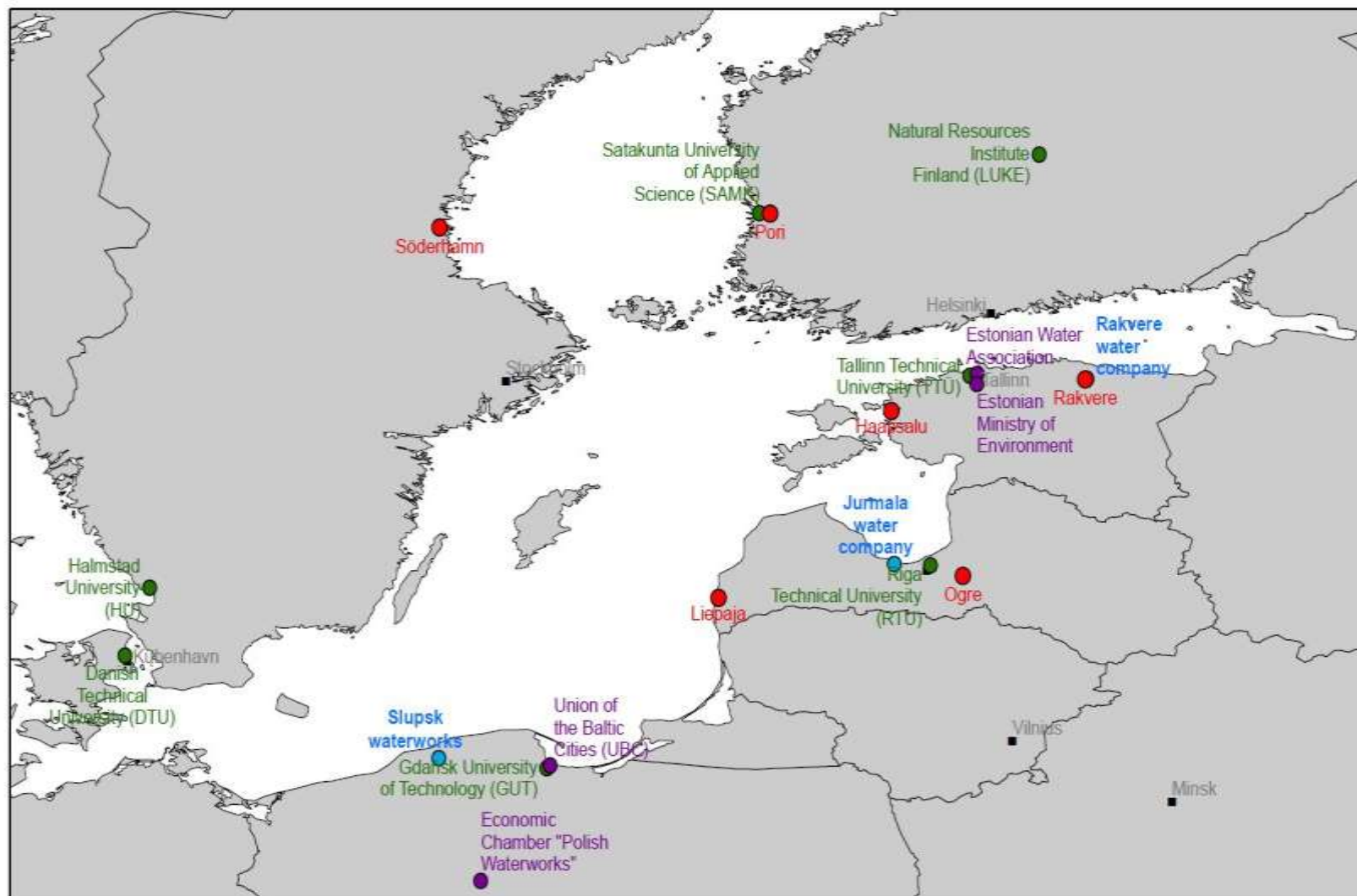
U.S. Environmental Protection Agency, 2004



NOAH PROJECT

- **Protecting Baltic Sea from untreated wastewater spillages during flood events in urban areas (NOAH)**
- Lead partner Tallinn University of Technology
- Project duration 01.2019 – 12.2021, budget ~3 M€
- 18 partners from six countries
- **Objectives of the project:**
 - Reduce the load of nutrients and hazardous substances to the Baltic Sea by enhancing capacity of public and private actors dealing with **land use and spatial planning**. **Result – development and implementation of an urban planning support tool.**
 - **Decrease spillages of untreated wastewater** from urban drainage network to the Baltic Sea by enhancing capacity of water utilities responsible for urban drainage system operation. **Result – implementation of smart urban drainage systems.**

NOAH PROJECT



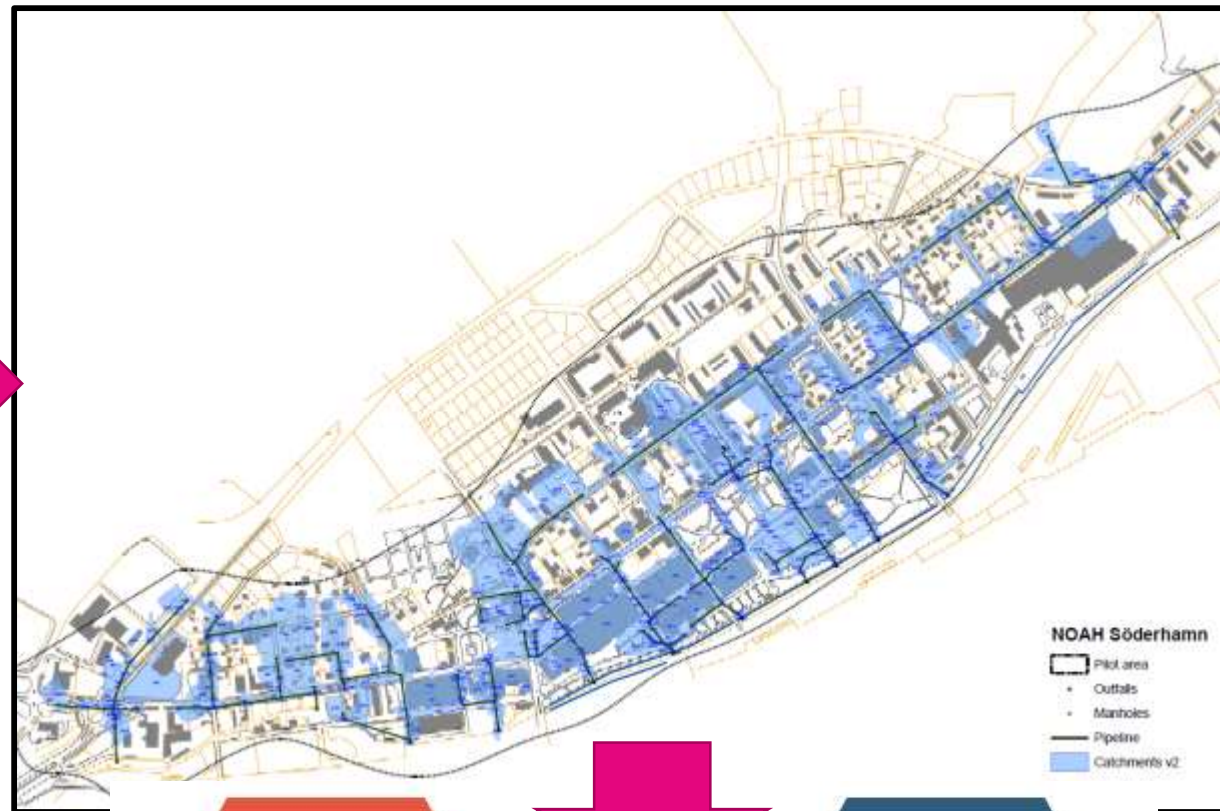
NOAH PARTNERS

- TOWNS
- WATER COMPANIES
- ORGANISATIONS AND POLICY MAKERS
- ACADEMIES



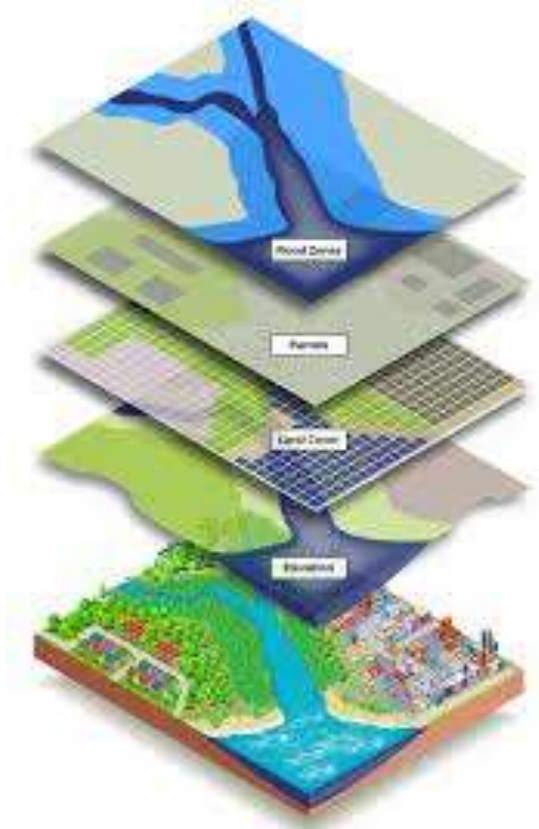
DEVELOPMENT FUND





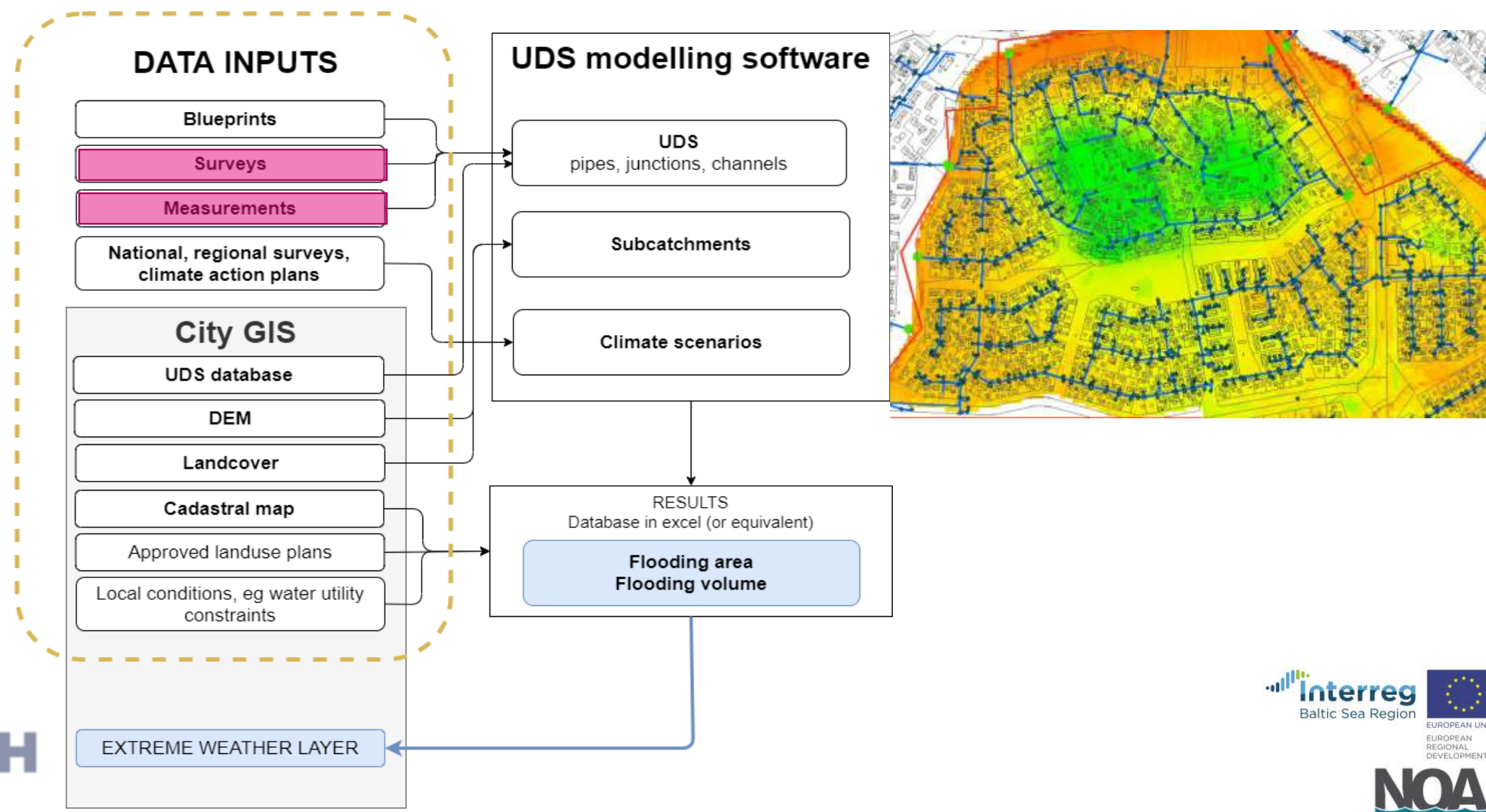
INTEGRATED PLANNING SUPPORT SYSTEM EWL

- **Reducing flood volume = reducing load** of nutrients and hazardous substances
- Develop a **planning support system** that enables to analyze the impact of future climate and development plans to the performance of the existing drainage system.
- **The tool enables:**
 - To assess today's risks
 - To consider **future scenarios**
 - To analyze the impact of the changes in the urban environment to the flood risk.
 - To analyze the impact of the mitigation measures to the flood risk.

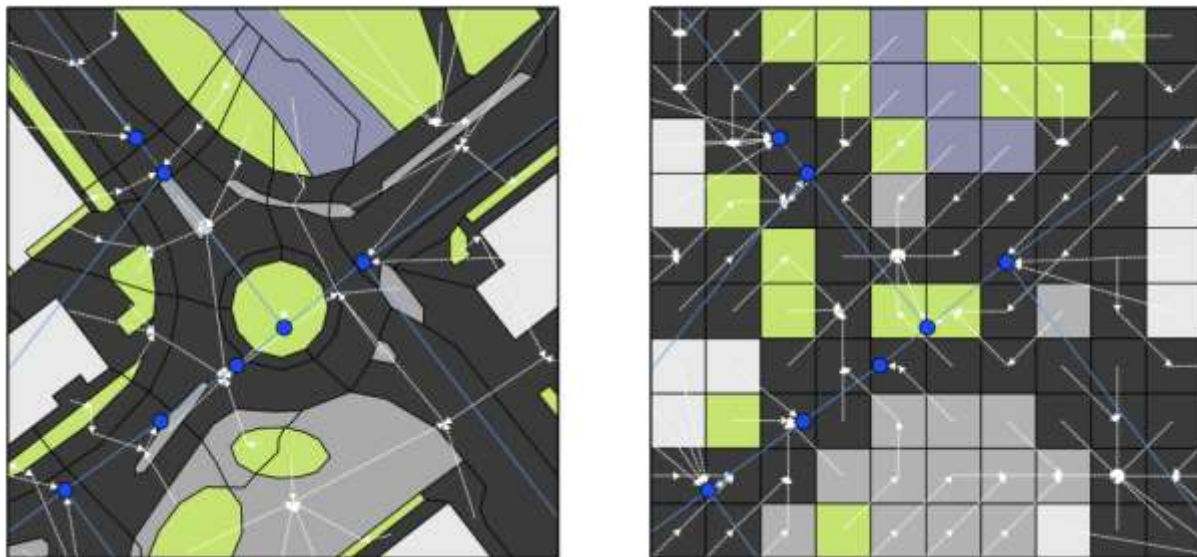


<https://coast.noaa.gov/digitalcoast/training/gi-mapping.html>

INTEGRATED PLANNING SUPPORT SYSTEM EWL

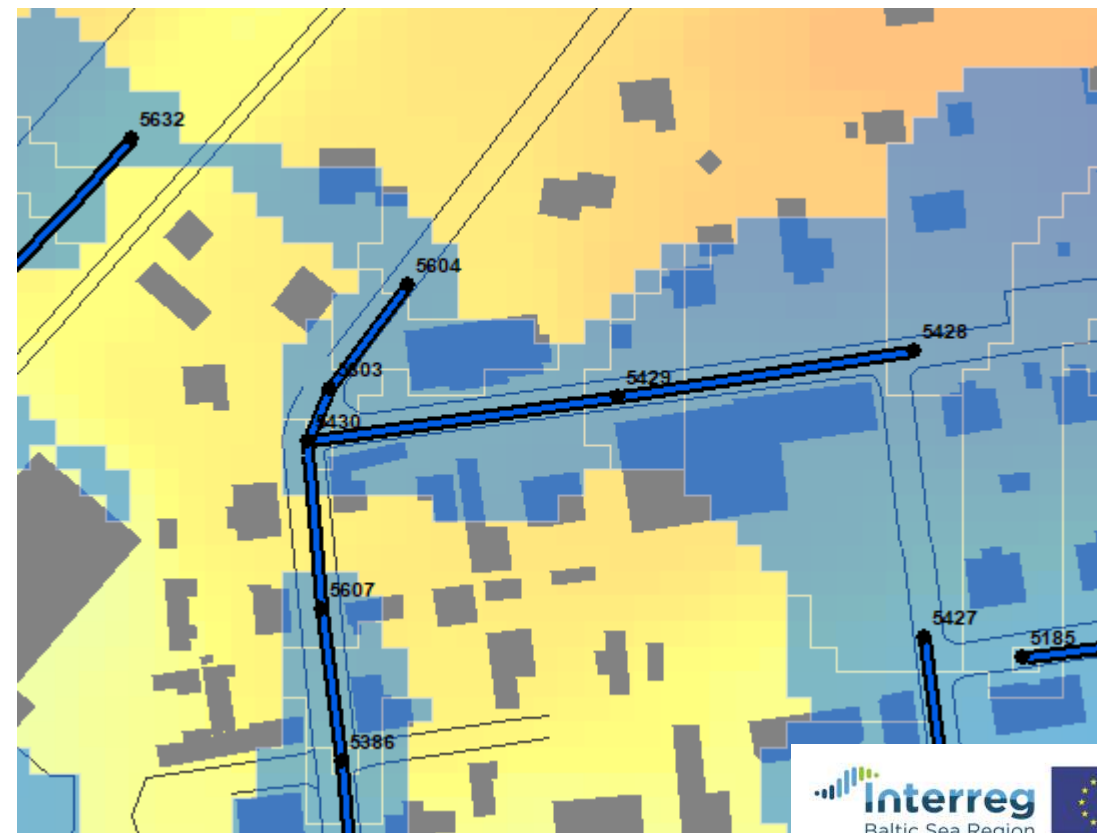


INTEGRATED PLANNING SUPPORT SYSTEM EWL

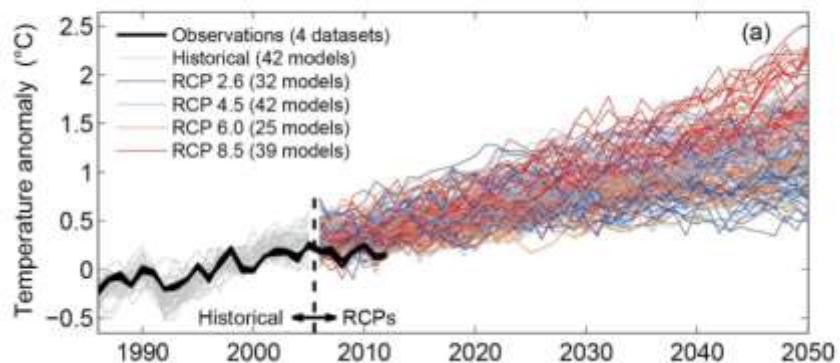


Warsta, L., Niemi, T.J., Taka, M., Krebs, G., Haahti, K., Koivusalo, H., & Kokkonen, T. (2017). Development and application of an automated subcatchment generator for SWMM using open data. *Urban Water Journal*, 14, 954–963.

RCP – Representative Concentration Pathway

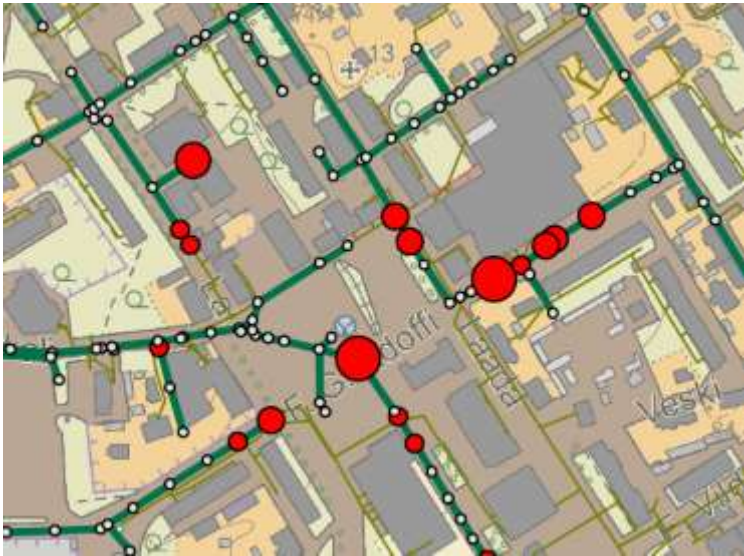


Global mean temperature near-term projections relative to 1986–2005



- NOAH project considered different **climate scenarios**:
 - Present situation (e.g. national design standards)
 - **Future climate scenarios (RCP4.5 ja RCP8.5)**
 - Local measured extremes

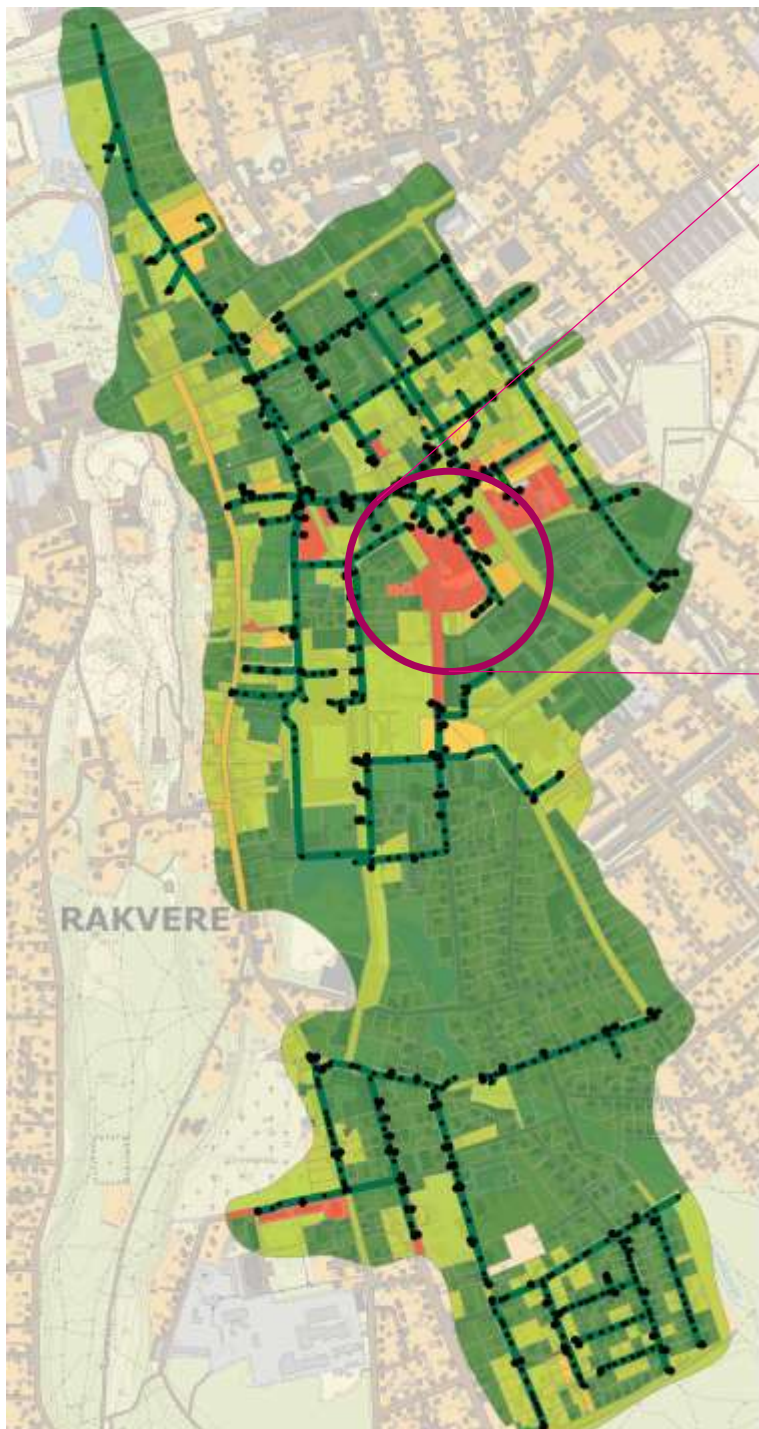
EWL – RANKING FLOOD PRONE AREAS



- **High risk level (3)**
- **Moderate risk level (2)**
- **Low risk level (1)**



EWL RESULTS - RAKVERE



Identify

Identify from: < Top-most layer >

ewl_plotview_rcp45
66301:005:0480

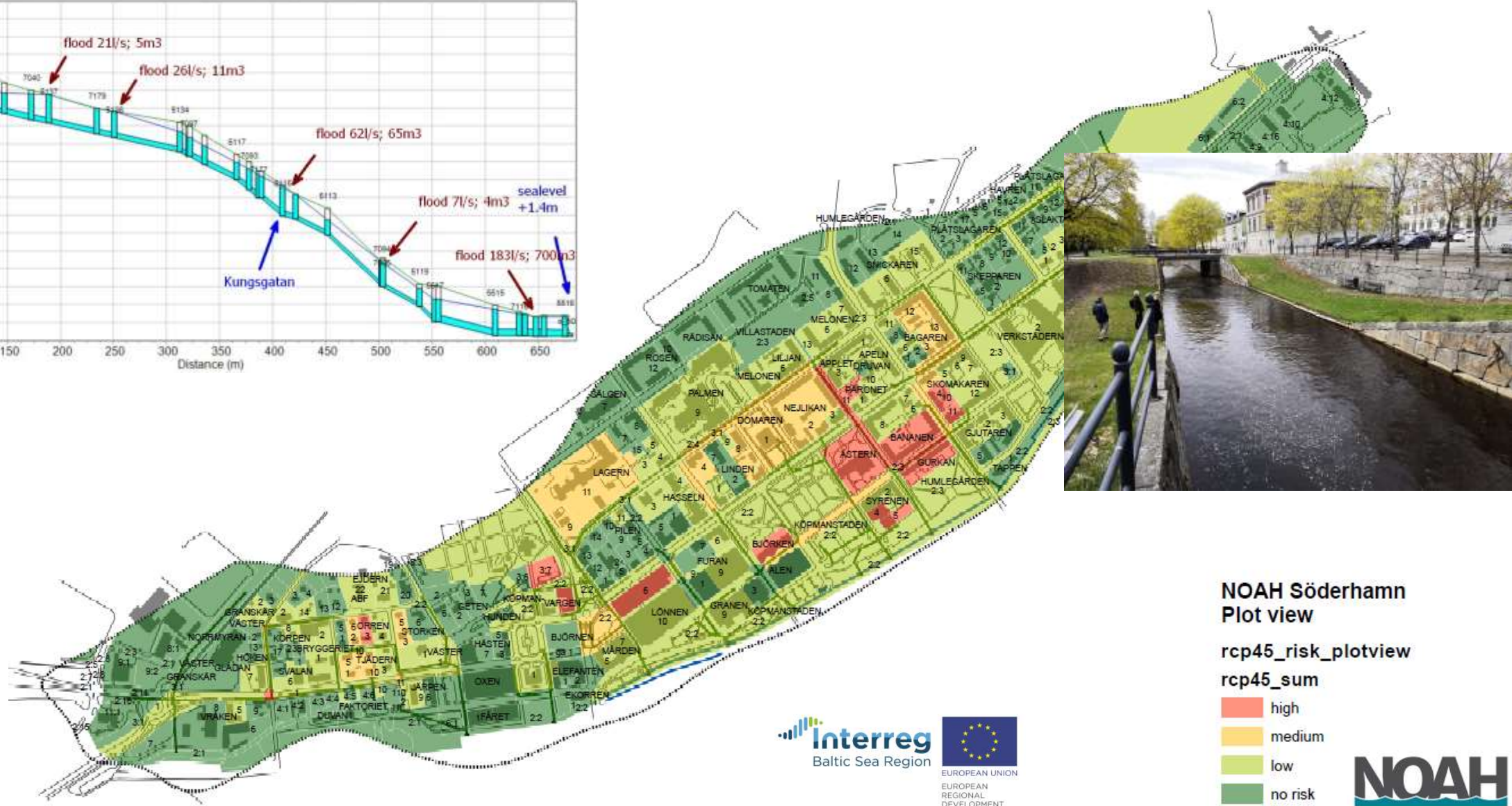
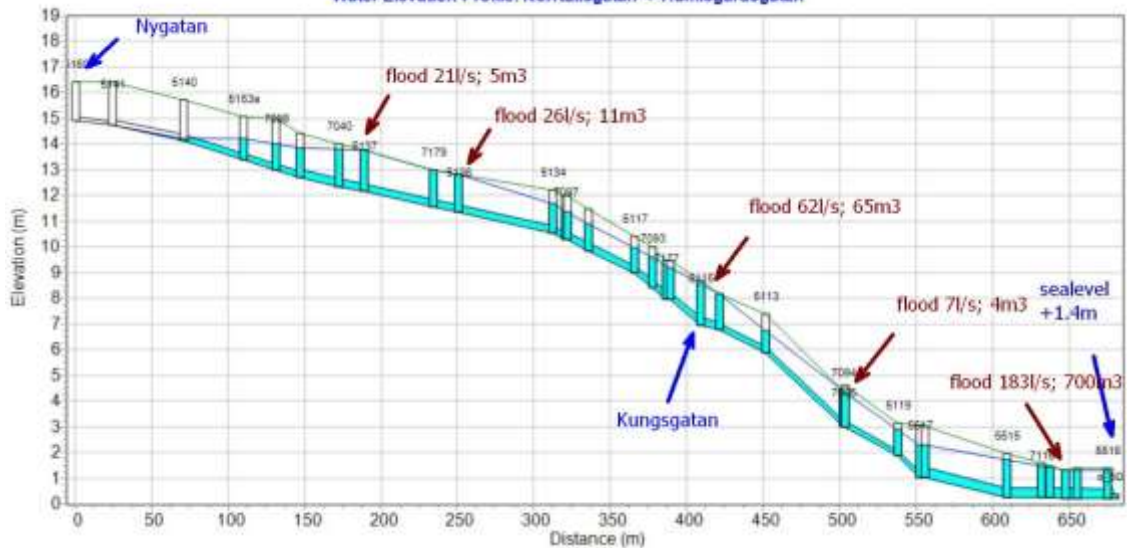
Location: 634 568.161 6 581 281.582 Meters

Field	Value
FID	258
Shape	Polygon
FID_esri_polygon	258
TUNNUS	66301:005:0480
HKOOD	0663
ME_NIME	Lääne-Viru maakond
OV_NIME	Rakvere linn
AY_NIME	Rakvere linn
L_AADRESS	Veski tn 5a
REGISTR	26.05.1999
MUUDET	22.12.2018
SIHT1	Ärmas
SIHT2	
SIHT3	
SO_PRTS1	100
SO_PRTS2	0
SO_PRTS3	0
PINDALA	852
RUUMPIND	852
REG_YHDK	M
HARITAV	0
ROHUMAA	0
METS	0
DLEMAA	0
MUUMAA	852
KINNISTU	4176331
MOOTVIIS	möödetatud, transformeeritud



EWL RESULTS - SÖDERHAMN

Water Elevation Profile: Norrtullsgatan -> Humlegårdsgatan



NOAH Söderhamn
Plot view

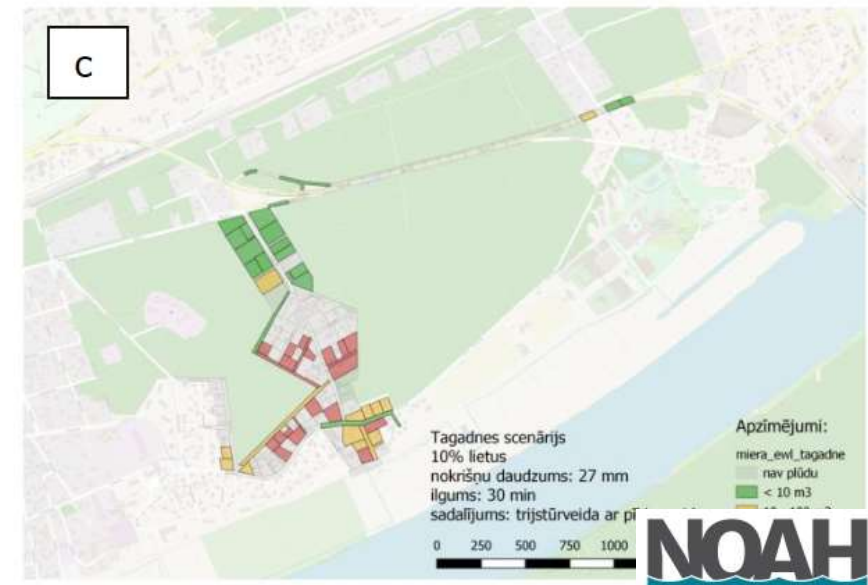
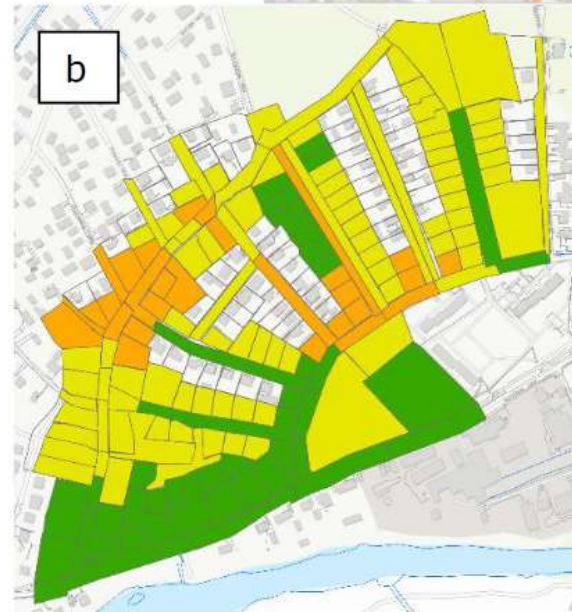
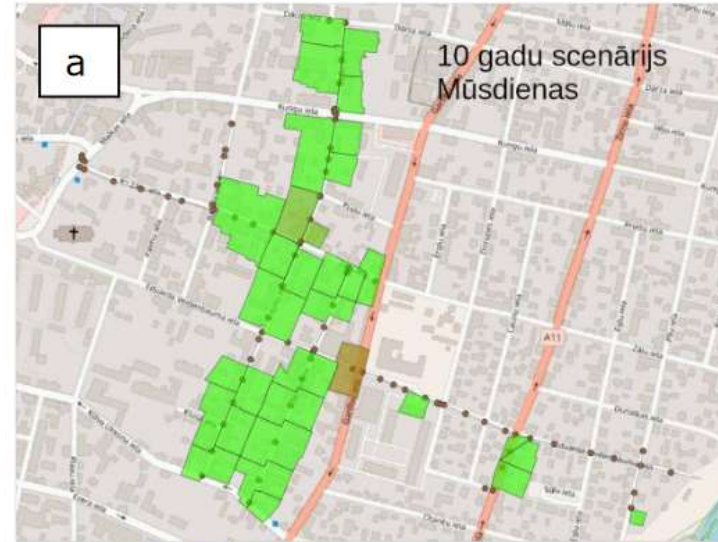
rcp45_risk_plotview
rcp45_sum

- high
- medium
- low
- no risk



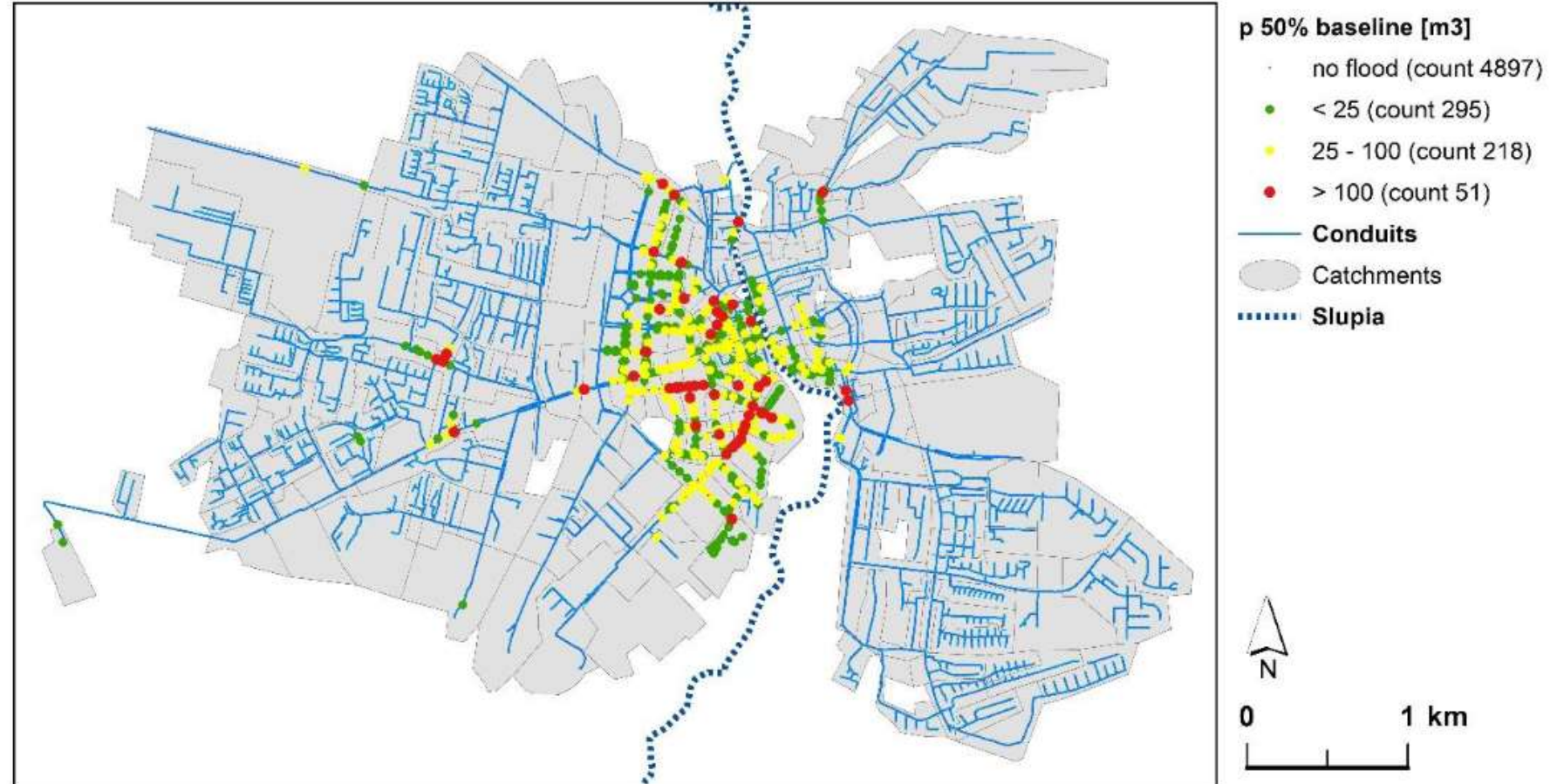
RESULTS – LIEPAJA (A), ORGE (B) JA JURMALA (C)

- Specificities:
 - Catchment = property
 - Risk classes are the same for all pilots

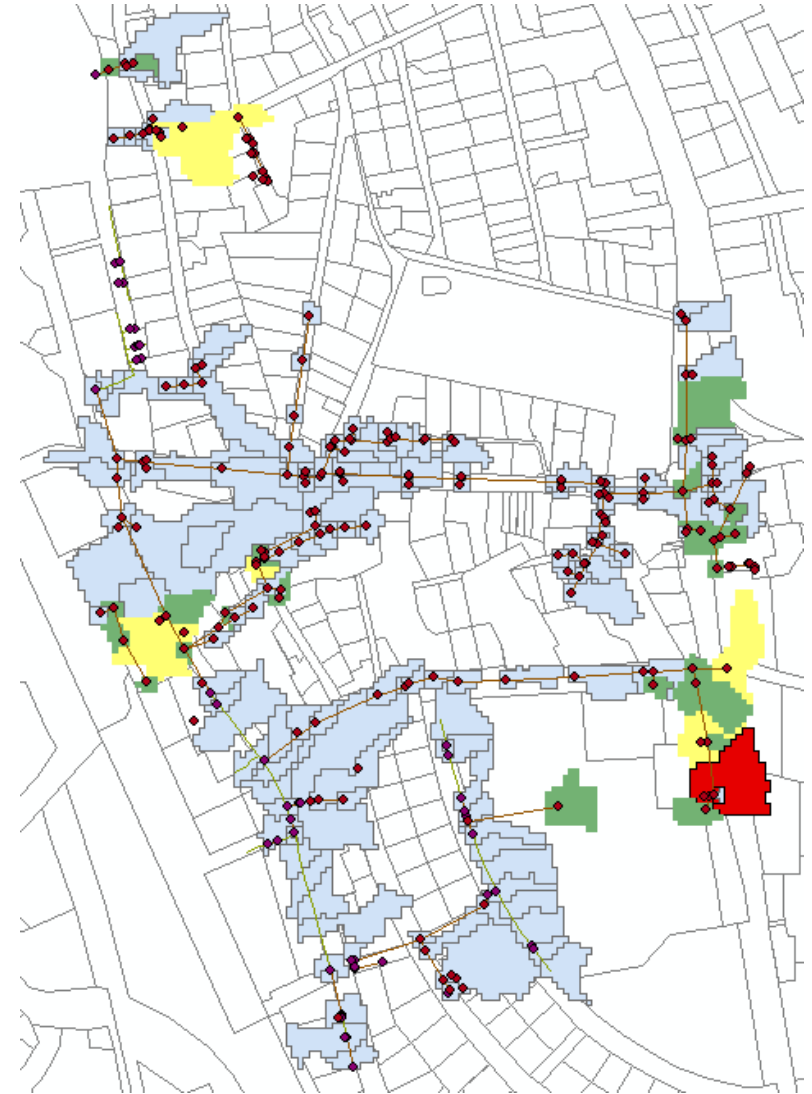


RESULTS - SLUPSK

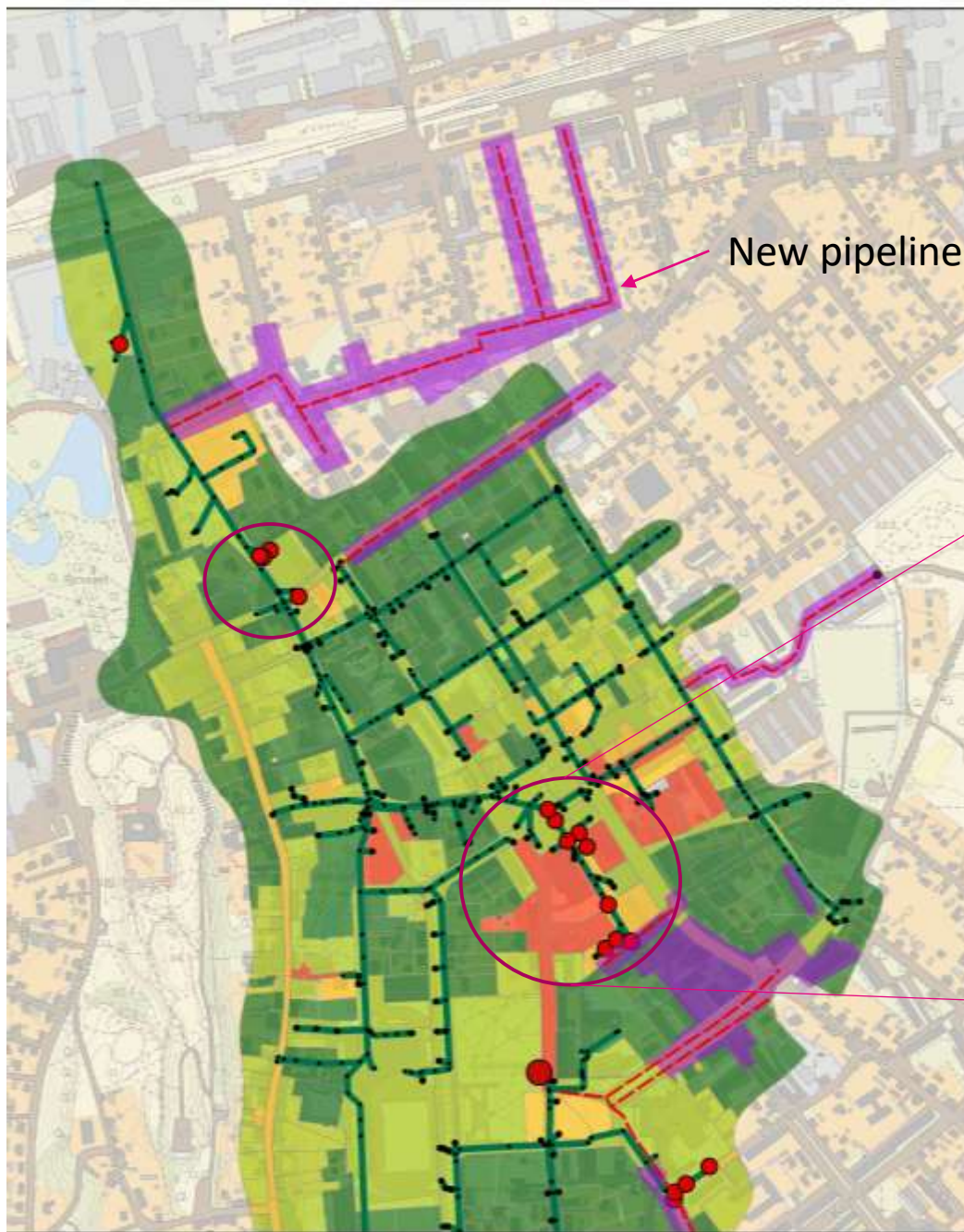
- Specificities:
 - Large catchments
 - Risks cannot be assessed on a manhole level
 - **Green**: $Q < 25 \text{ m}^3$
 - **Yellow**: $25 \text{ m}^3 \leq Q < 100 \text{ m}^3$
 - **Red**: $Q \geq 100 \text{ m}^3$



RESULTS – PORI AND HAAPSALU



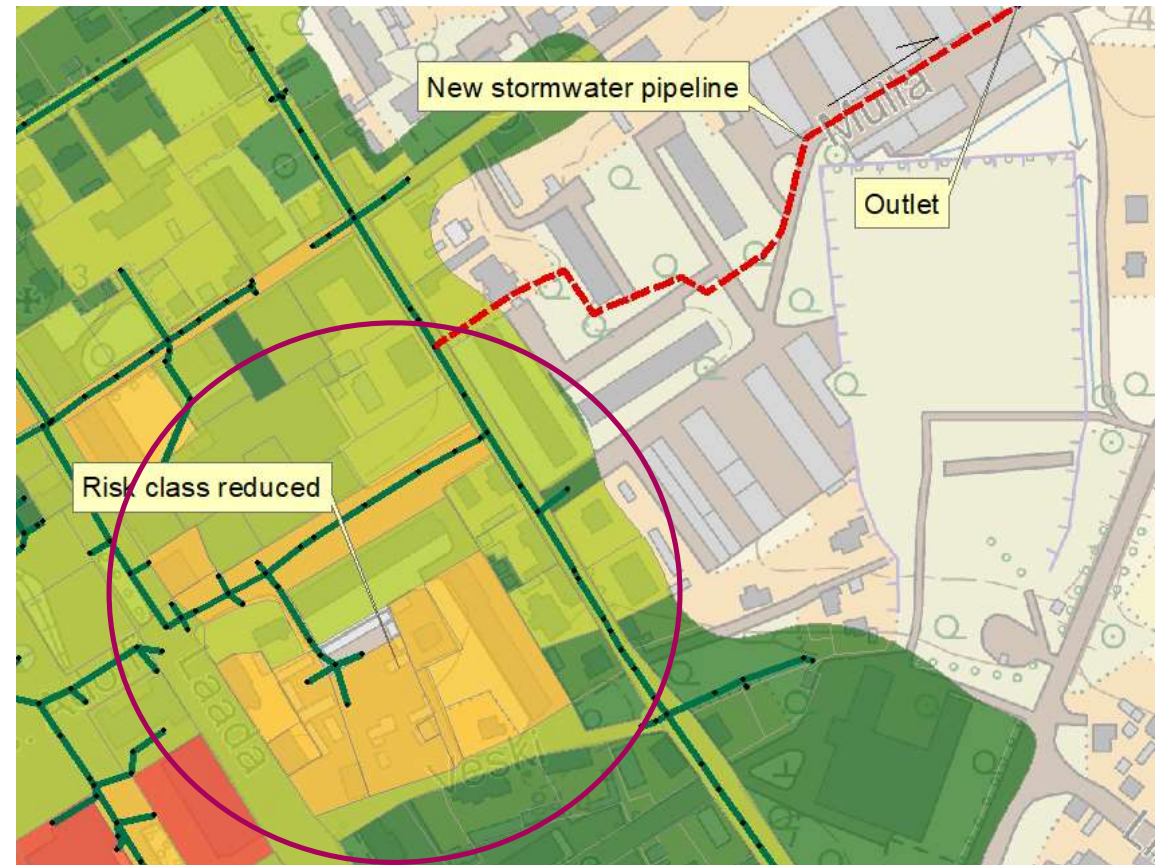
EWL AND FUTURE CATCHMENTS



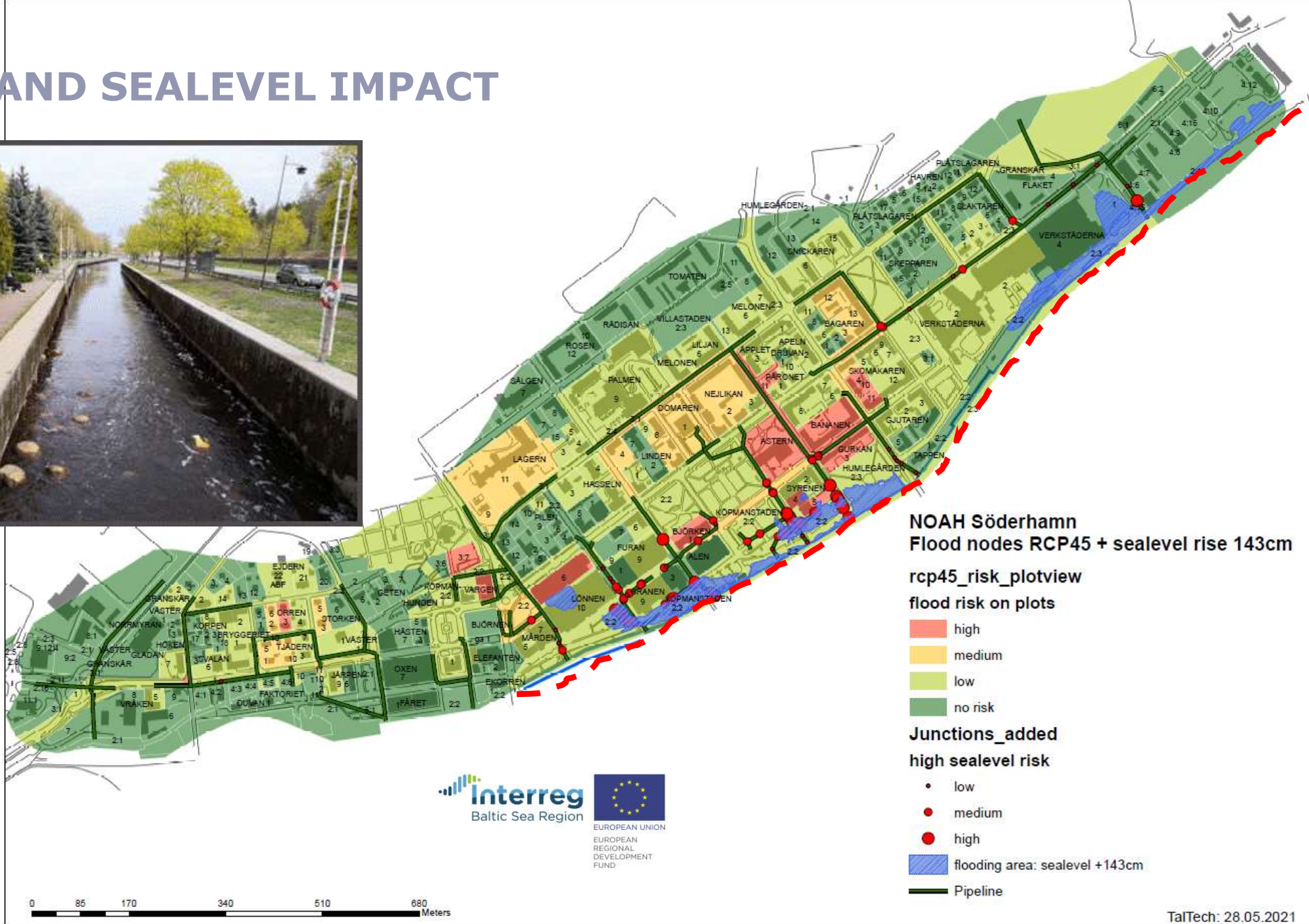
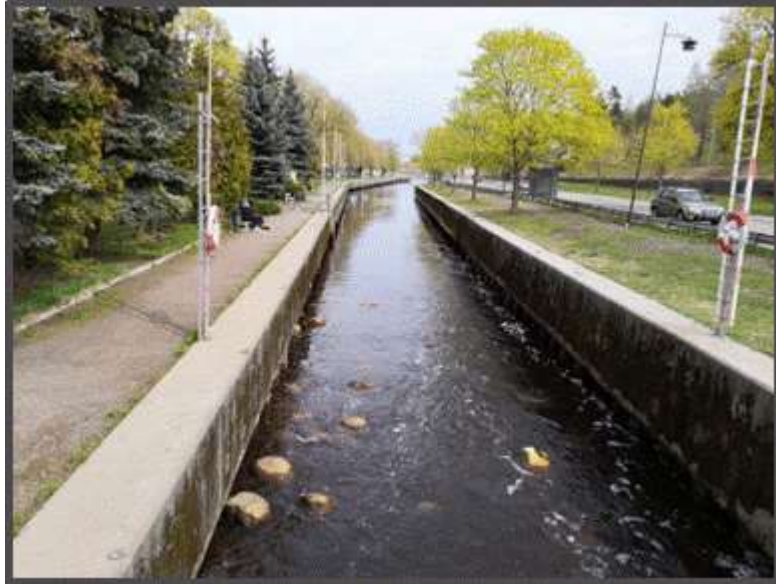
New pipeline & catchment



EWL AND STORMWATER PIPELINE PROJECTS



EWL AND SEALEVEL IMPACT

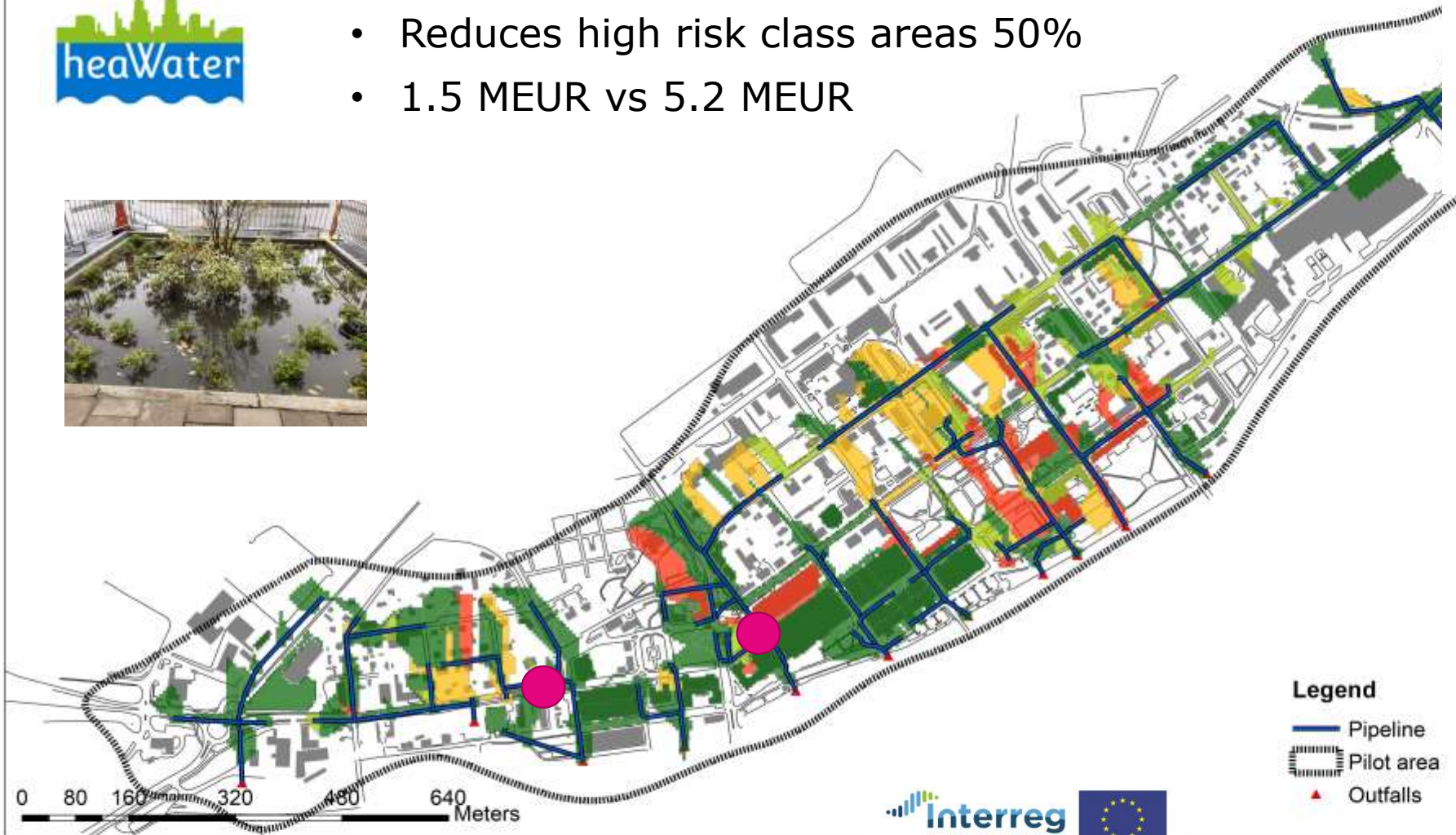


EWL AND LOW IMPACT DEVELOPMENTS

NOAH

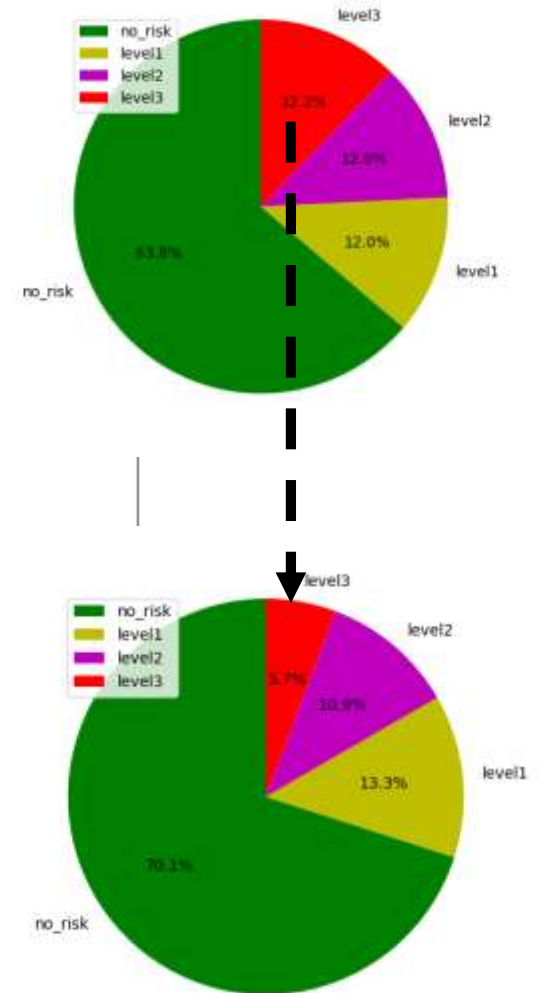
heaWater

- 37 catchments = raingardens
- Reduces high risk class areas 50%
- 1.5 MEUR vs 5.2 MEUR



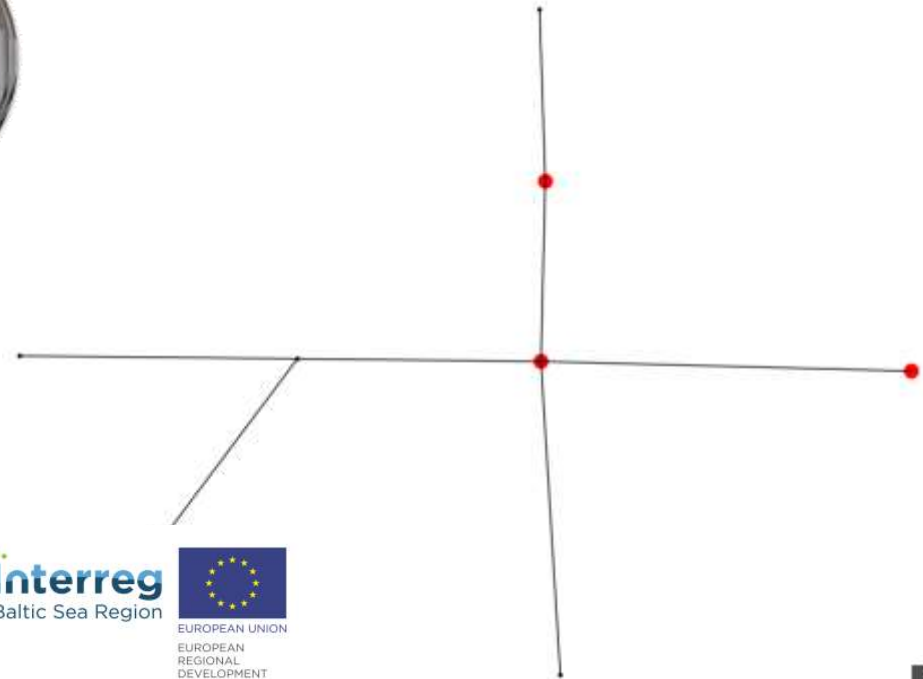
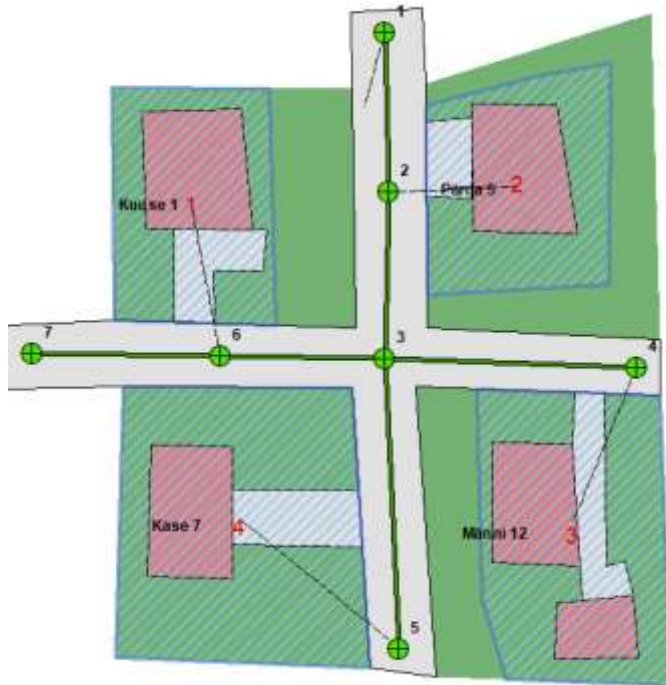
Legend

- Pipeline
- ▭ Pilot area
- ▲ Outfalls



WHAT NEXT?

Address	Area	Manhole	Current_%	Reserved_%	New_%	Additional_runoff_LPS	Info
Kuuse 1	10144	6	32	0	50	61	reduce runoff!
Pärna 5	10304	2	24	10	0	0	-
Männi 12	14244	4	31	10	60	137.9	reduce runoff!
Kase 7	17990	5	27	0	0	0	-



CONCLUSIONS

- EWL is implemented in **eight municipalities around the Baltic Sea**
- As a result of the combination of **passive** and active measures the discharge of the pollutants from urban areas during the **rainfall event will be reduced 50%**.
- See more: <https://sub.samk.fi/wp-content/uploads/2021/01/NOAH-O2.4-Report-on-pilot-implementation-of-Extreme-Weather-Layer.pdf>



THANK YOU!



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