NOAH

Protecting Baltic Sea from untreated wastewater spillages during flood events in urban areas

Riga Technical University
www.wrl.bf.rtu.lv/en
Facebook: Ūdens Pētniecības Laboratorija
janis.rubulis@rtu.lv
+37129438018

Jānis Rubulis
Dr.Sc.ing., asoc.prof.

Partners

Academies (EST, FIN, POL, SWE, LV, DEN)

PP 1 - Tallinn University of Technology
PP 2 - Satakunta University of Applied Sciences
PP 3 - Gdansk University of Technology
PP 7 - Natural Resources Institute Finland (Luke)
PP 10 - Halmstad University
PP 12 - Riga Technical University
PP 15 - Technical University of Denmark

Municipalities/water companies (EST, FIN, POL, SWE, LV)

PP 4 - City of Haapsalu
PP 5 - City of Rakvere
PP 6 - Liepaja municipal authority "Komunālā pārvalde"
PP 9 - City of Pori
PP 13 - Ogre municipality
PP 14 - Slupsk Water Supply
PP 16 - Jurmalas udens Ltd
PP 17 - The municipality of Söderhamn
PP 18 - Rakvere Water Company

Umbrella organisations (EST, POL)

PP 8 - Estonian Waterworks Association
PP 11 - Economic Chamber Polish Waterworks

Projekta realizācija: 01.01.2019.-30.09.2021.

Associated organisations (EST, FIN)

AO 1 - Union of the Baltic cities
AO 2 - Ministry of Environment
AO 3 - Satakunta Chamber of Commerce

2

MOTIVATION

1995

2018

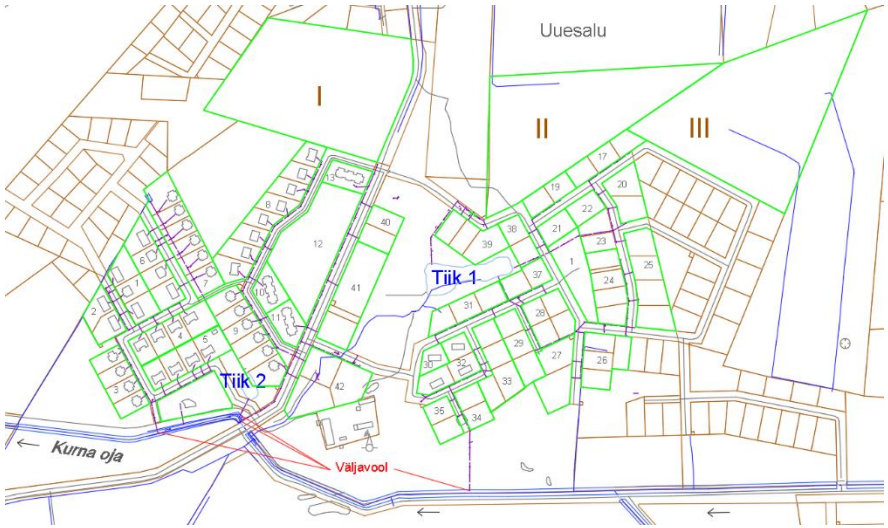
Interreg Baltic Sea Region

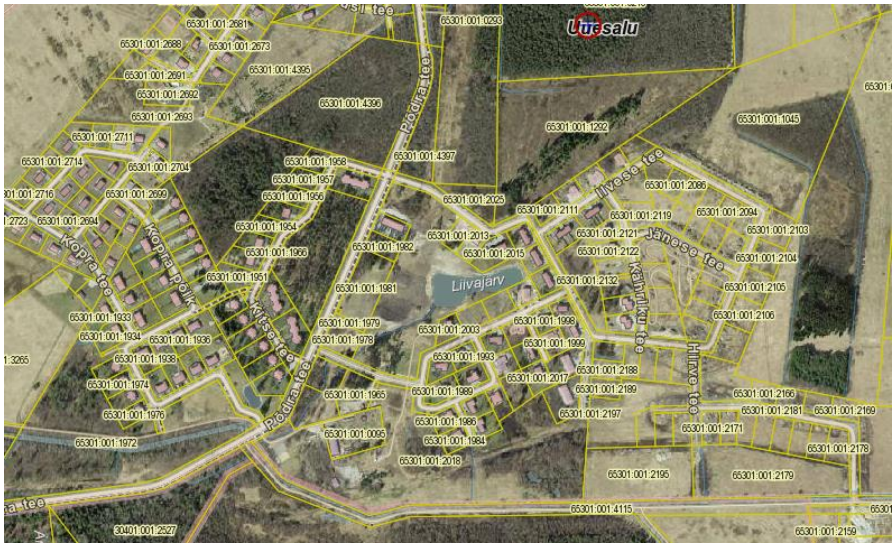
EUROPEAN UNION
EUROPEAN REGIONAL DEVELOPMENT FUND

NOAH

TAL TECH

WP2 SHORTCOMES IN PLOT BASED PLANNING





Interreg Baltic Sea Region

EUROPEAN UNION
EUROPEAN REGIONAL DEVELOPMENT FUND

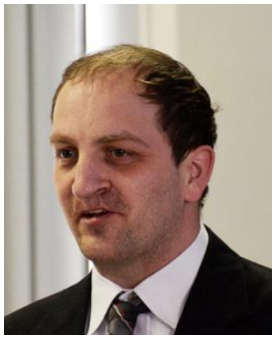
NOAH

TAL TECH

LV scientific core team

Arnis Lektauers

Jānis Zvirgzds



Māris Kaļinka

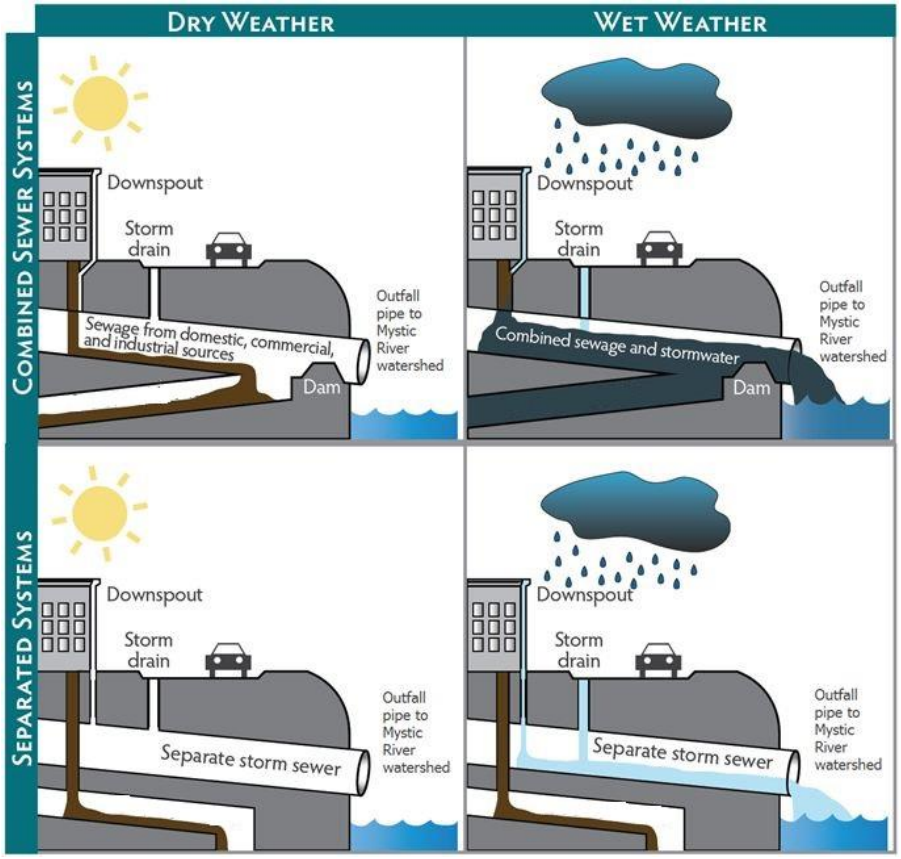
1. Water research laboratory
2. Department of Geomatics/Spatial and Regional Development Research laboratory
3. Department of Modelling and Simulation

Andrejs Zubaničs –
Latvian Environment, Geology and Meteorology Centre
Forecasts and Climate Department,
Hydrometeorological Forecasts Division

Jānis Rubulis

5

State of play for LV end-users



Liepāja had partly combined system. In future would like separate system.

Ogre and Jūrmala. However for Jūrmala storm sewer (ditches) is influenced by decentralized (private) sewerage.

6

Liepaja

7

	Challenge	Task	Objective	Tool, approach used
1.	How stormwater system (Tebras area) works? How often outlet is flooded due to water level rise in Lake Liepāja from November till January (**Western wind**)? More connections possible?	Precipitation, level measurements and flow calculation	Define interaction between precipitation, water level in Lake and storm water system operation	Modelling of flows (dry and wet weather cases) with Bentley StormCAD and EPA SWMM. Installation of online sensors (level) in storm water system manhole. Water level, wind speed (!!!) and precipiatation data from LGEMC. Extreme Weather Layer (EWL) – graphical presentation of the results.
2.	High grounwater table	To measure it	How it influence stormwater fillage	**Real time Control (RTC)** ???
3.	40 % / 60 % (separate/combinate)	Inventory of all system	Recomendations for 100% separate system	GIS based tool developed by RTU

The flooding beginns	The water level - LAS-2000,5 (European Vertical Reference System)
The floodplain of Lake Liepāja	0,67 m
City of Liepāja	1,17 m

https://www.meteo.lv

PILOT SITES

Rainwater drainage in the lake, Tebras Street

Basic Data:

- Area = ~51,00 ha;
- Planned Pilot site located near the lake in Eastern part of city;
- Main problem is that storm waters from the Baltic sea come in by trade channel, outlet located in lake does not function.

From kick-off in Tallin

NOAH

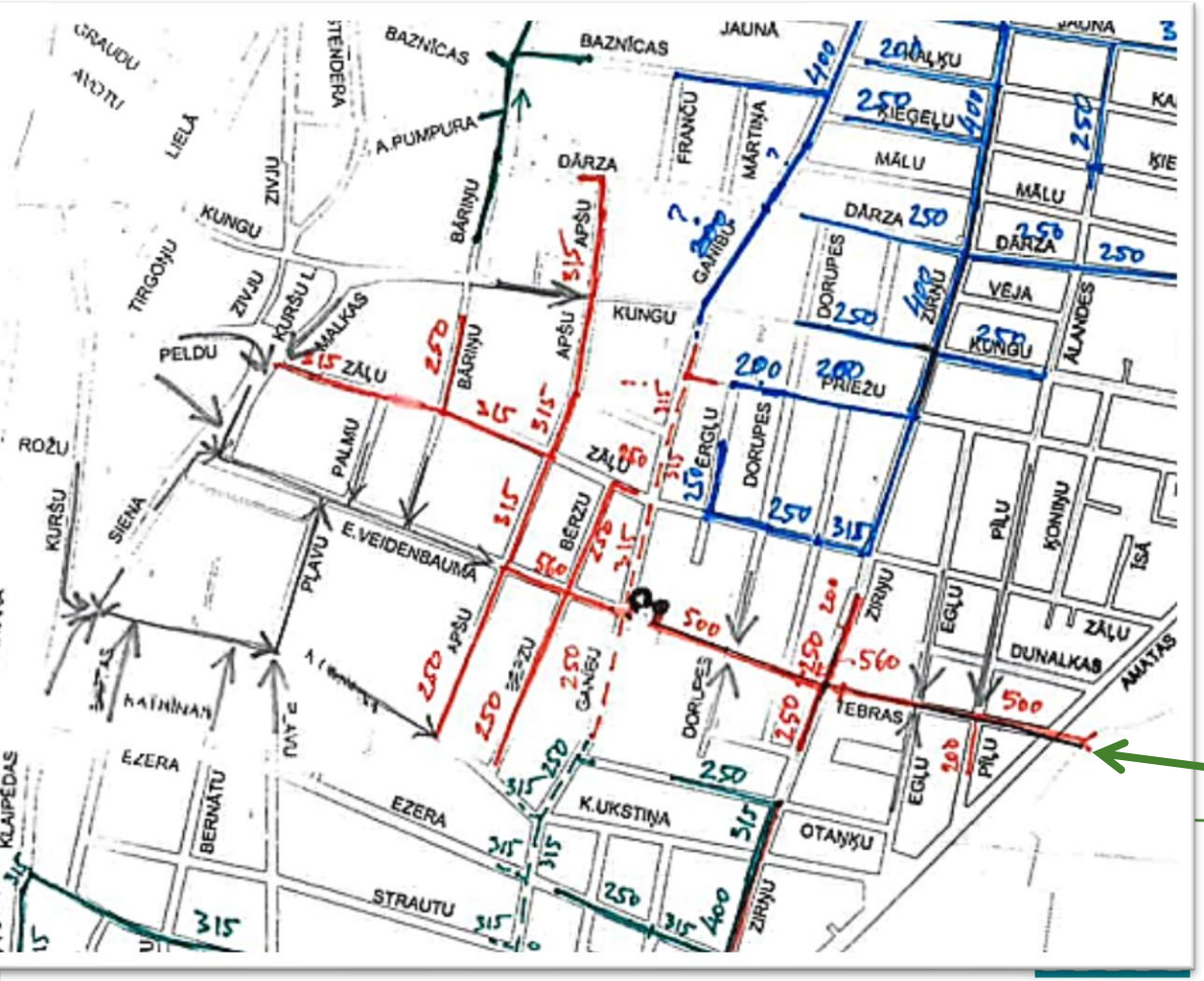
Interreg Baltic Sea Region

EUROPEAN UNION

EUROPEAN REGIONAL DEVELOPMENT FUND

grupa93

Pilot site at Tebra street catchment area - modelling



Storm water outlet in Lake Liepāja

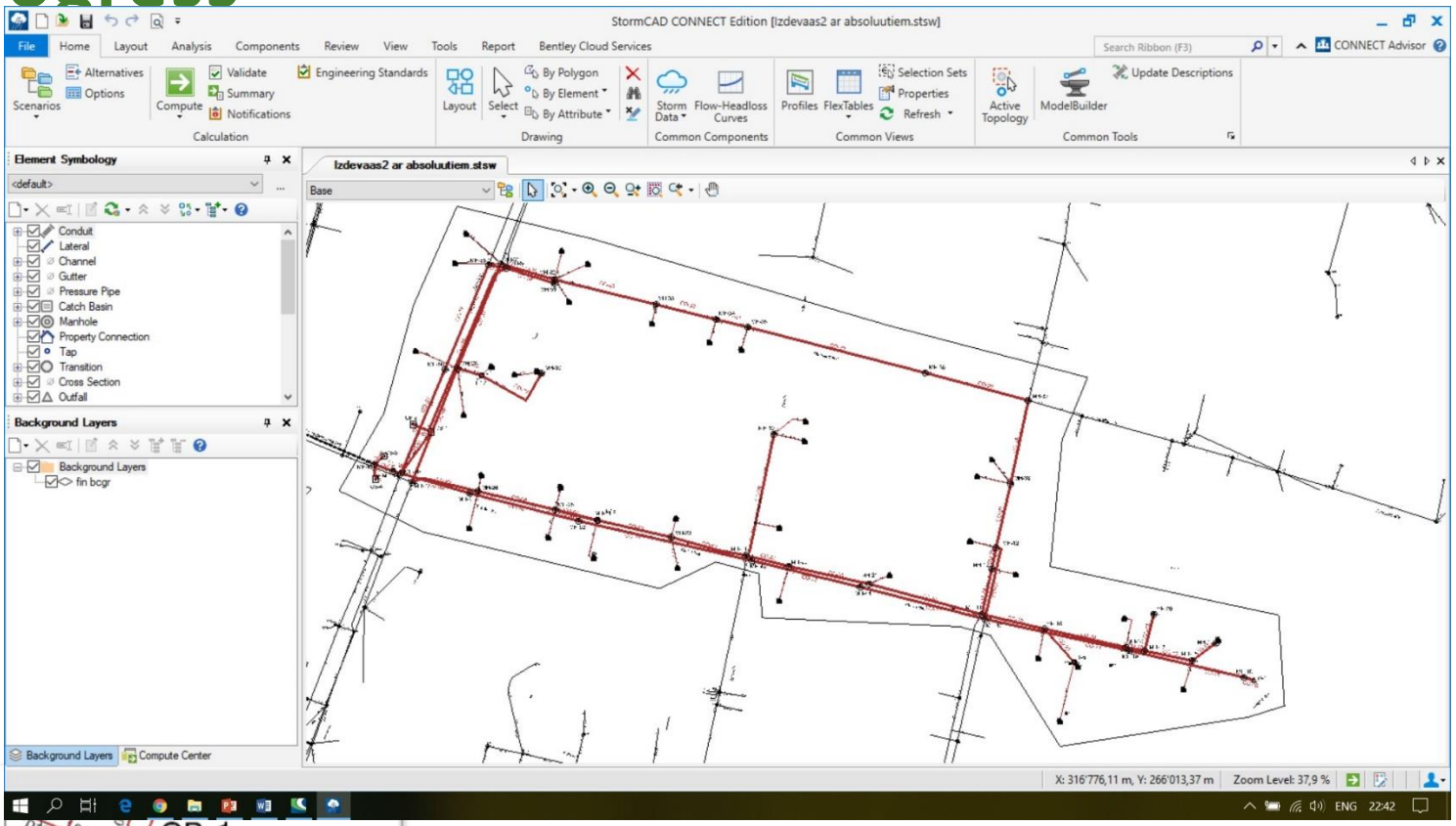
Interreg Baltic Sea Region

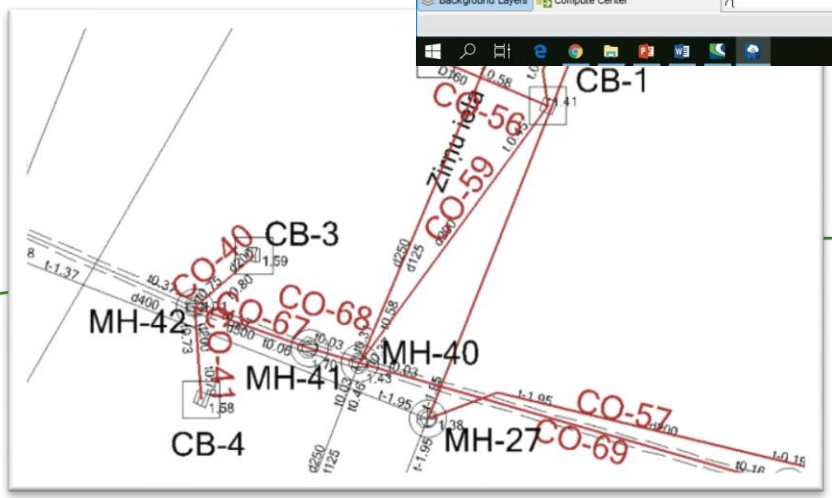
EUROPEAN REGIONAL DEVELOPMENT FUND

EUROPEAN UNION

2D model development in StormCAD by RTU – work in progress

RTU
sc.assist.
Valts
Urbanovičs



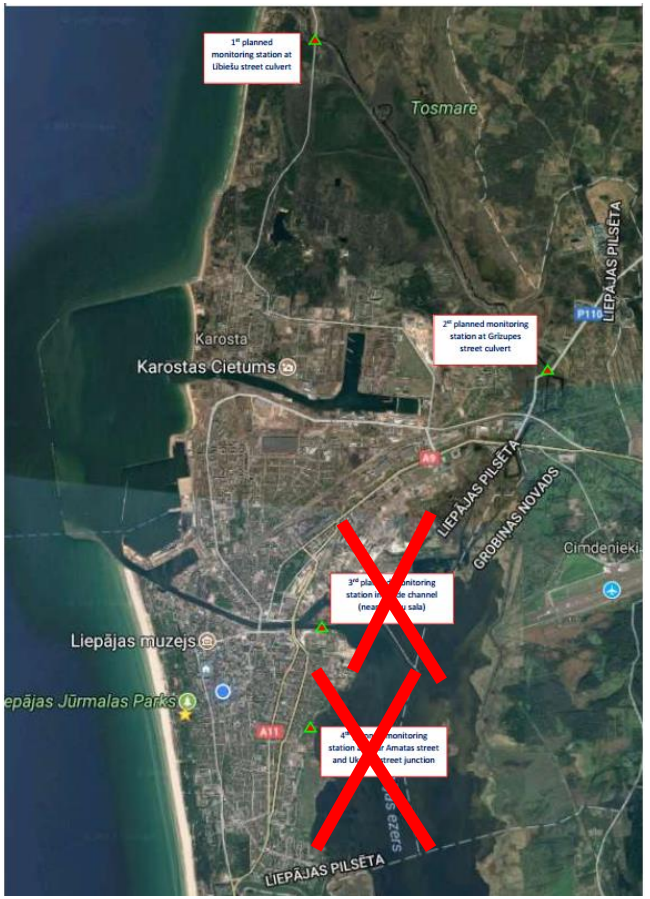


NOAH

Interreg
Baltic Sea Region

EUROPEAN UNION
EUROPEAN REGIONAL DEVELOPMENT FUND

Pilot sites for AHS location in Liepāja, removed



NOAH

Interreg Baltic Sea Region

EUROPEAN UNION

EUROPEAN REGIONAL DEVELOPMENT FUND

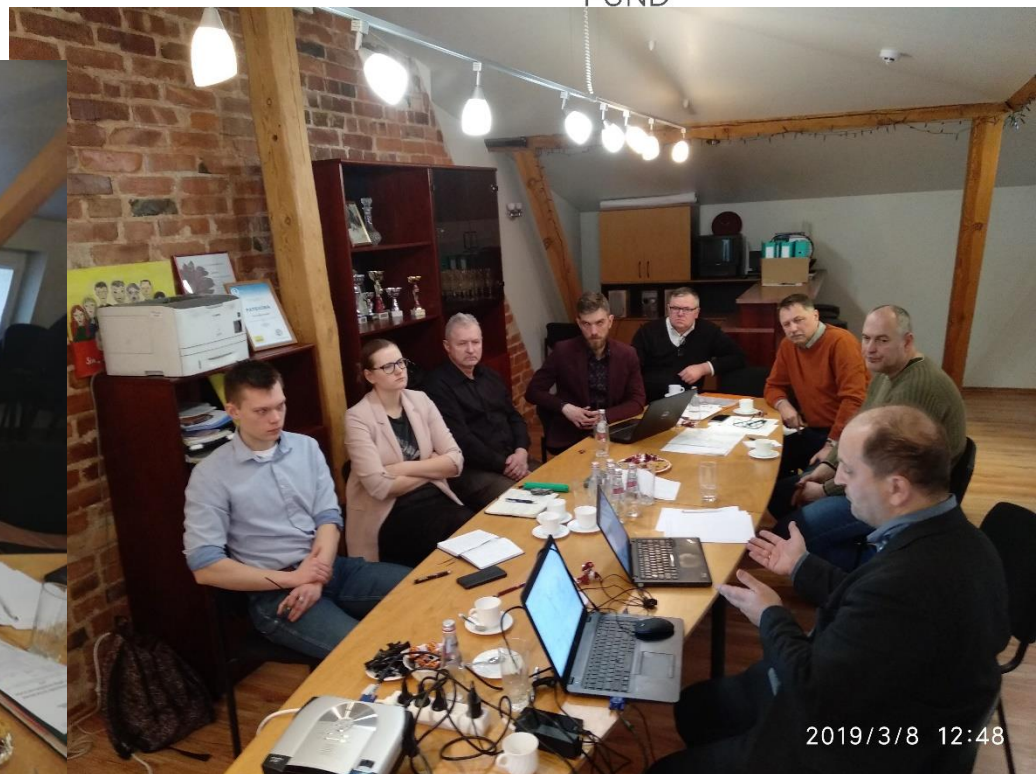
Slaidi sagatavoti sadarbībā ar Liepaja municipal authority

«Komunālā pārvalde»

Interreg
Baltic Sea Region

EUROPEAN UNION

EUROPEAN
REGIONAL
DEVELOPMENT
FUND



Jūrmala

15

	Challenge	Task	Objective	Tool, approach used
1.	Separate systems. Hovewer in past were cases when the inflow to Sloka NAI was 2x higher during the rain. Suggestions to transfer stormwater effluents from the beach to river Lielupe	Precipitation, level and flow measurements	Define correlation between precipitation, storm water levels and flow in the waste water sewerage → Define critical spots.	Modelling of flows (dry and wet weather cases) with Bentley SewerGEMS/StormCAD vai EPA SWMM. Installation of online sensors (level, flow) in storm water system manholes. Extreme Weather Layer (EWL) – graphical presentation of the results.
2.	Inhabitants do not connect to city sewerage system. Spillages during the street flood	Contamination detection at storm water drainage outlets.	Detection and prevention of potential illegal activity (to understand source of pollution)	Water qulity analyses in storm sewer (grab samples, online measurements). Installation of automatic sampler near by dithces and online sensors in storm water system manholes?! Pollution transport in soil using EIS method!!

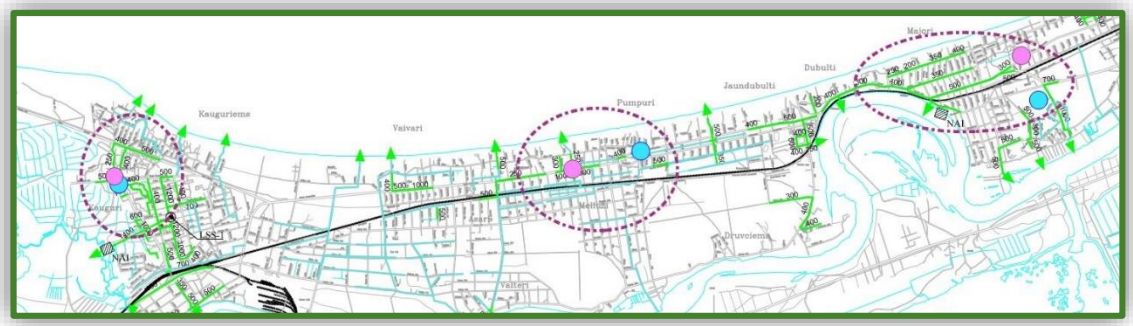
16

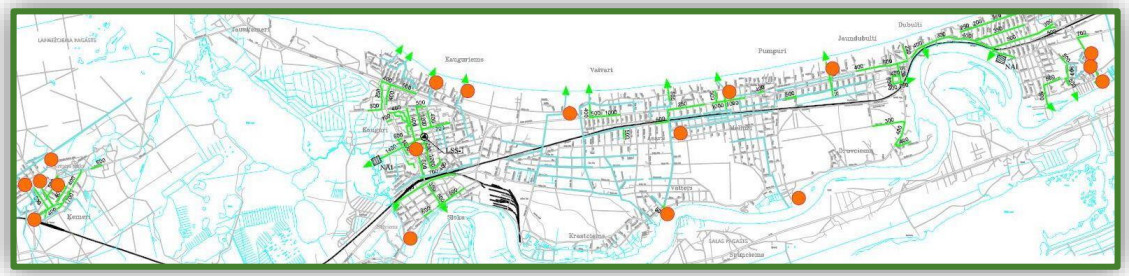
1. Pilot site mapping

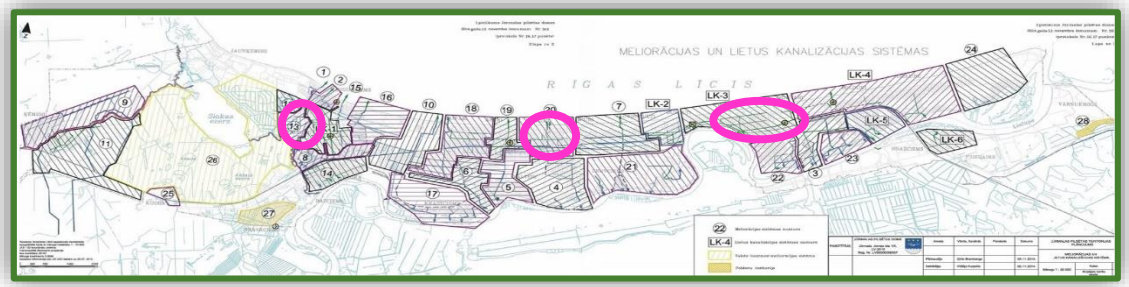
1.1. Precipitation, storm water level, waste water sewerage flow measurements

1.2. Possible contamination detection

1.3. Model development

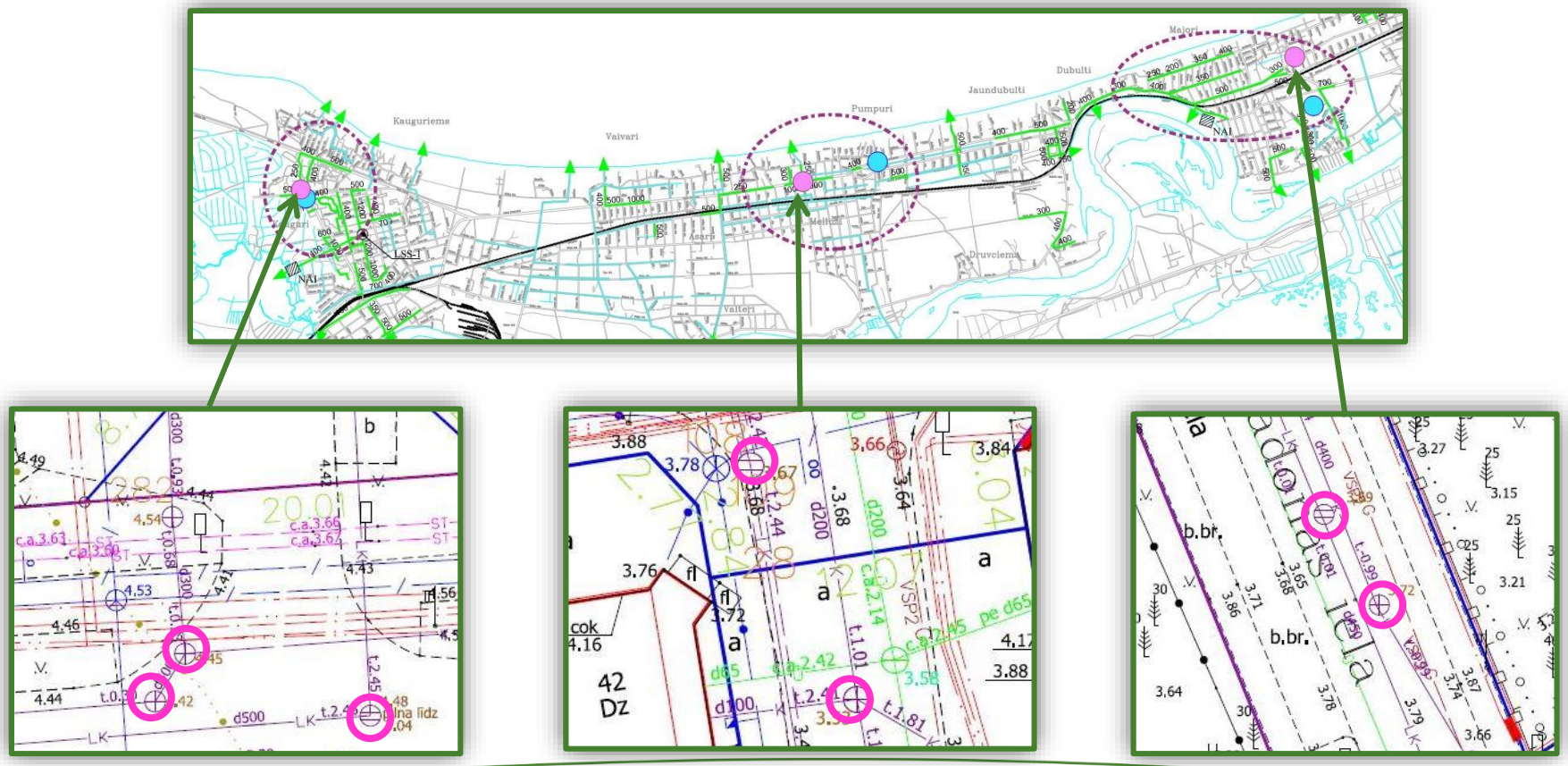






2. Topographical overview

2.1. Defining manholes for sensor/meter installation



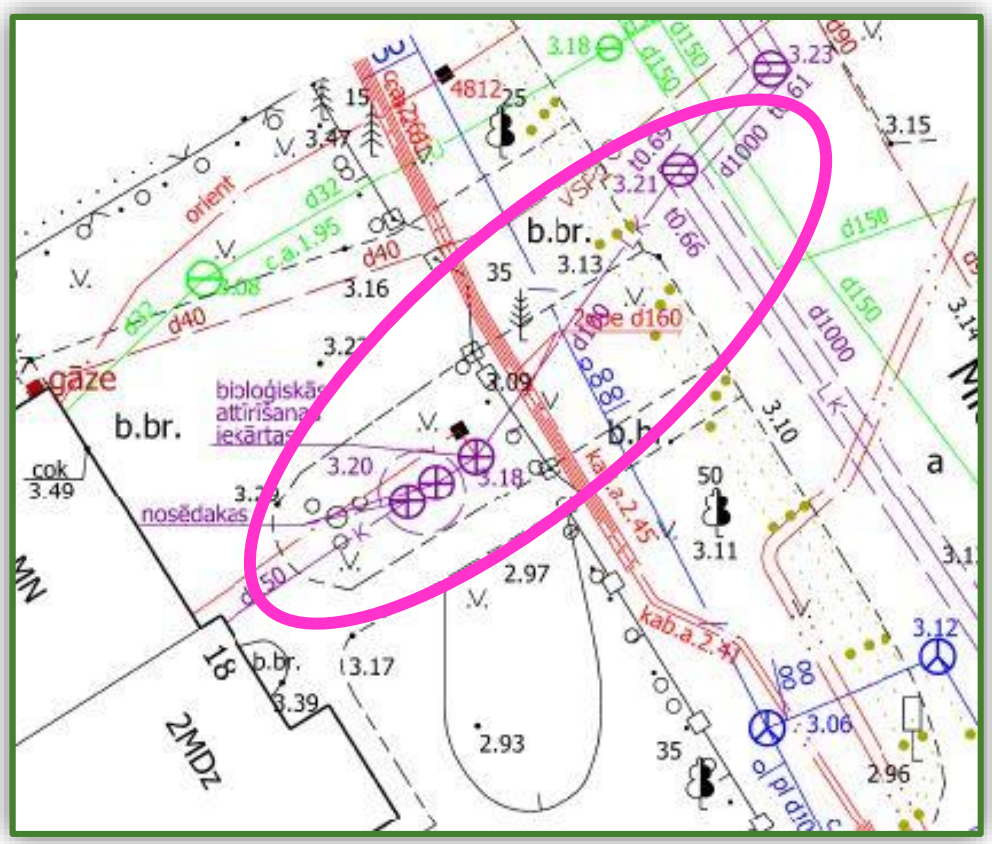
2. Topographical overview

2.2. Defining sampling spots

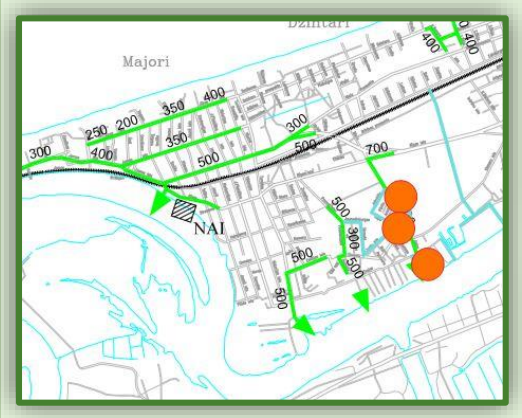
A. Suspecious outlets in the ditches

B. Household waste water sewage biological treatment outlets

C. Outlets from other local sewage collecting solutions (settle tanks, etc.)

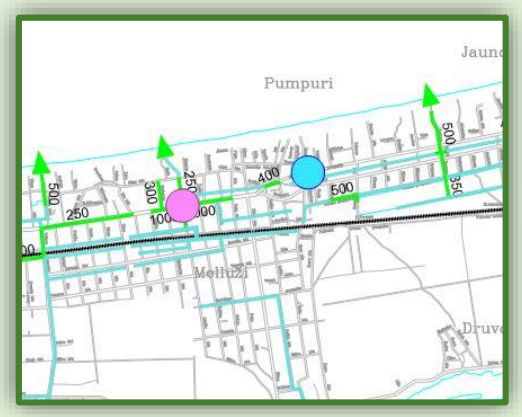


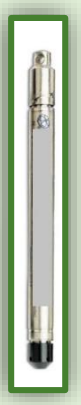
3. Equipment overview



Multiparameter probe

t°; pH; electrical conductivity; ammonium, nitartes; total dissolved solids; dissolved oxygen





Flow meter
Waste water flow

Level sensor
Storm water level

Local meteostation
Precipitation

NOAH

Interreg Baltic Sea Region

EUROPEAN UNION
EUROPEAN REGIONAL DEVELOPMENT FUND

4. Sampling strategy – water quality

Stationary and In-sity (online)

1. Electrical conductivity (incl. temperature)
2. Nitrate
3. Turbidity ⟶ Total suspended solids (TSS)
4. Nitrate (NO_3^- - N)
5. Dissolved oxygen

- Water Level ⟶ Flowrate
- Portable Sampler (1L x 124sampling bottles) for grab samples

Grab samples by Jurmala water

1. P-tot
2. Biological oxygen demand (BOD5)
3. pH
4. NH4-N, NO3-N and N-tot

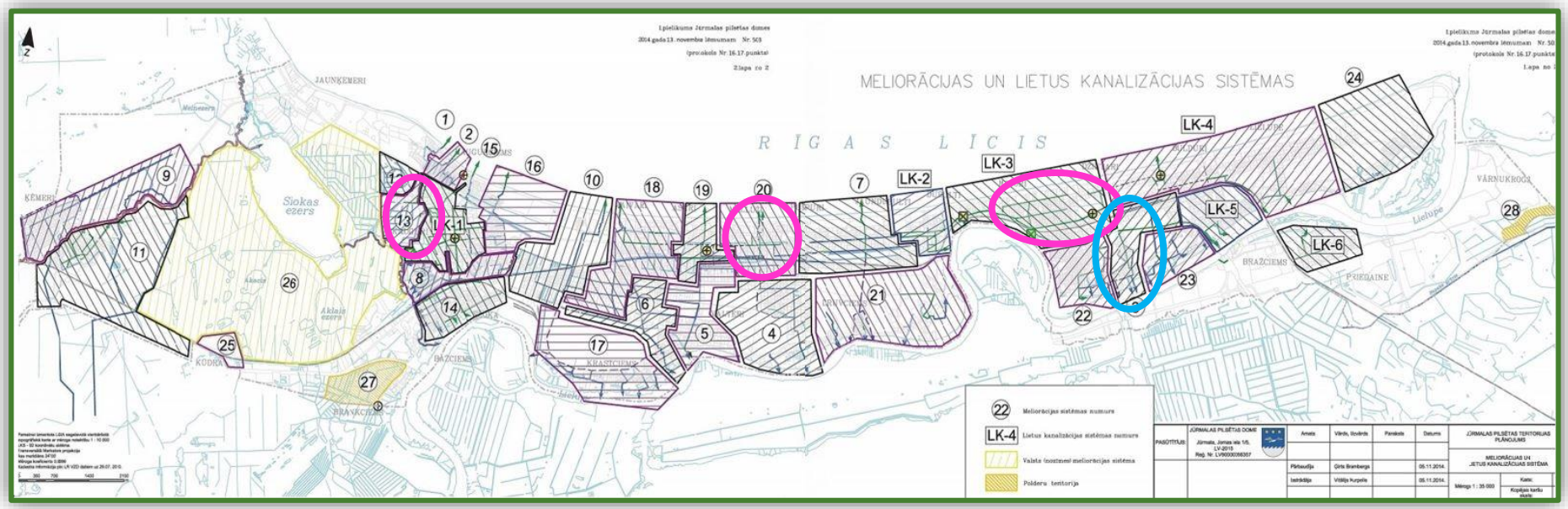
Grab samples by RTU

1. TOC &DOC
2. Coliformic bacteria
3. 16 heavy metals
4. Phosphate phosphorous
5. Oil Index
6. PAH

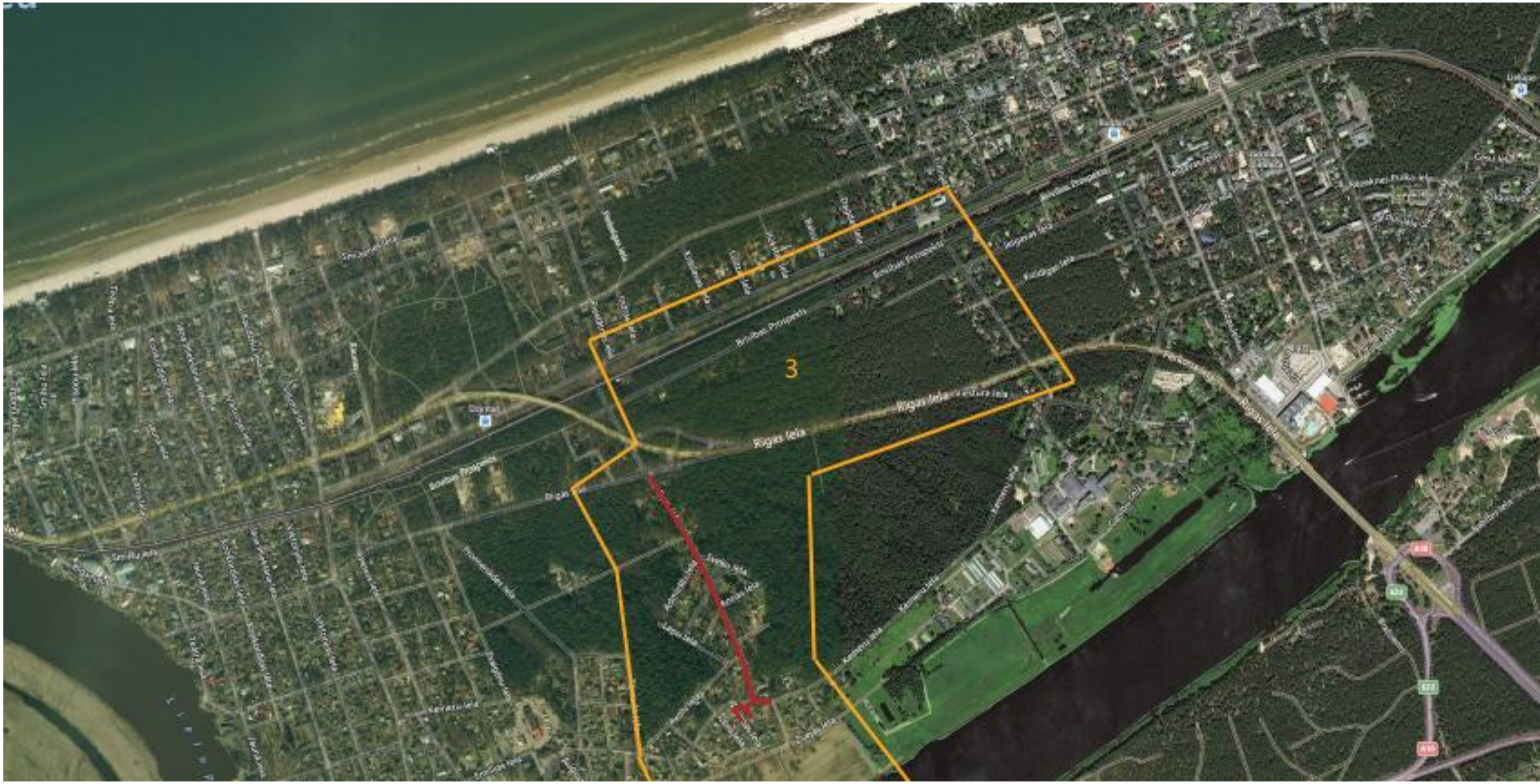
6. Model development

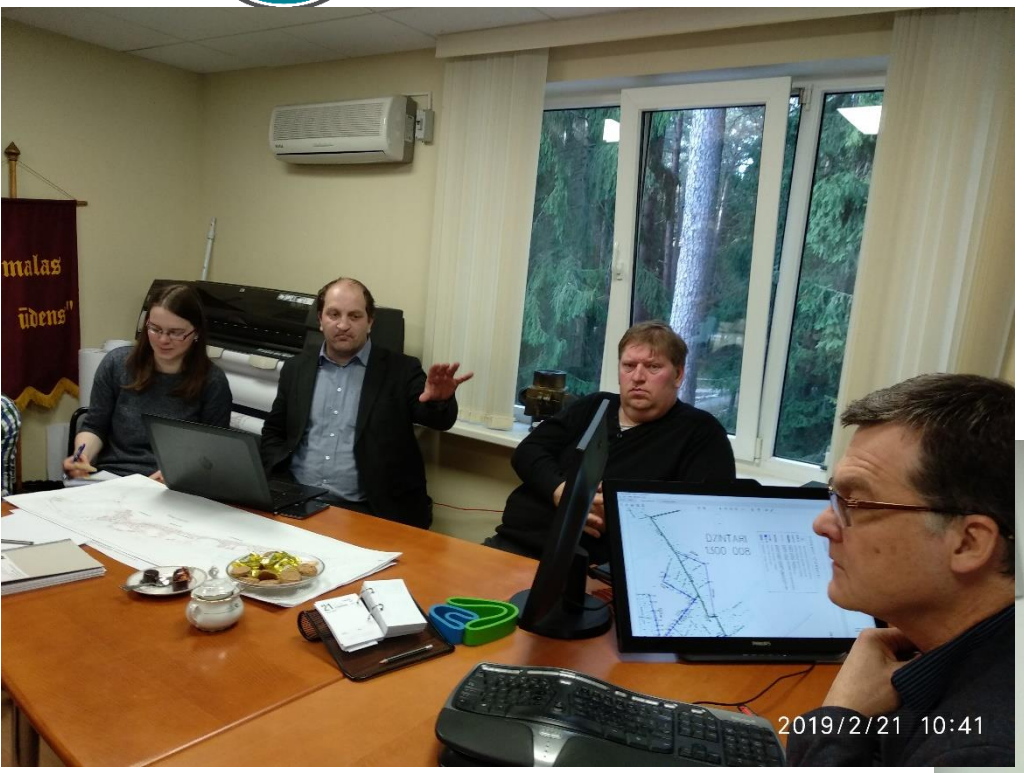
RTU
sc.assist.
Gints Dakša

6.1. 2D model development by Riga Technical University – work in progress



NOAH
Interreg Baltic Sea Region
EUROPEAN REGIONAL DEVELOPMENT FUND
EUROPEAN UNION


3
Rigas iela



Slaidi sagatavoti sadarbībā ar JURMALAS UDENS LTD

EUROPEAN UNION

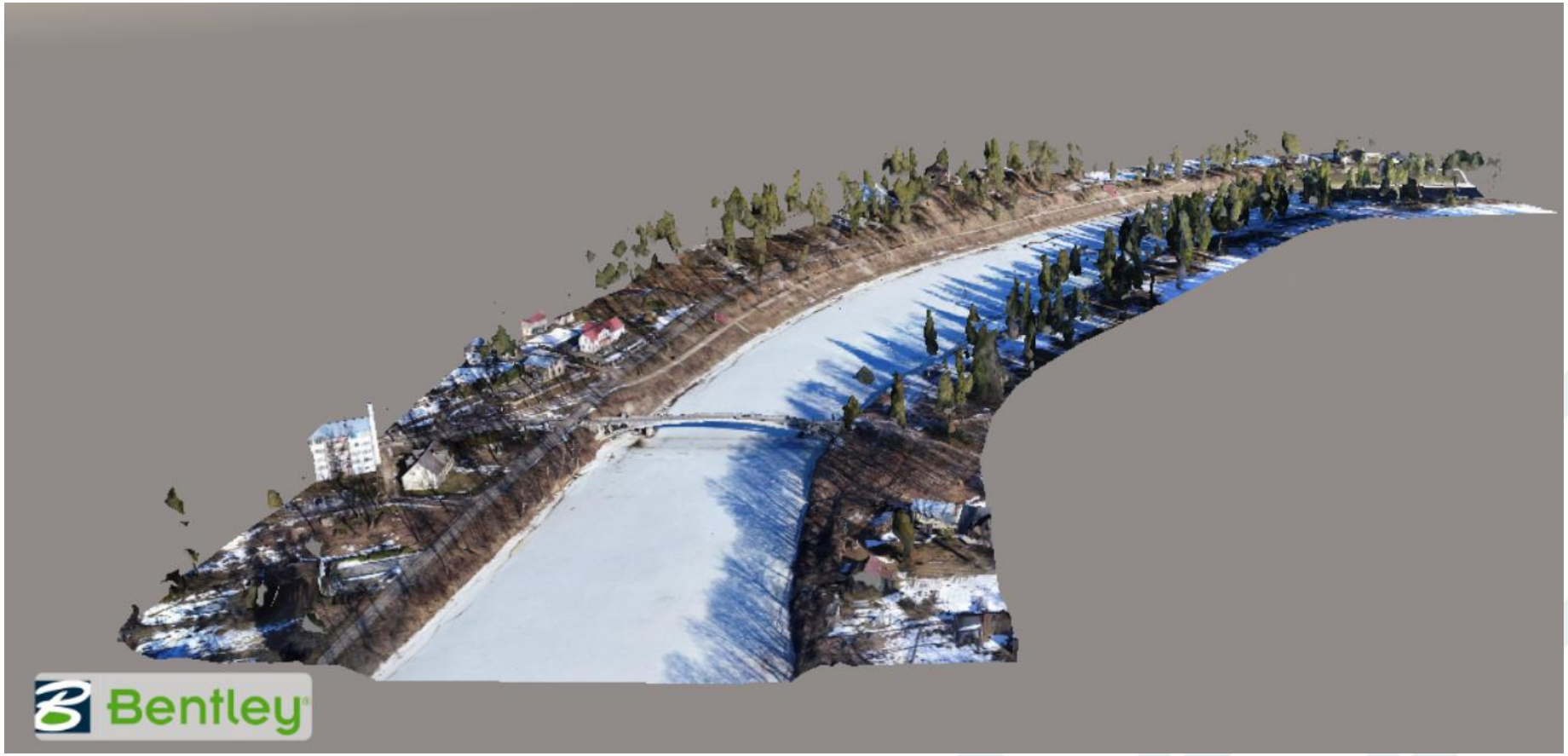
EUROPEAN REGIONAL DEVELOPMENT FUND

Ogre

25

	Challenge	Task	Objective	Tool, approach used
1.	Improve Early Warning System for responsible services during the floods in the city of Ogre	River scanning Installation of online sensors (level) in Ogre River.	Increased responsiveness of responsible services to ensure the requirements of Section 3 of the Civil Protection and Disaster Management Act → Define critical spots	3 D model of Ogre River Precipitation, water level measurements Modelling of flows (dry and wet weather cases)
		Satellite data analysis, precipitation, water level measurements	Preventive pocedures for ice jam cases	

26



27

NOAH

Protecting Baltic Sea from untreated wastewater spillages during flood events in urban areas

Riga Technical University
www.wrl.bf.rtu.lv/en
Facebook: Ūdens Pētniecības Laboratorija
janis.rubulis@rtu.lv
+37129438018

Jānis Rubulis
Dr.Sc.ing., asoc.prof.