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Latvia – Lithuania

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**ICEREG**

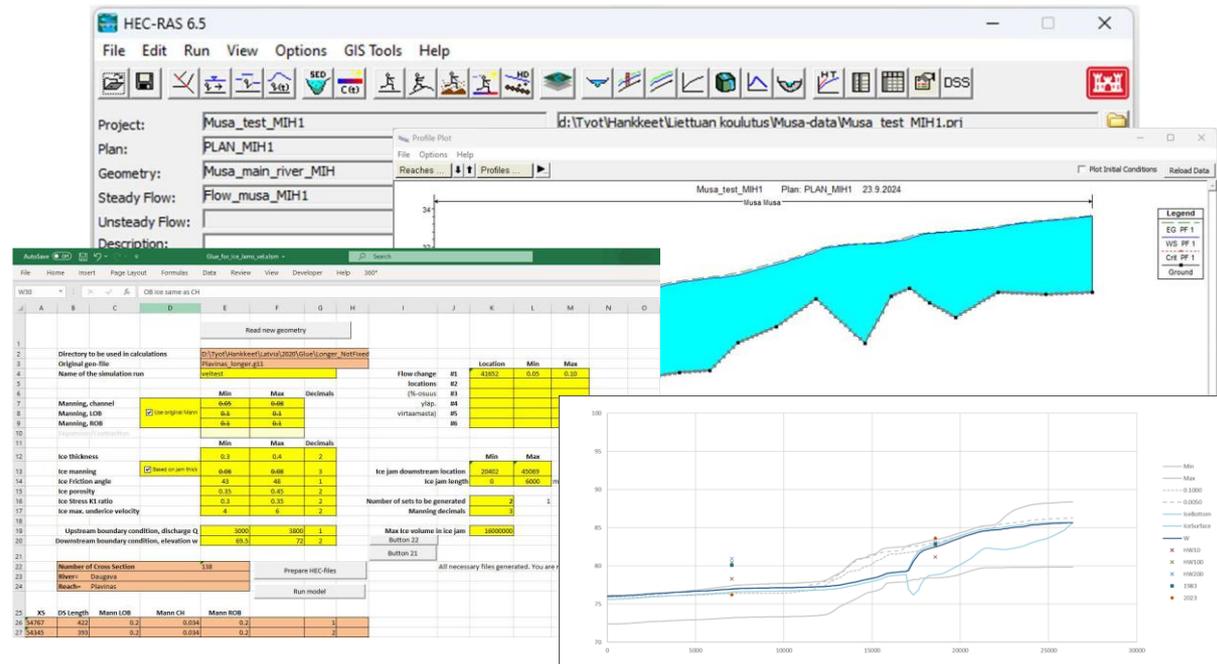
# ICE-JAM FLOOD HAZARD AND RISK MAPS FOR PILOT AREAS IN LATVIA

EMĪLS RUBĪNS | GIS EXPERT  
RĪGA, 21.01.2026

# DATA AND SOFTWARE AVAILABLE FOR ICE FLOOD MODELLING



- Hydrological parameters (data for period 1961-2023 from hydrological observation stations)
- Morphological parameters (field measurements and calculations)
- 1D HEC-RAS Model
- Special Tool “Excel-VBA” created by SYKE (FI) experts



# DATA TABLE WITH YEARS OF OBSERVED ICE JAMS AND WATER LEVELS IN LV PILOT AREAS



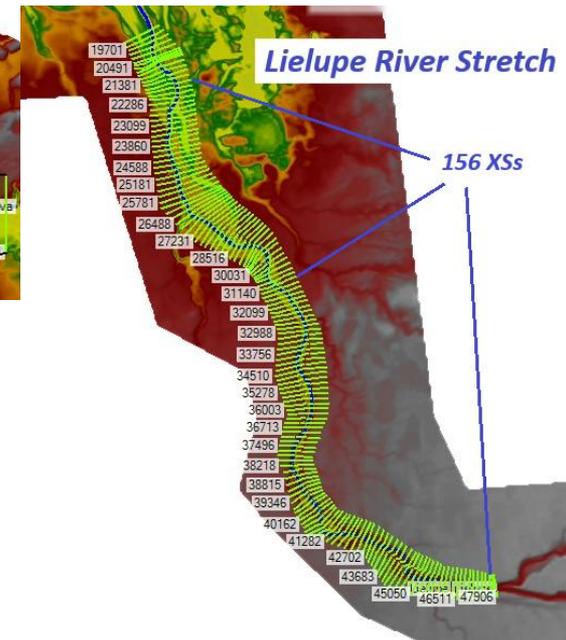
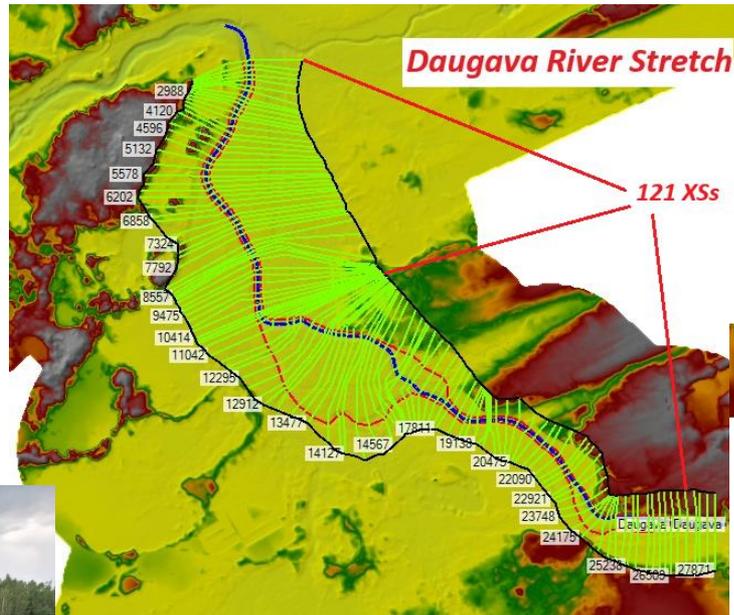
River, hydrological station	Years with ice jams, 1961-2024	Maximum water level rise	
		WL rise*, cm	Year
Daugava, Jēkabpils	1962-1963, 1966, 1969-1970, 1972-1973, 1975, 1979-1981, 1983, 1985, 1987-1991, 1994, 1996-1998, 2001-2002, 2004-2005, 2007-2014, 2016-2024	434	2023
Daugava, Zeļķi	1968-1970, 1972-1985, 1987-1991, 1994-1996, 1998-2002, 2004-2008, 2010-2019, 2021, 2023-2024	725	1988
Lielupe, Mežotne	1961, 1963, 1971, 1979, 1980, 1983-1985, 1994, 1998, 2007, 2013, 2015, 2018, 2022, 2023	275	1985
Lielupe, Staļģene	1963, 1971, 1980, 1987, 1992, 1994, 1998, 2000-2002, 2017, 2022	397	1994

\* The difference between the maximum water level during an ice jam, and the water level at the beginning of an ice jam

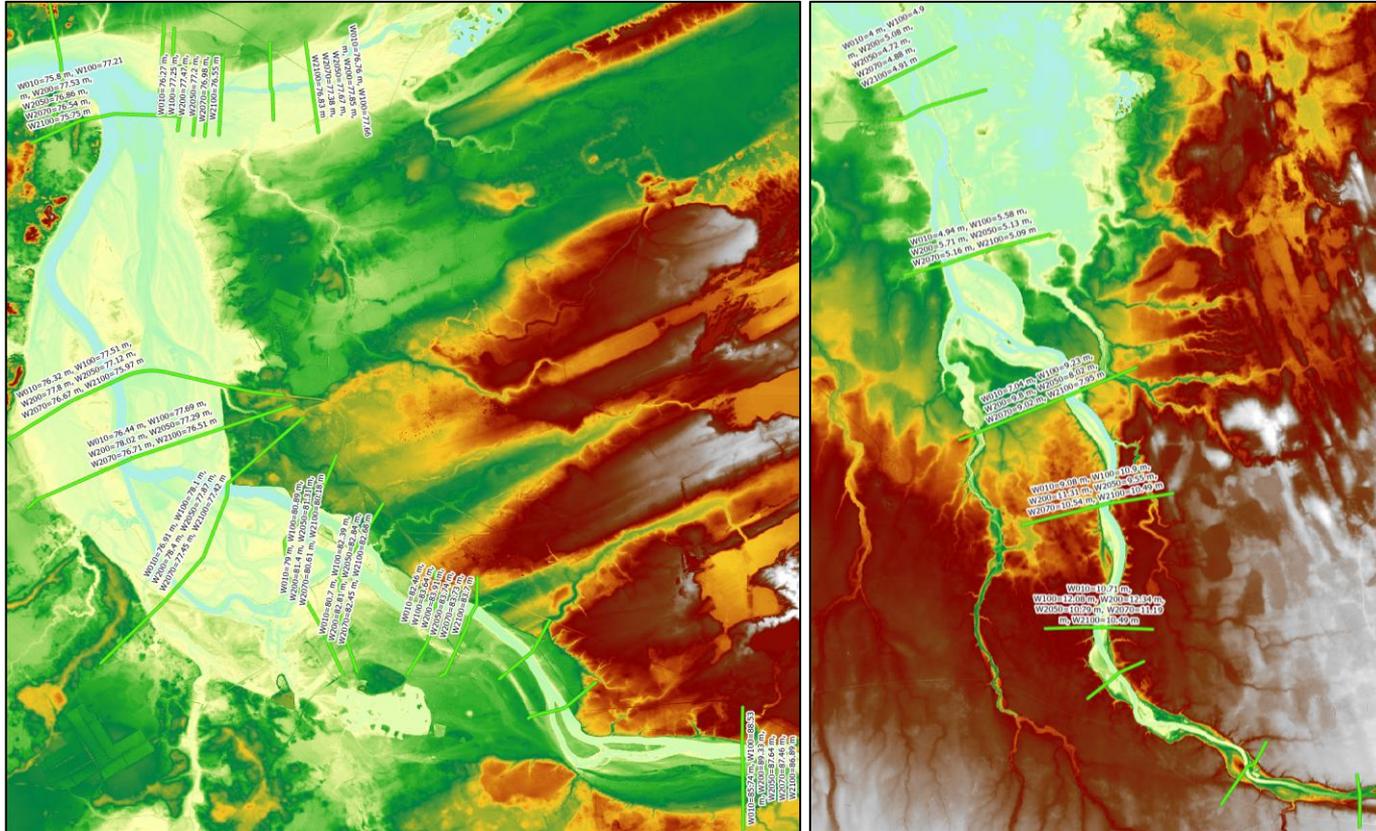
# ICE-JAM FLOOD MODELLING



*To get better results of ice-jam flood simulation, cross-sections of the pilot river stretches have been interpolated in the HEC-RAS model, so that the maximum distance between them is 100-200 m, on average*

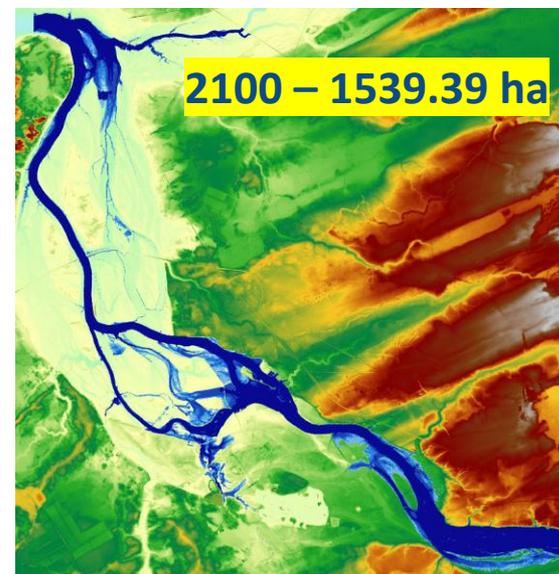
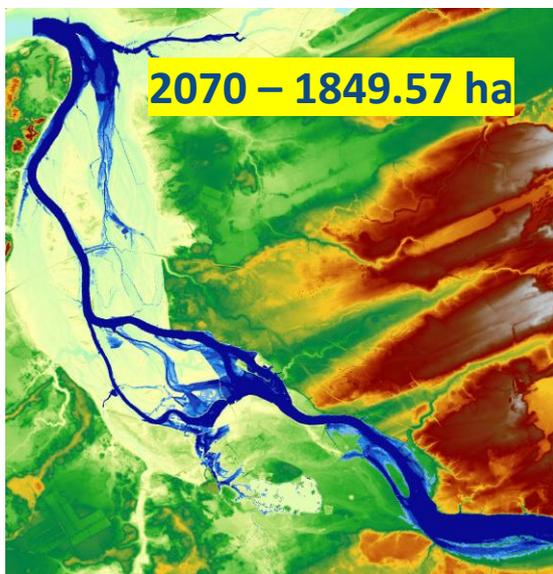
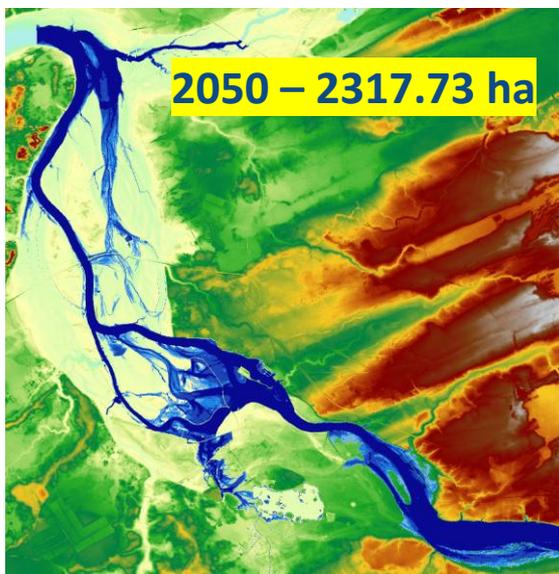
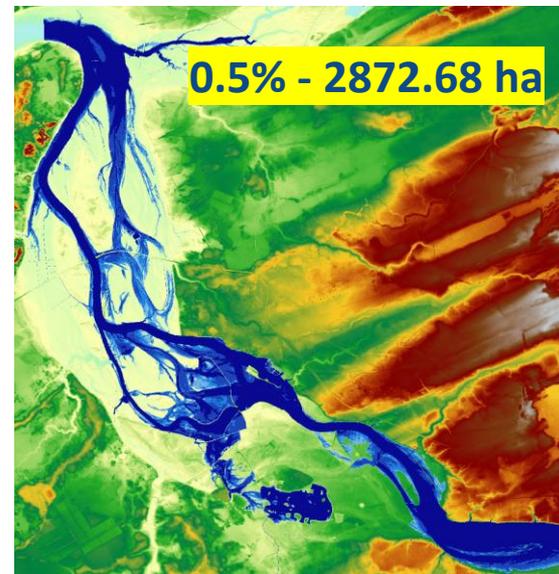
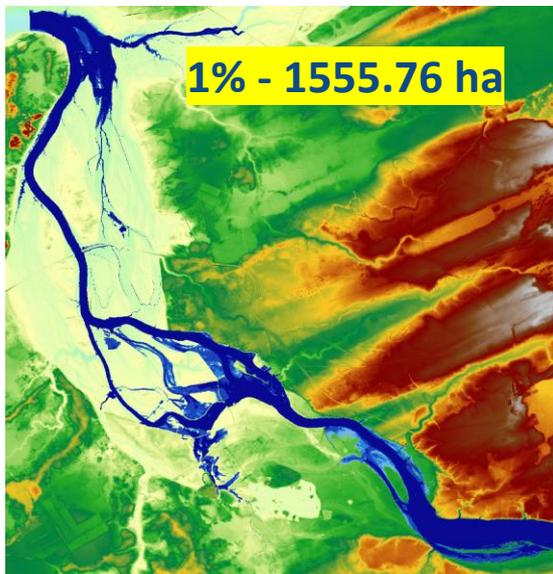
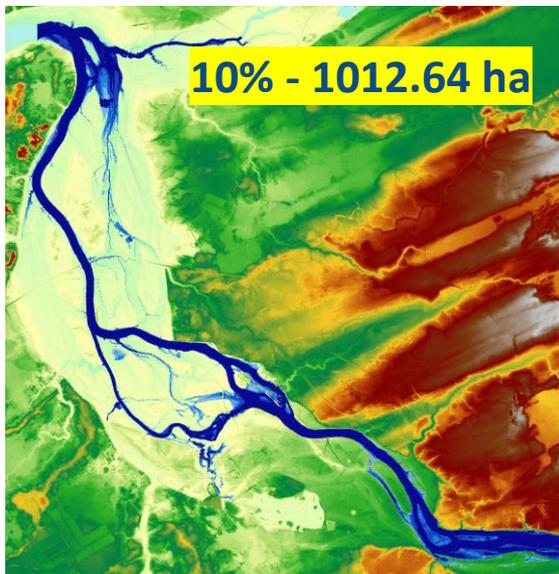


# MAPPING THE FLOODED AREAS

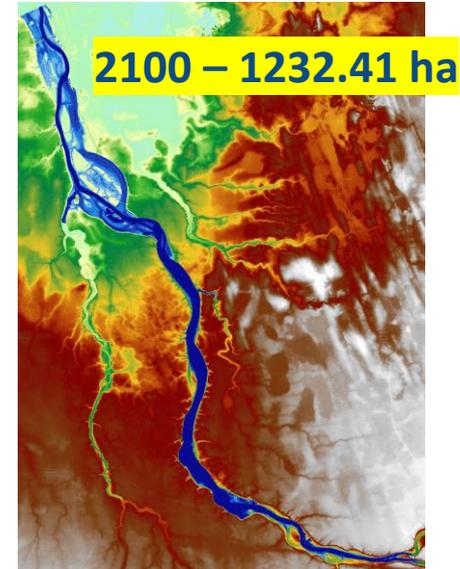
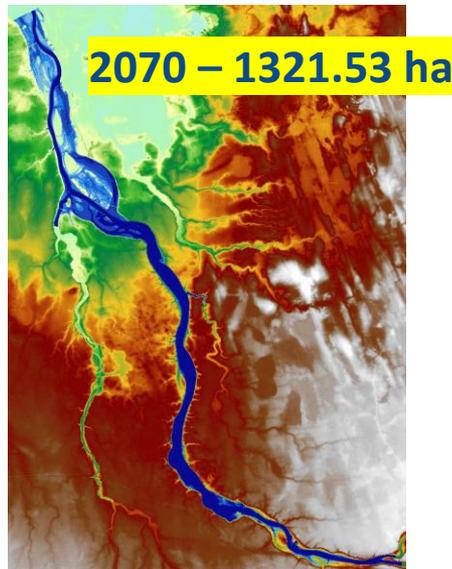
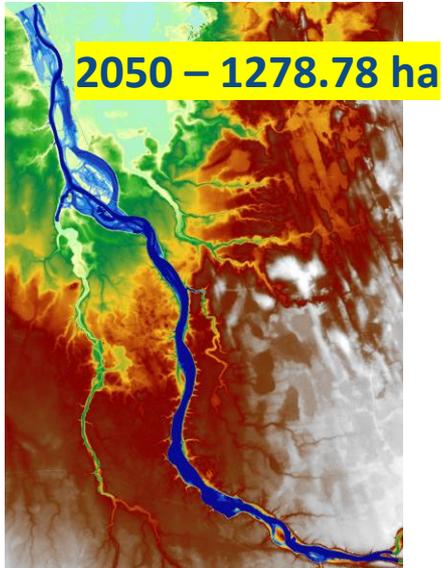
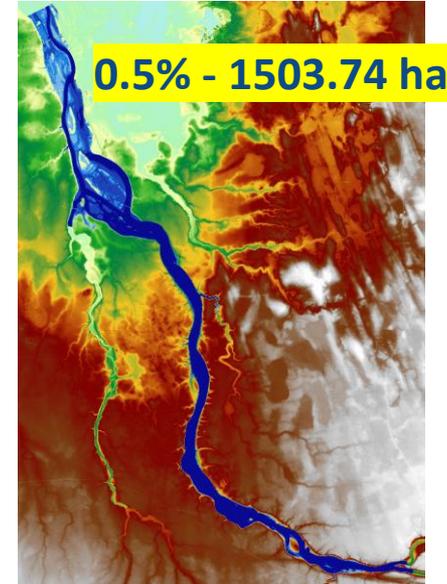
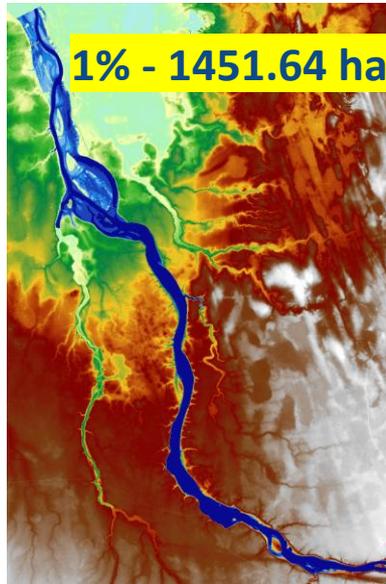
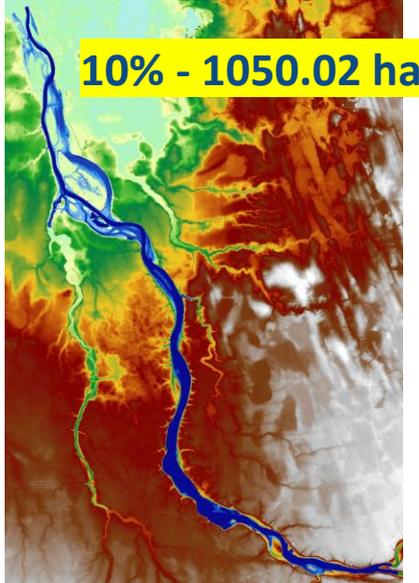


- Using modeled water levels at cross-section used before: Downstream, upstream and key locations selected from modelled water levels.
- Modeled water levels on LiDAR digital terrain model (DTM) ( 2014 for Lielupe river and 2015 for Daugava and Aiviekste river).

# FLOODED AREAS FOR DIFFERENT SCENARIOS ON DAUGAVA PILOT AREA AND AIVIEKSTE DOWNSTREAM



# FLOODED AREAS FOR DIFFERENT SCENARIOS ON LIELUPE PILOT AREA

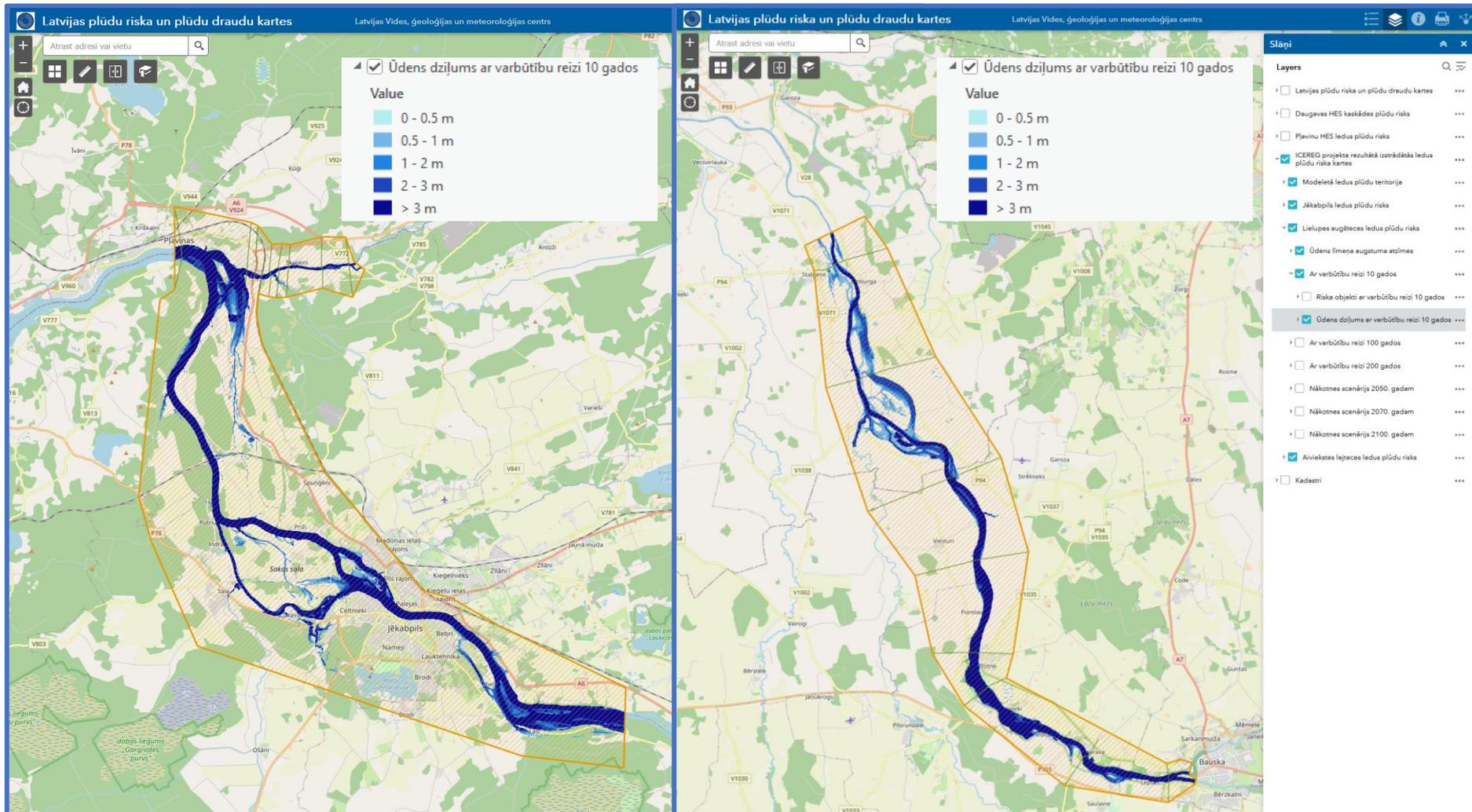


# ICE JAM FLOOD RISK MAPS



In the map service with other flood risk maps:

<https://videscentrs.lv/gmc.lv/iebuve/vets/pludu-riska-un-pludu-draudu-kartes>



# ICE JAM FLOOD RISK MAPS



## In the map service with other flood risk maps:

<https://videscentrs.lv/gmc.lv/iebuve/vets/pludu-riska-un-pludu-draudu-kartes>

- Modeled areas;
- Water levels for all scenarios;
- Ice jam inundated areas with depth information;
- Risk objects:
  - Endangered population;
  - Roads;
  - Waste water treatment plants;
  - Schools (none is endangered);
  - Hospitals (none is endangered);
  - Buildings.
- Other information.

Slāņi

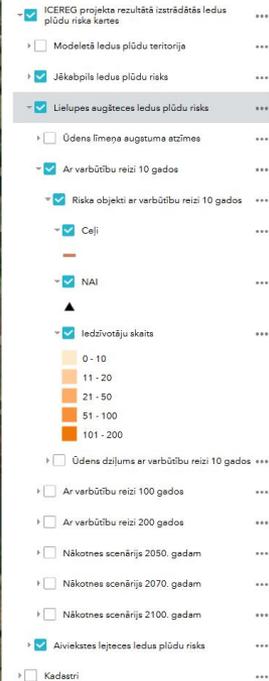
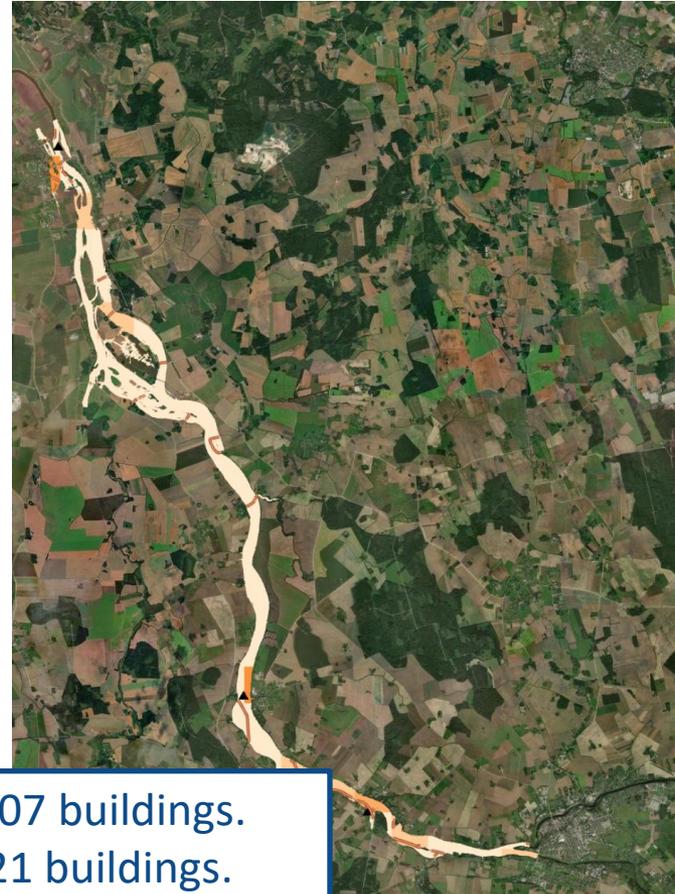
Layers

- Latvijas plūdu riska un plūdu draudu kartes ...
- Daugavas HES kaskādes plūdu risks ...
- Pļavinu HES ledus plūdu risks ...
- ICEREG projekta rezultātā izstrādātās ledus plūdu riska kartes ...
  - Modeletā ledus plūdu teritorija ...
  - Jēkabpils ledus plūdu risks ...
    - Ūdens līmeņa augstuma atzīmes ...
    - Ar varbūtību reizi 10 gados ...
      - Riska objekti ar varbūtību reizi 10 gados ...
      - Ūdens dziļums ar varbūtību reizi 10 gados ...
    - Ar varbūtību reizi 100 gados ...
    - Ar varbūtību reizi 200 gados ...
    - Nākotnes scenārijs 2050. gadam ...
    - Nākotnes scenārijs 2070. gadam ...
    - Nākotnes scenārijs 2100. gadam ...
  - Lielupes augšteces ledus plūdu risks ...
  - Aiviekstes lejteces ledus plūdu risks ...
  - Kadestri ...

# ICE JAM FLOOD RISK IN LIELUPE PILOT AREA



- Endangered population;
- Roads;
- Waste water treatment plants;
- Schools (none is endangered);
- Hospitals (none is endangered);
- Buildings.



**10%:** 401 persons; roads 25.46 km; 3 WWTP, 107 buildings.

**1%:** 531 persons; roads 32.32 km; 3 WWTP, 221 buildings.

**0.5%:** 544 persons; roads 32.32 km; 3 WWTP, 249 buildings.

**2050:** 484 persons; roads 30.19 km; 3 WWTP, 140 buildings.

**2070:** 481 persons; roads 27.43 km; 2 WWTP, 110 buildings.

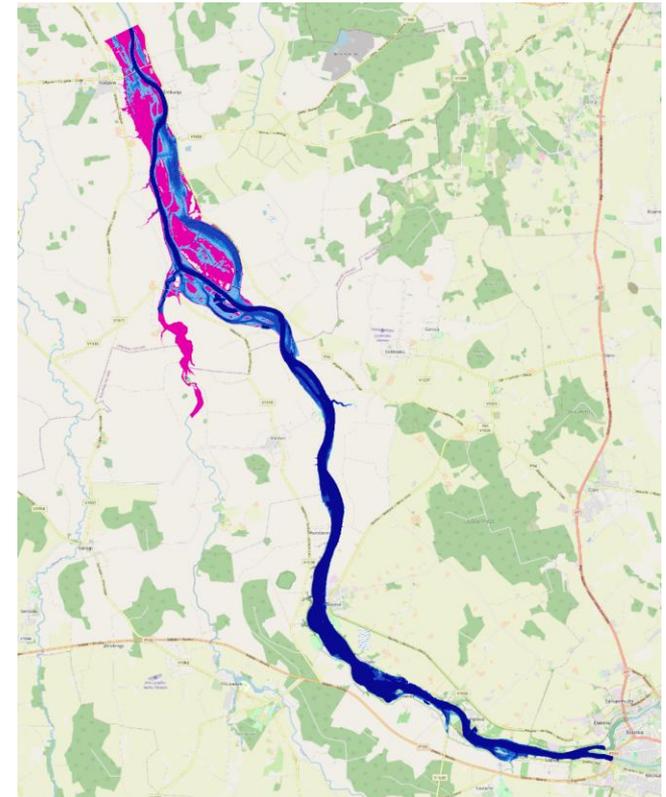
**2100:** 462 persons; roads 24.35 km; 2 WWTP, 89 buildings.

SSP2 – 4,5

# SPRING FLOOD RISK IN LIELUPE PILOT AREA



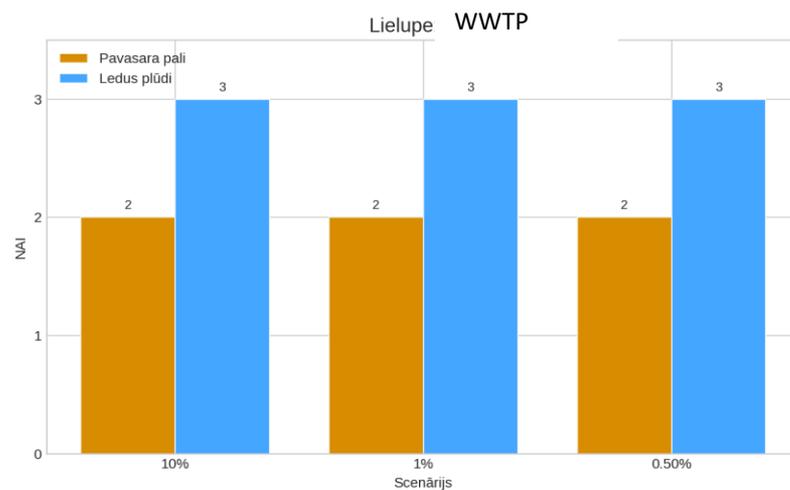
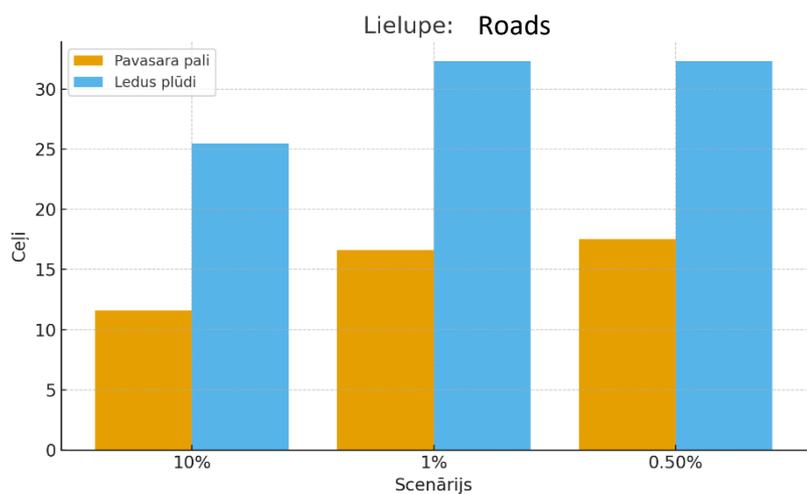
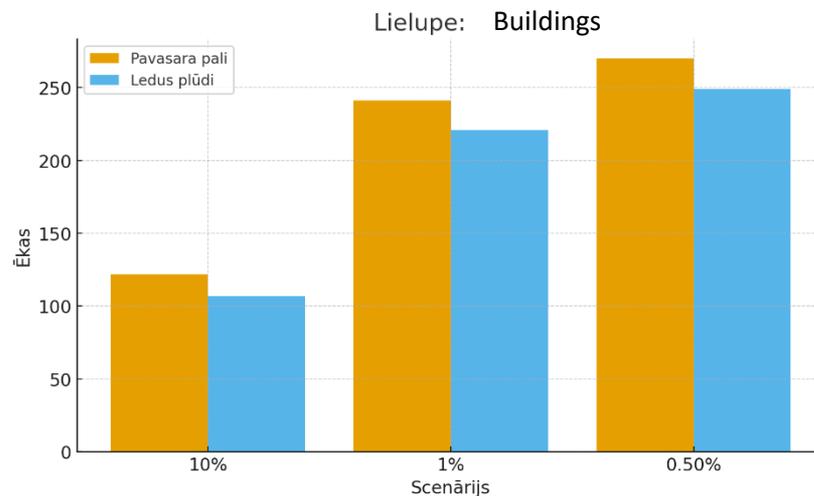
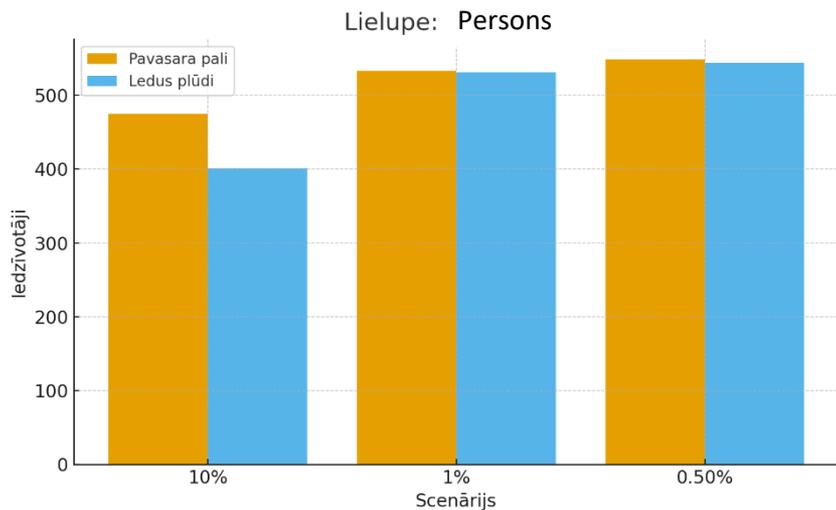
- Endangered population;
- Roads;
- Waste water treatment plants;
- Schools (none is endangered);
- Hospitals (none is endangered);
- Buildings.



10% scenario comparison  
Spring flood

**10%:** 475 persons; roads 11.59 km; 1 WWTP, 122 buildings.  
**1%:** 533 persons; roads 16.61 km; 1 WWTP, 241 buildings.  
**0.5%:** 549 persons; roads 17.52 km; 1 WWTP, 270 buildings.

# SPRING FLOOD RISK IN LIELUPE PILOT AREA- comparison



# ICE JAM FLOOD RISK IN DAUGAVA PILOT AREA



- Endangered population;
- Roads;
- Waste water treatment plants;
- Schools (none is endangered);
- Hospitals (none is endangered);
- Buildings.



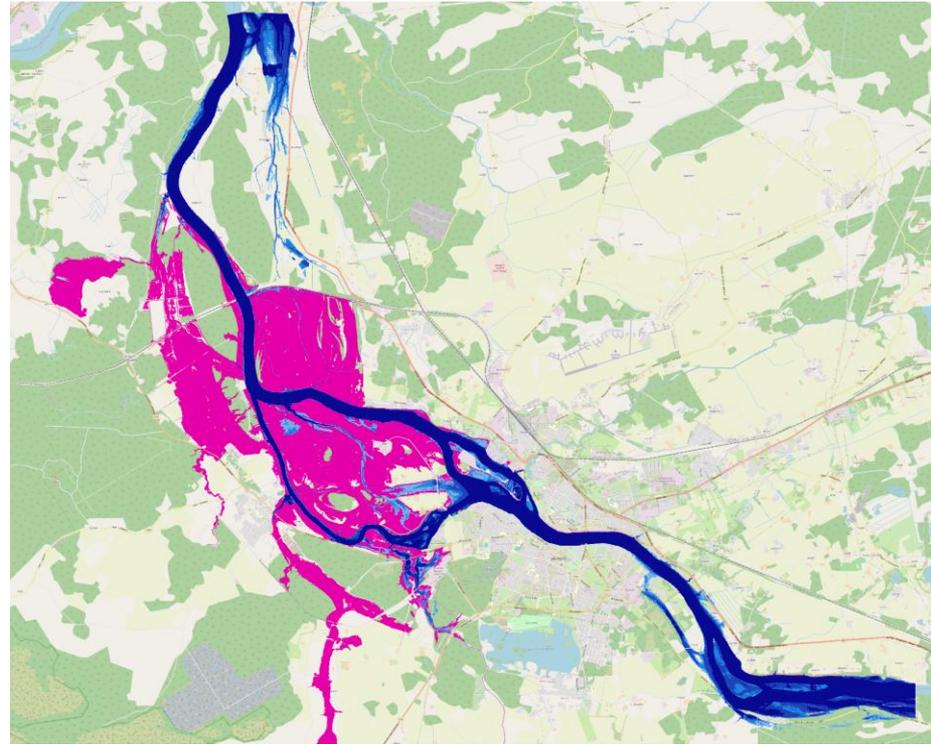
**10%:** 2053 persons; roads 34.66 km; 0 WWTP, 234 buildings.  
**1%:** 3226 persons; roads 57.05 km; 0 WWTP, 769 buildings.  
**0.5%:** 4085 persons; roads 100.87 km; 1 WWTP, 1390 buildings.  
**2050:** 3414 persons; roads 85.52 km; 0 WWTP, 1046 buildings.  
**2070:** 3333 persons; roads 68.09 km; 0 WWTP, 881 buildings.  
**2100:** 3274 persons; roads 59.70 km; 0 WWTP, 776 buildings.

SSP2 – 4,5

# SPRING FLOOD RISK IN DAUGAVA PILOT AREA



- Endangered population;
- Roads;
- Waste water treatment plants;
- Schools;
- Hospitals (none is endangered);
- Buildings.



10% scenario comparison  
Spring flood

**10%:** 2165 persons; 41.75 km; 2 WWTP, 662 buildings.

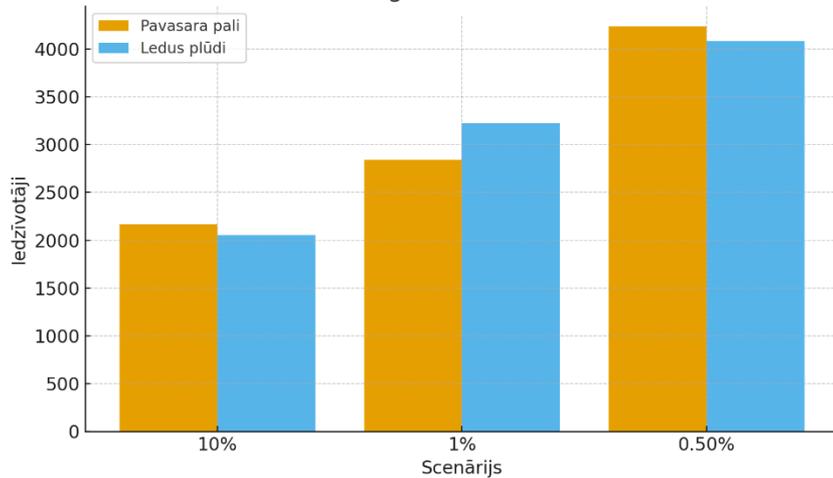
**1%:** 2838 persons; 103.19 km; 3 WWTP, 1450 buildings.

**0.5%:** 4239 persons; 126.39 km; 3 WWTP, 2401 buildings, 3 schools.

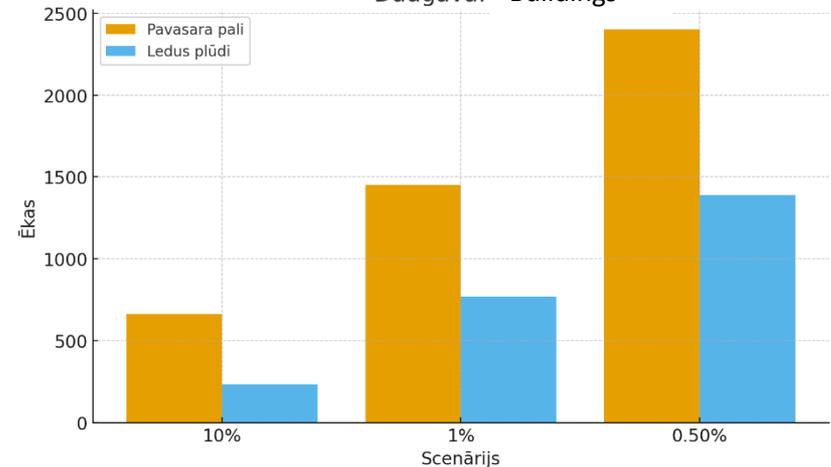
# SPRING FLOOD RISK IN DAUGAVA PILOT AREA- comparison



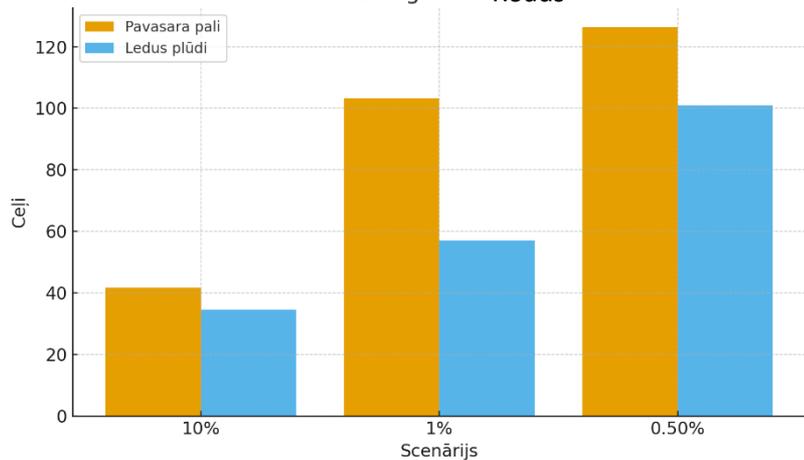
Daugava: Persons



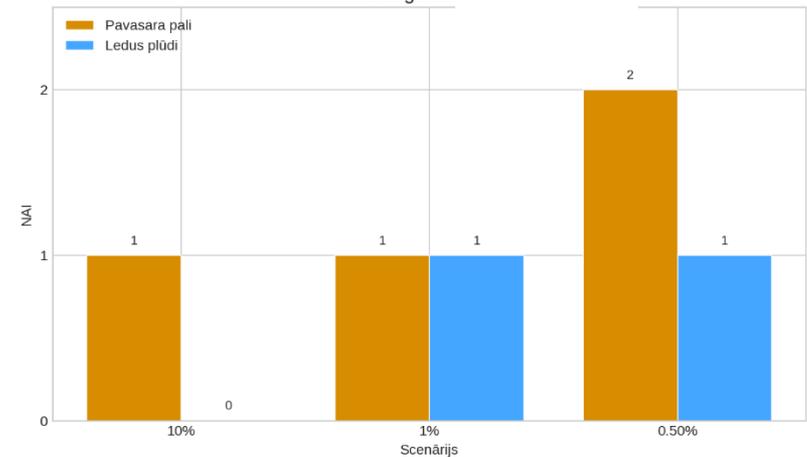
Daugava: Buildings



Daugava: Roads



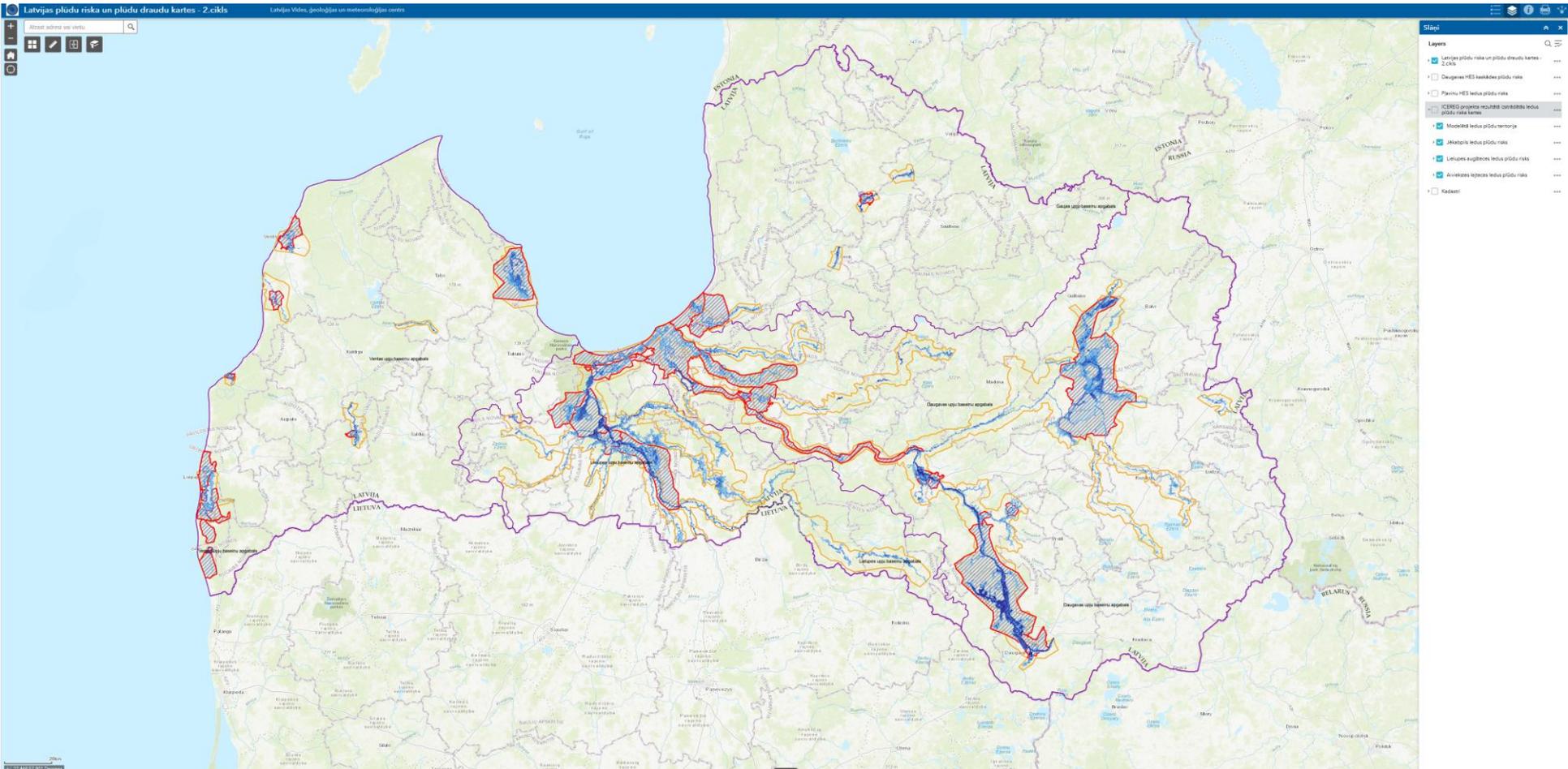
Daugava: WWTP



# Map Service



<https://videscentrs.lv/gmc.lv/iebuverts/pludu-riska-un-pludu-draudu-kartes>



**Future for all flood maps:**

<https://videscentrs.lv/gmc.lv/iebuverts/hidrologiskas-prognozes>



**THANKS FOR YOUR ATTENTION!**



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