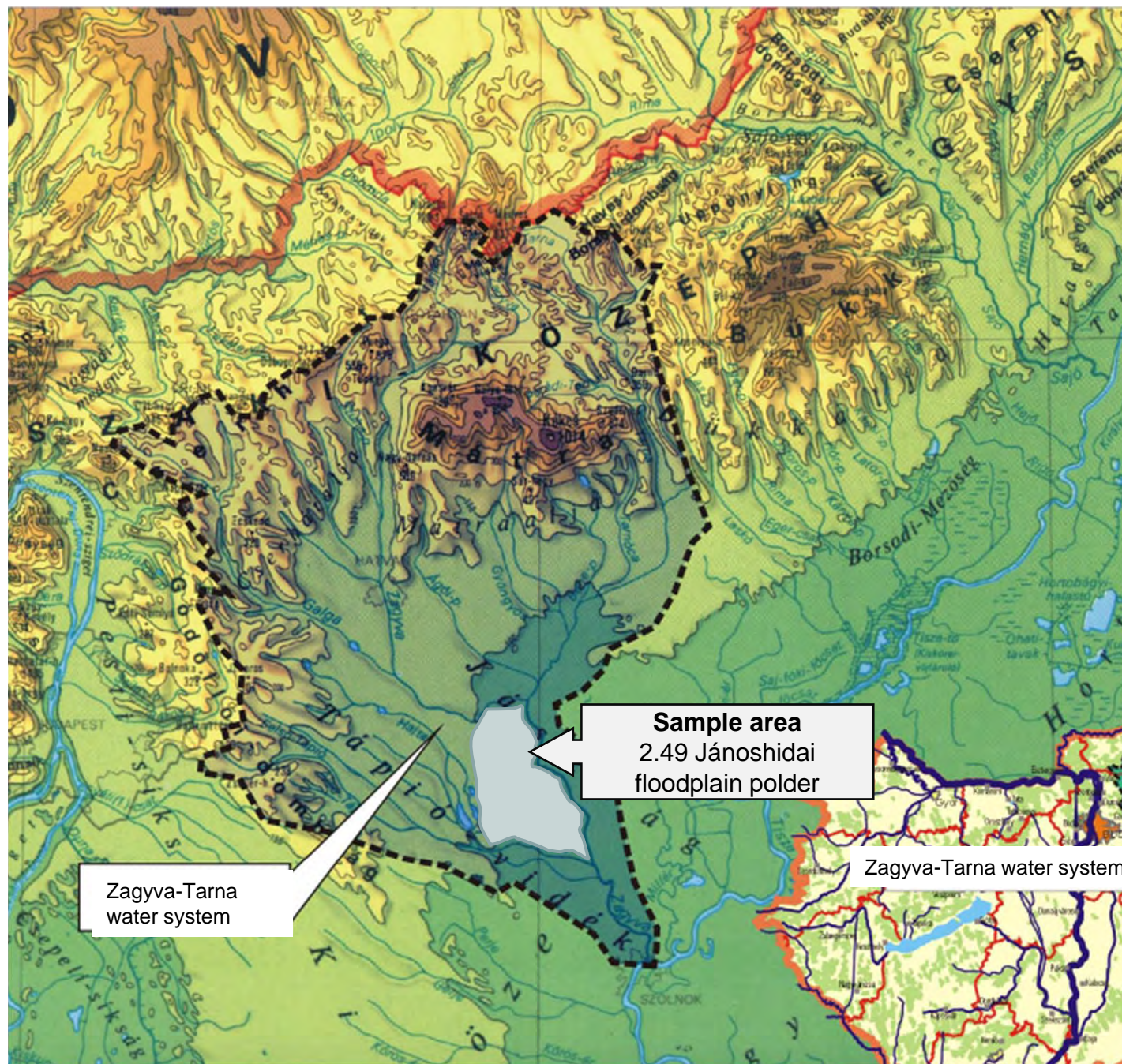


# Flood-risk mapping in a floodplain polder along the Middle-Tisza I.

## 2.49 Jánoshidai polder

Andor Kerti  
flood-prevention expert  
VIZITERV-ENVIRON Ltd. Nyíregyháza  
[info@environ.hu](mailto:info@environ.hu)





Zagyva-Tarna  
water system

**Sample area**  
2.49 Jánosidai  
floodplain polder

Zagyva-Tarna water system





## Flood-prevention establishments of the sample area

### 2.49 Jánoshidai floodplain polder

#### Its borders:

- North, East: Zagyva right bank flood-protection dikes
- South: Tápió left bank flood-protection dike
- West: field range

Area of floodplain polder 90 km<sup>2</sup>

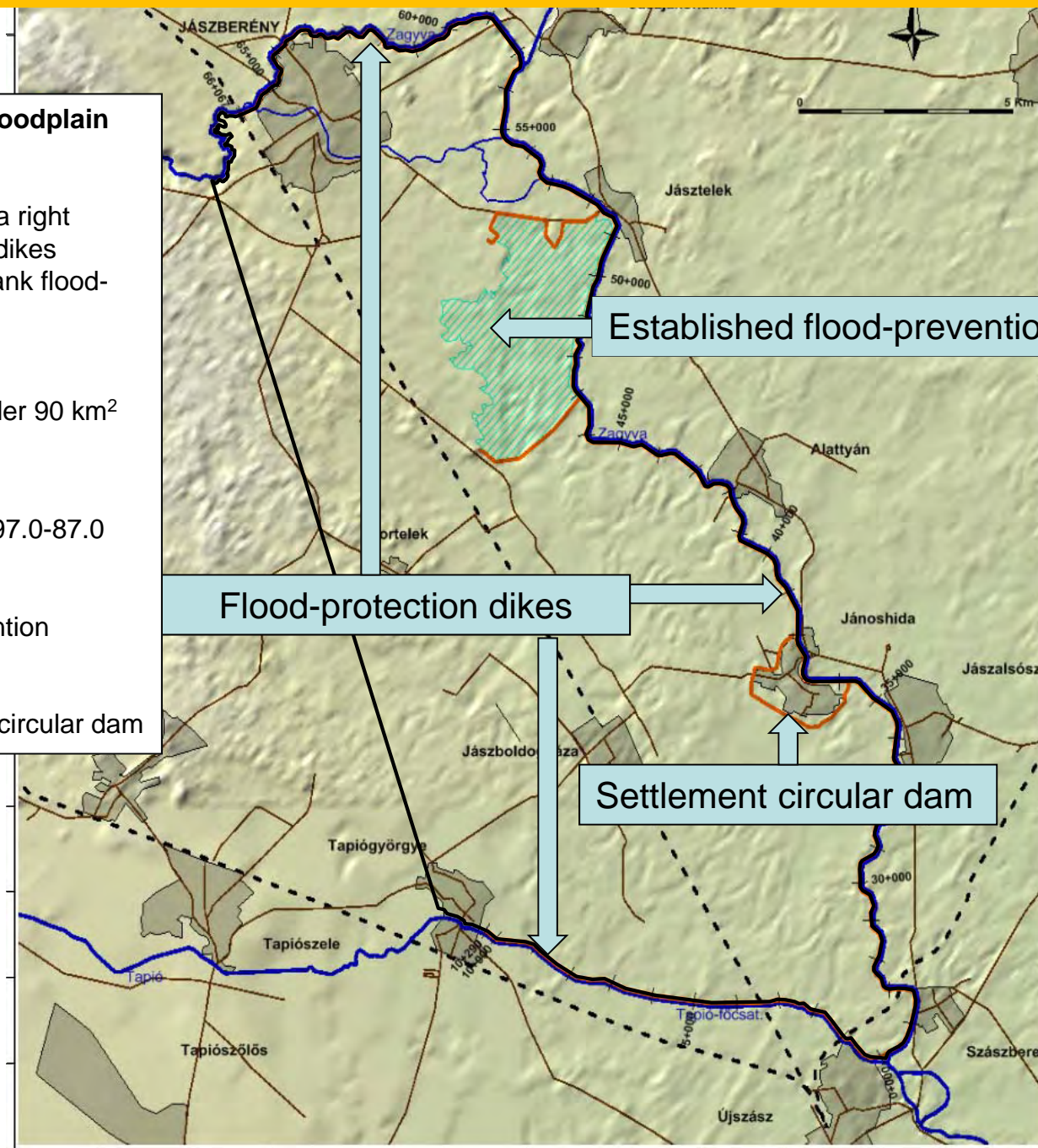
5 settlements

Field height between 97.0-87.0 maB

Jászapáti flood-prevention reservoir

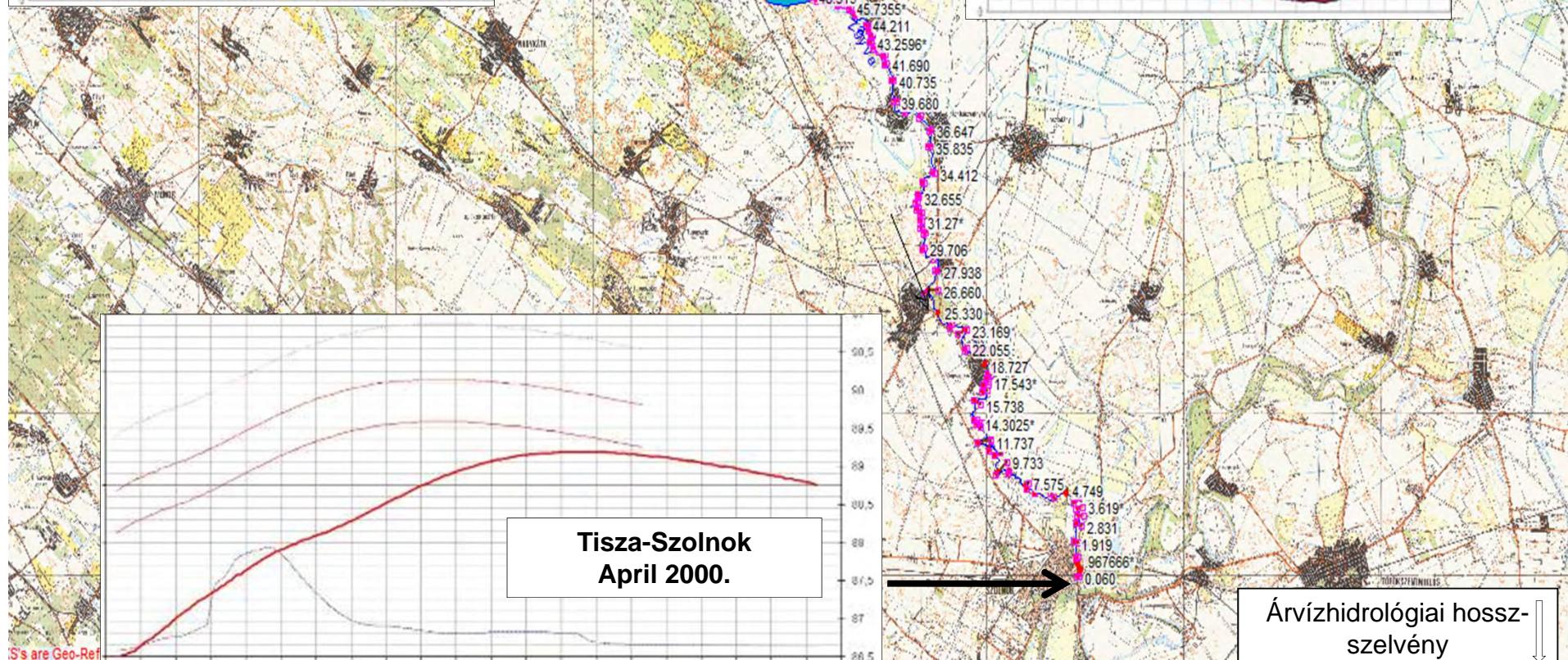
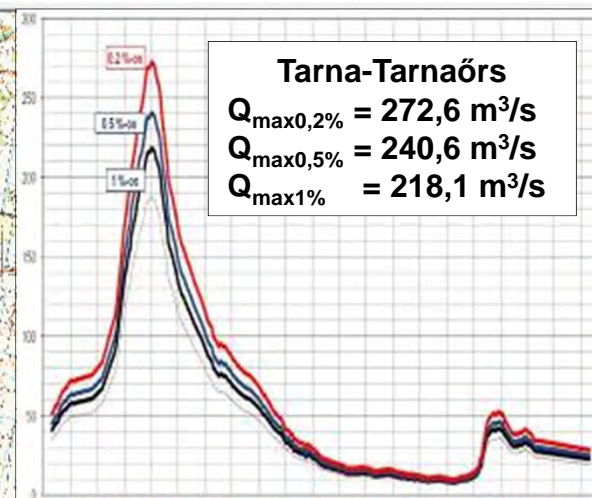
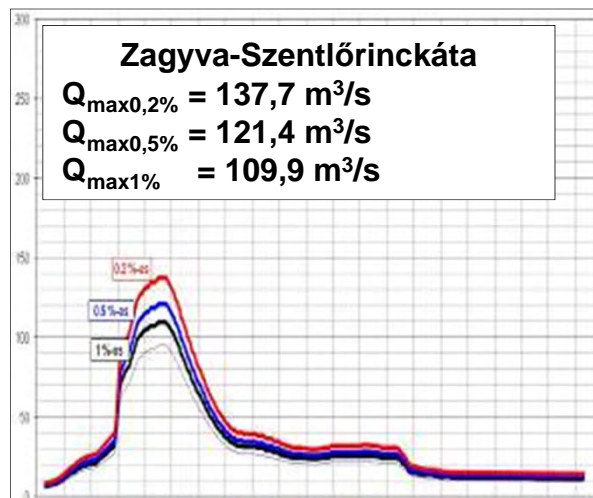
Jánoshida settlement circular dam

Lefolyási modell

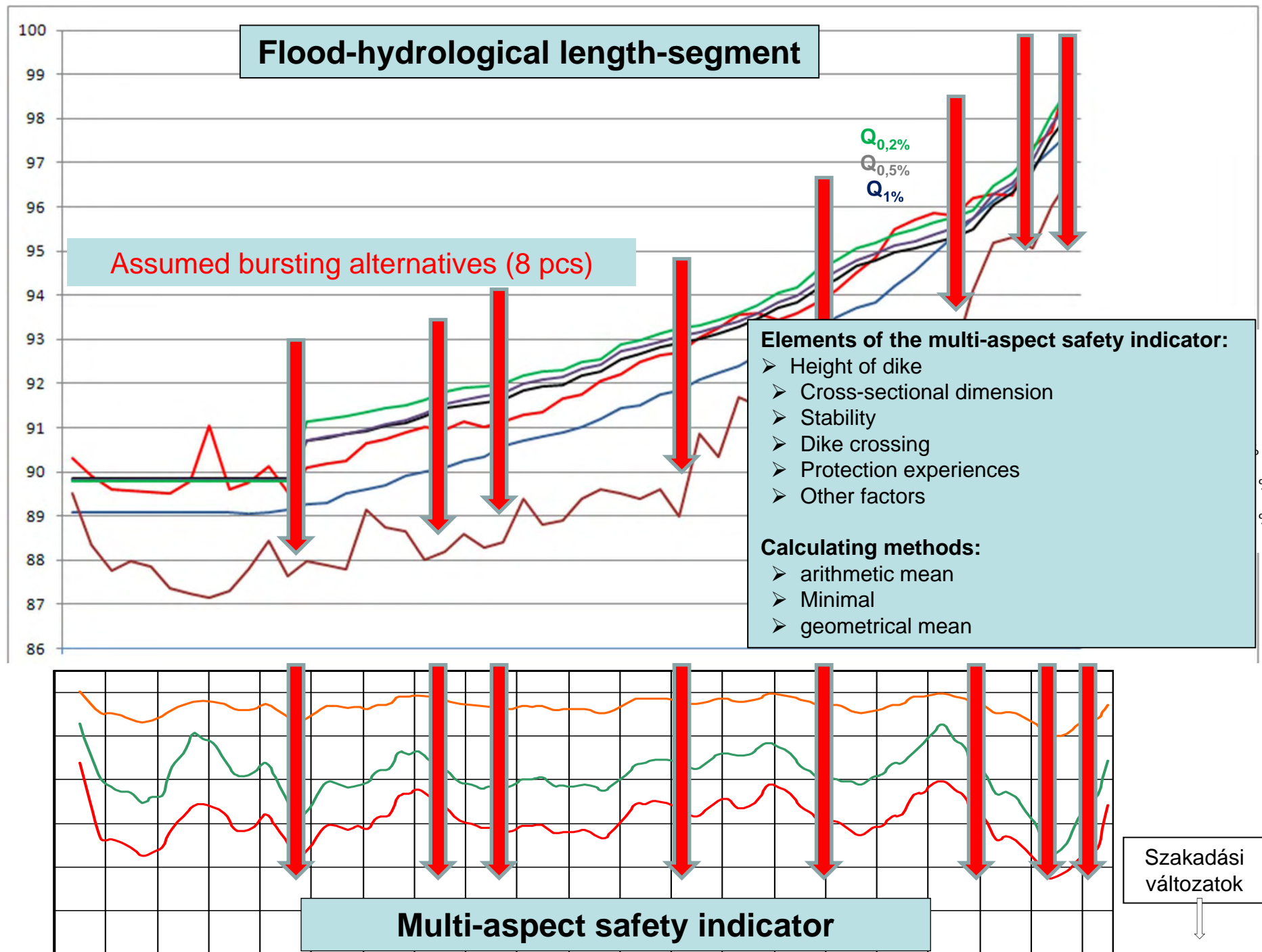




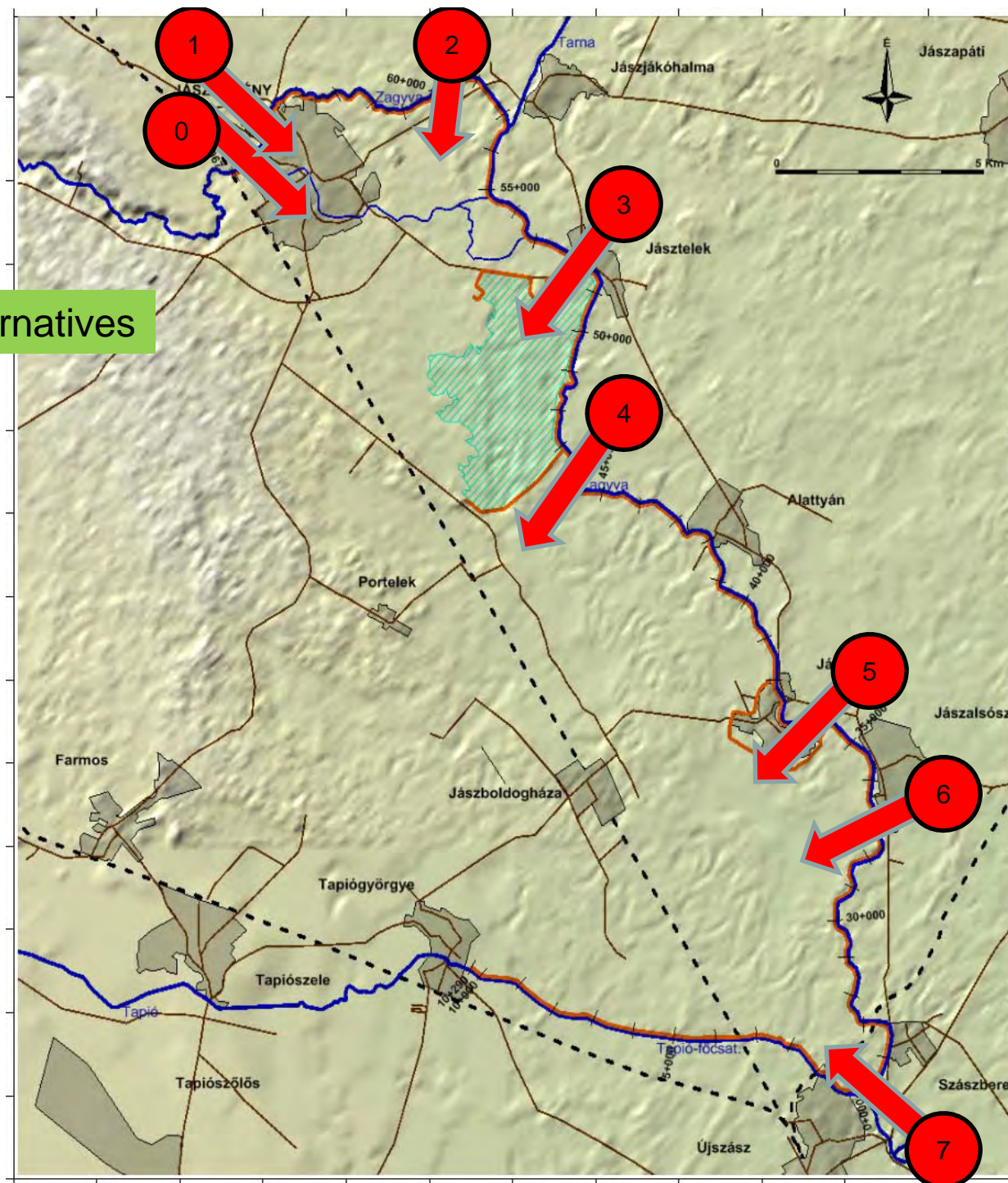
# Floodwave maps of runoff model







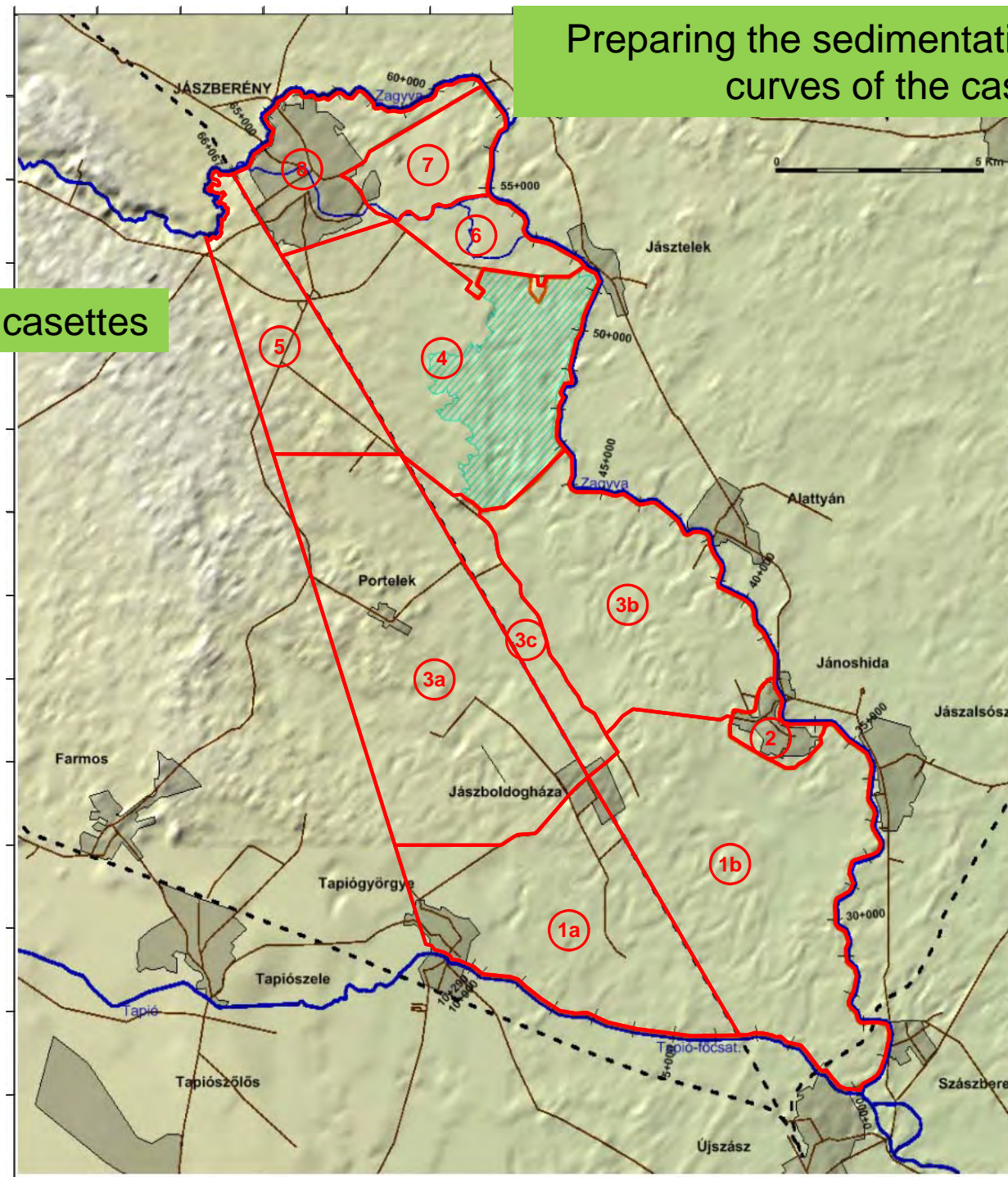
Bursting alternatives





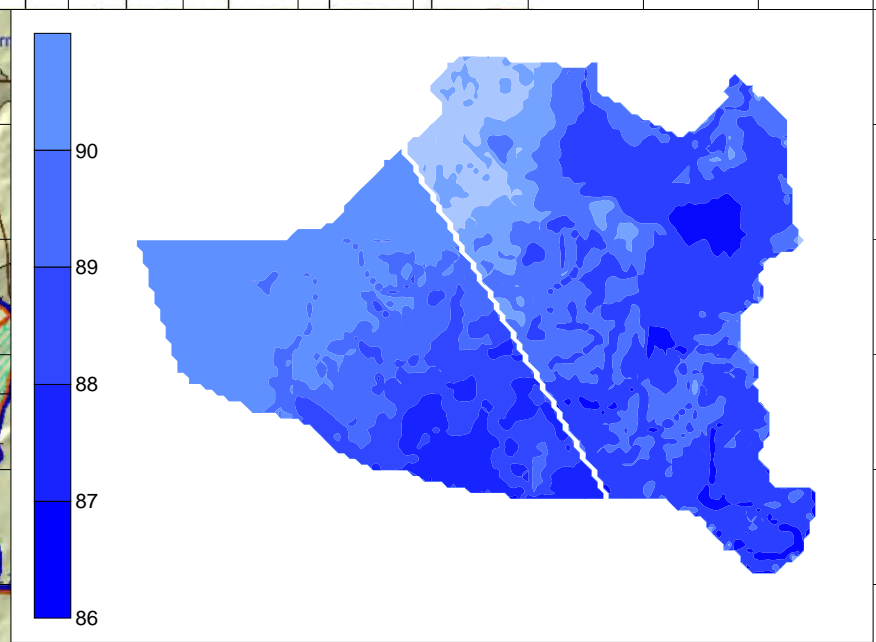
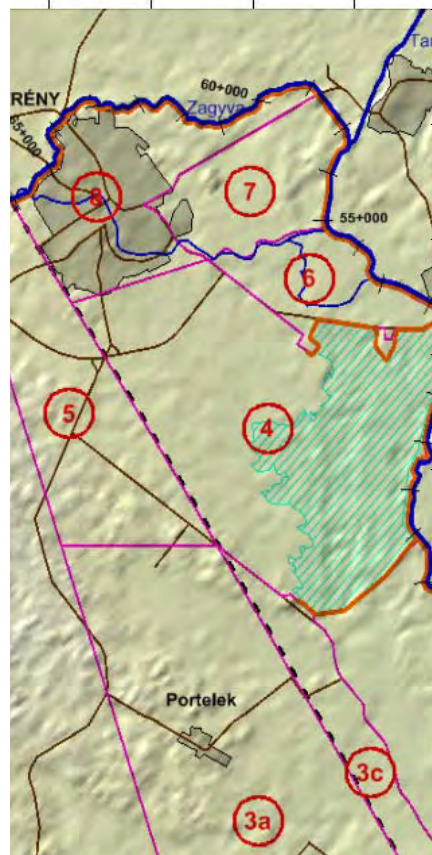
Preparing the sedimentation volumetric curves of the cassette

Establishing cassettes

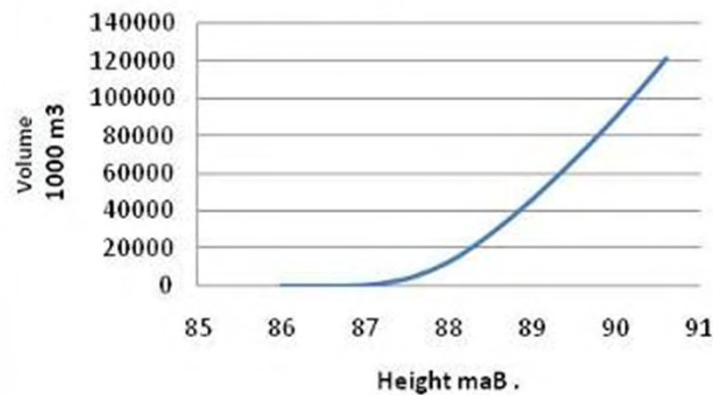


## 1a-1b Casette sedimentation volumetric curve

Inundation level (maB)	Inundated volume thousand m3	
<b>86</b>	<b>0</b>	<b>Free outflow</b>
86,2	4	
86,4	18	
86,6	59	
86,8	197	
<b>87</b>	<b>483</b>	
87,2	1448	
87,4	2957	
87,6	5271	
87,8	8613	
<b>88</b>	<b>12856</b>	<b>Field</b>
88,2	18277	
88,4	24429	
88,6	31265	
88,8	38626	
<b>89</b>	<b>46379</b>	
89,2	54593	
89,4	63109	
89,6	71972	
89,8	81147	
<b>90</b>	<b>90615</b>	
90,2	100637	
90,4	110952	
90,6	121564	



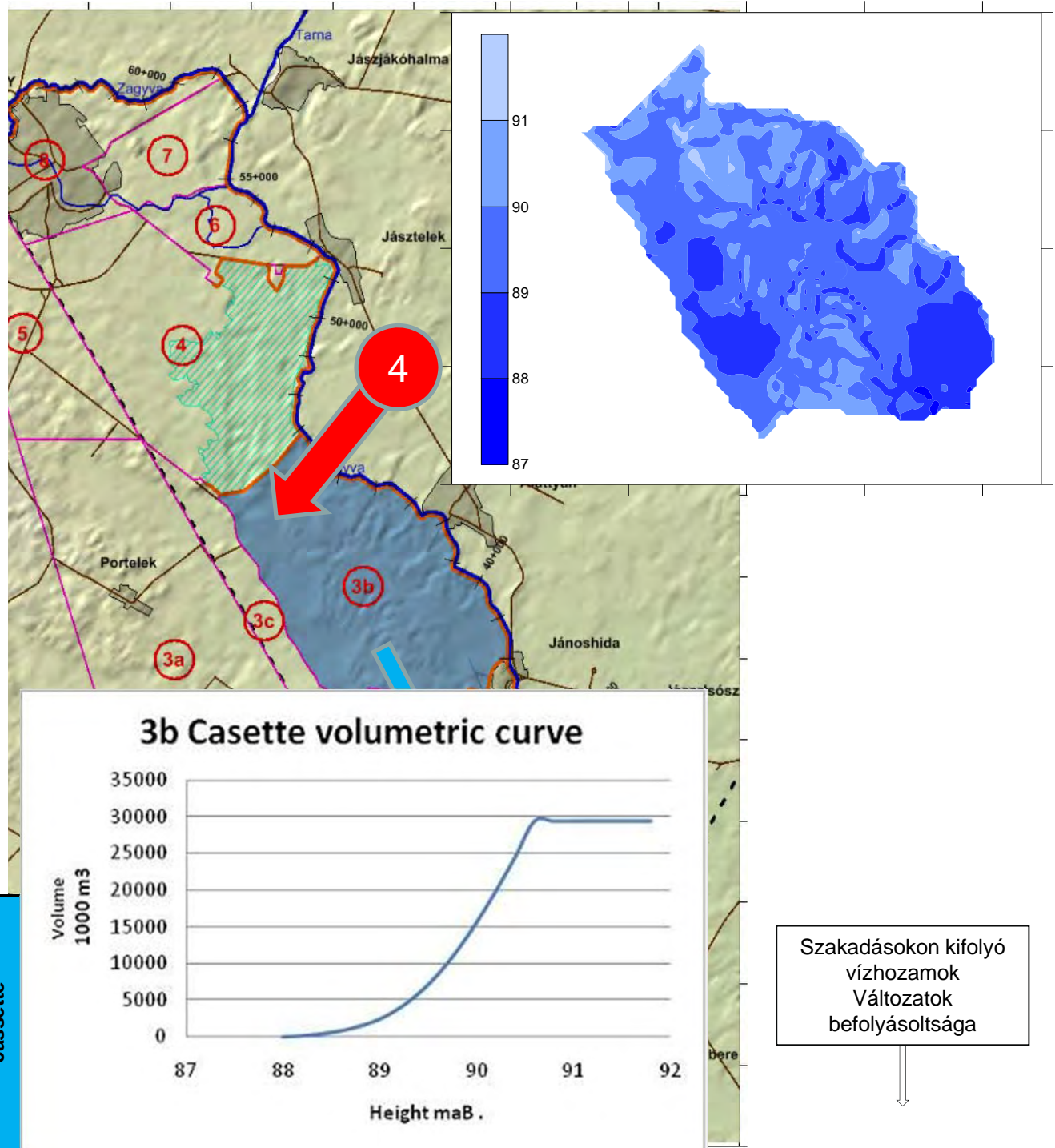
### 1a-1b Casette volumetric curve



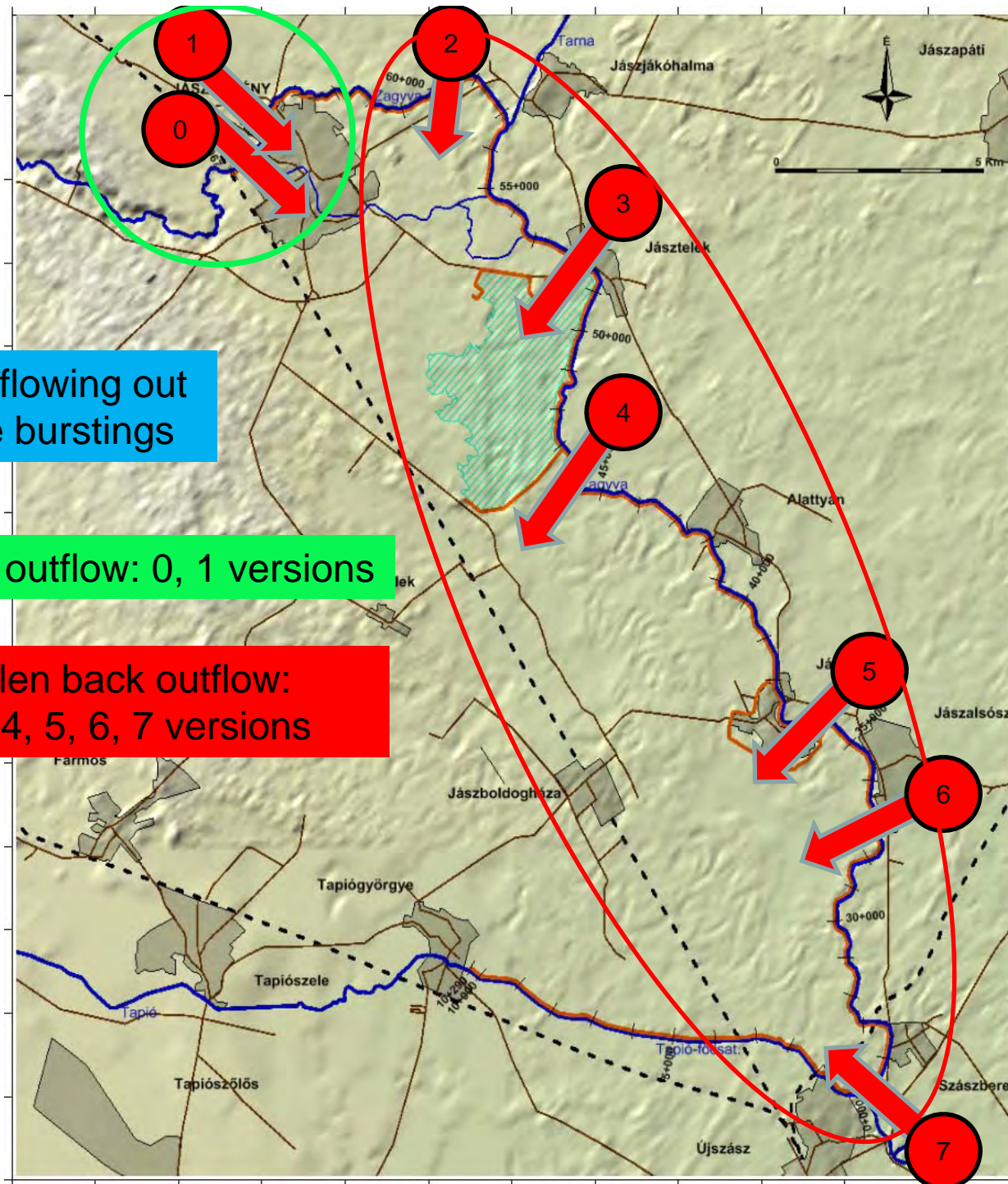


## 3b Casette sedimentation volumetric curve

Inundation level (maB)	Inundated volume thousand m3	
88	21	Free outflow
88,2	173	
88,4	429	
88,6	849	
88,8	1505	
89	2435	Field
89,2	3898	Swollen back outflow
89,4	5871	
89,6	8472	
89,8	11734	
90	15551	
90,2	19877	
90,4	24534	
90,6	29466	
90,8	29466	
91	29466	
91,2	29466	Outflow into other cassette
91,4	29466	
91,6	29466	
91,6	29466	
91,8	29466	







Discharges flowing out through the burstings

Free outflow: 0, 1 versions

Swollen back outflow:  
2, 3, 4, 5, 6, 7 versions

Szakadásokon kifolyó  
vízhozamok  
árhullámképek



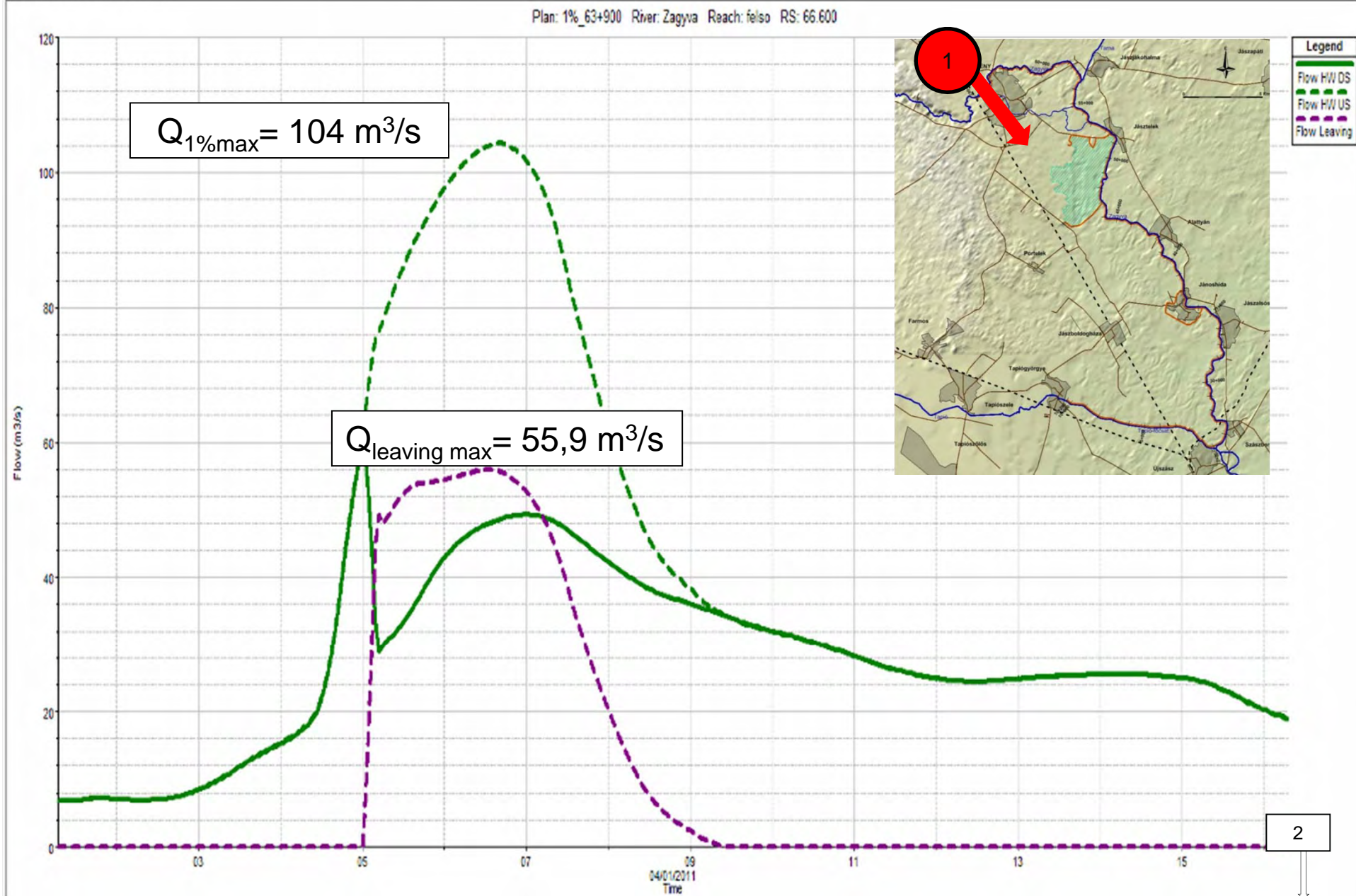
# Outflow discharges 1st Bursting alternative $Q_{1\%}$

River: Zagyva  
Reach: felső  
River Sta: 66.600 LS

☐ Plot Stage ☒ Plot Flow ☐ Obs Stage ☐ Obs Flow ☐ Use Ref Stage

Stage Flow | Table | Rating Curve

Time Series	Maximum	Time at Max	Volume(1000 m3)
1 Hw Stage	95.68	05Apr2011 01:03	
2 Tw Stage	95.66	05Apr2011 01:03	
3 Flow Leaving	55.94	06Apr2011 13:03	12503.75

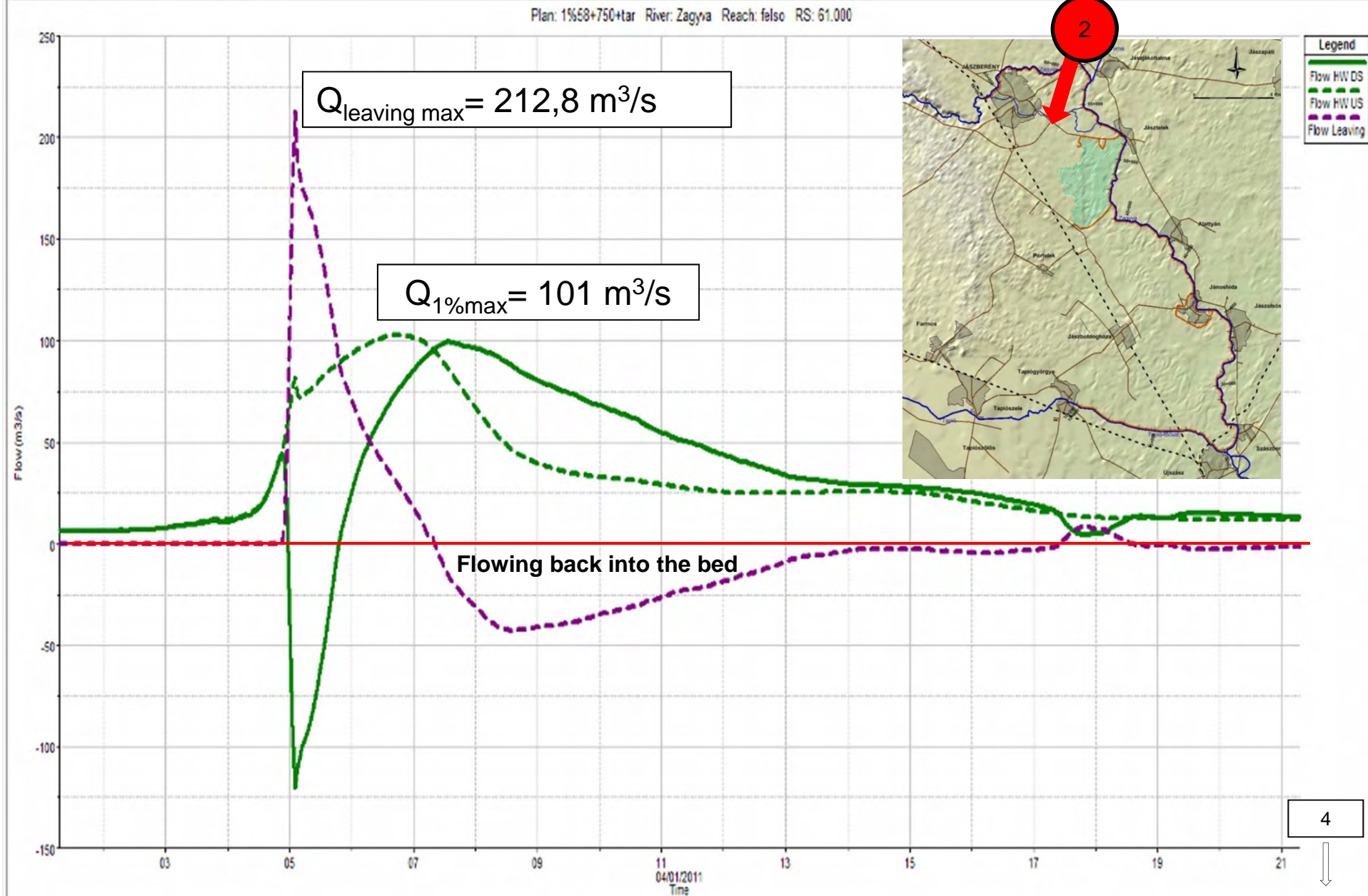




# Outflow discharges 2nd Bursting alternative $Q_{1\%}$

River: **Zagyva**  
 Reach: **felso** River Sta: **61.000 LS**  
☐ Plot Stage ☒ Plot Flow ☐ Obs Stage ☐ Obs Flow ☐ Use Ref Stage  
 Stage Flow | Table | Rating Curve

Time Series	Maximum	Time at Max	Volume(1000 m3)
1 HW/US Stage	94.90	04Apr2011 2200	
2 HW/DS Stage	94.90	04Apr2011 2200	
3 Flow Leaving	212.34	05Apr2011 0200	1067.69

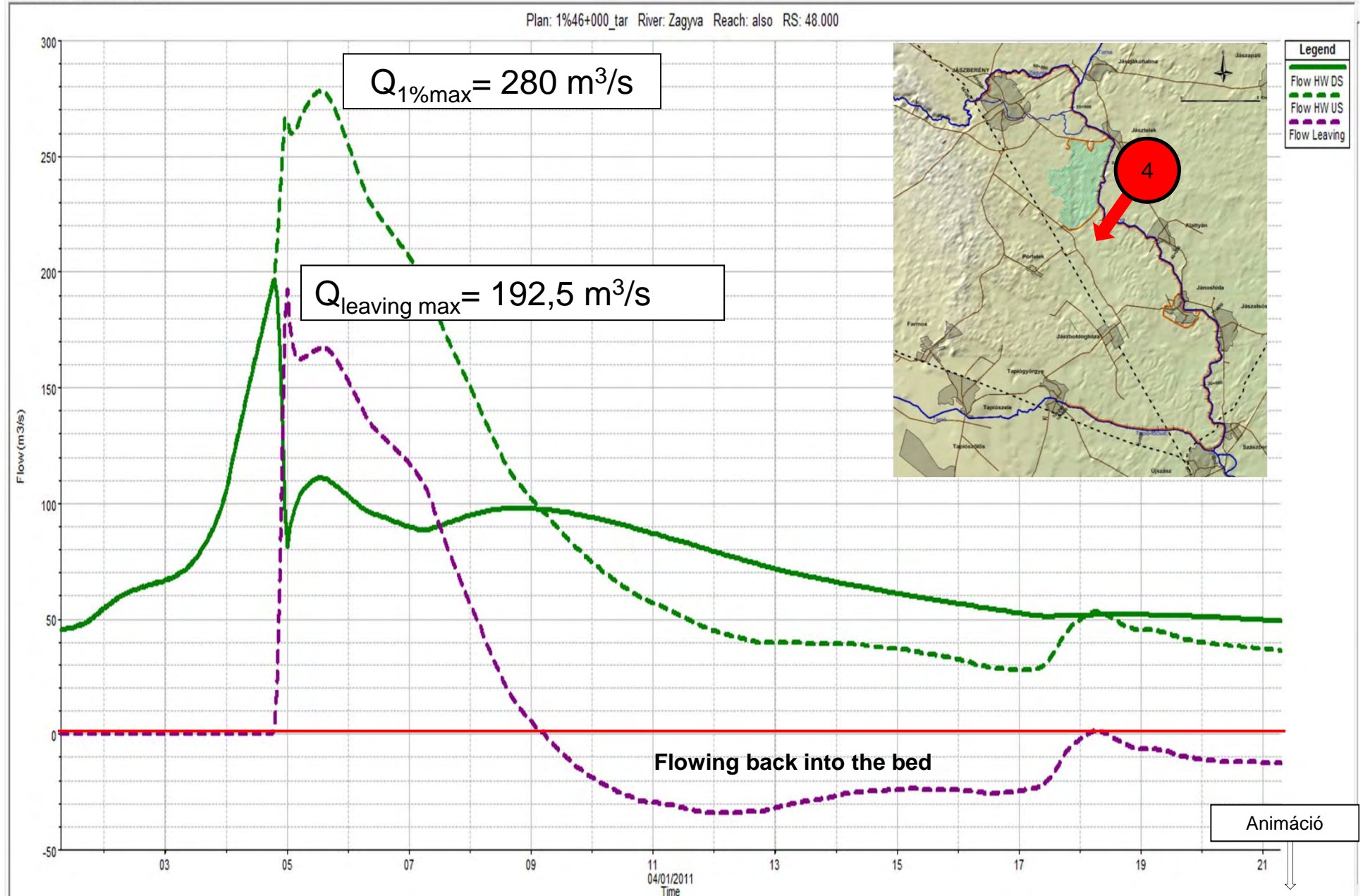




River: **Zagyva** | 07Apr2011 19:37:28, 175.43  
 Reach: also | River Sta.: 48.000 LS  
☐ Plot Stage ☒ Plot Flow ☐ Obs Stage ☐ Obs Flow ☐ Use Ref Stage  
 Stage Flow | Table | Rating Curve

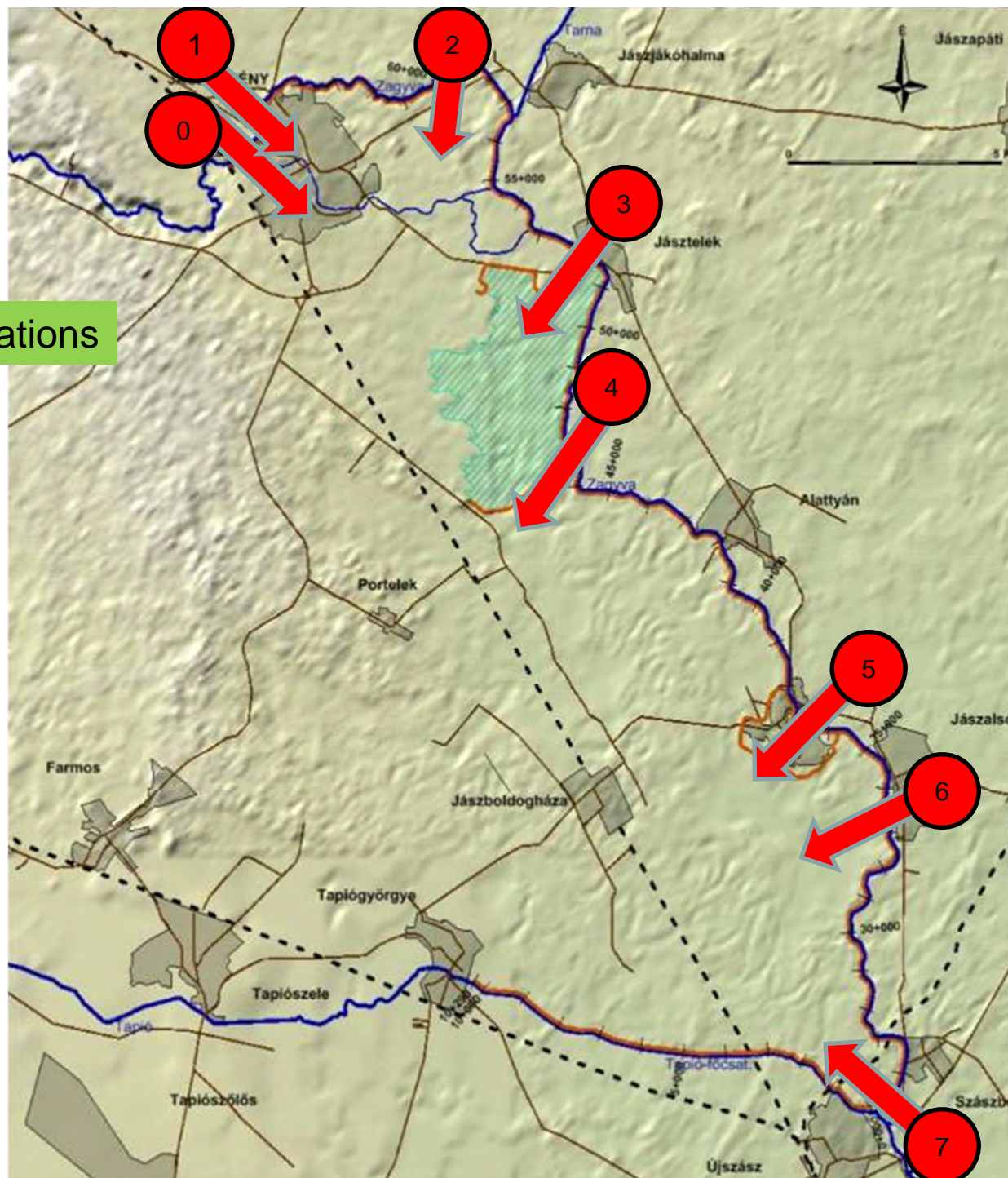
Time Series	Maximum	Time at Max	Volume(1000 m3)
1 HW US Stage	92.10	04Apr2011 2000	
2 HW DS Stage	92.09	04Apr2011 2000	
3 TW Stage	90.91	09Apr2011 0400	

# Outflow discharges 4th Bursting alternative Q<sub>1%</sub>



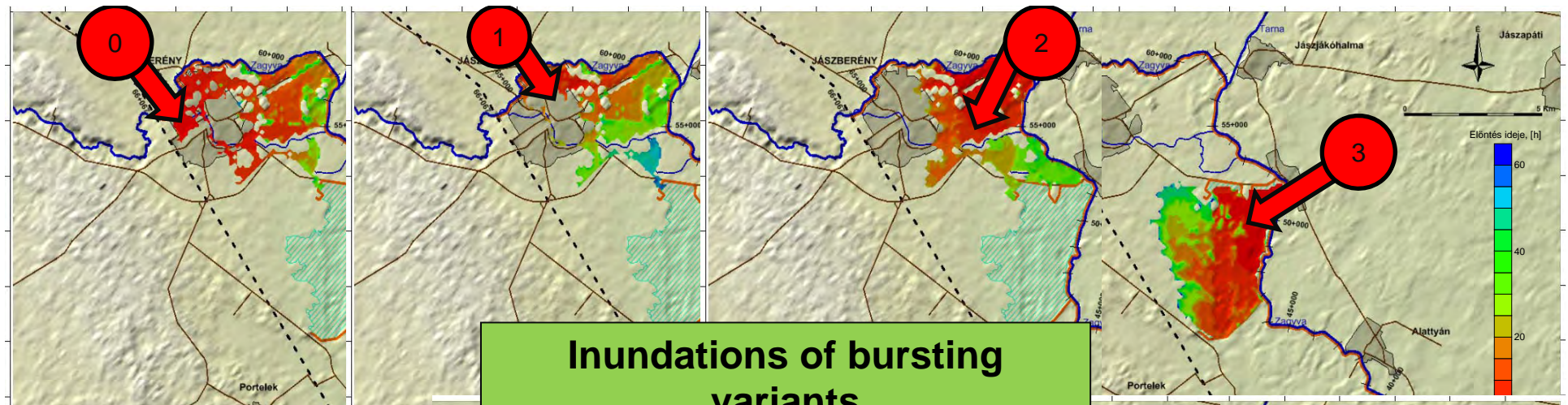


Animations

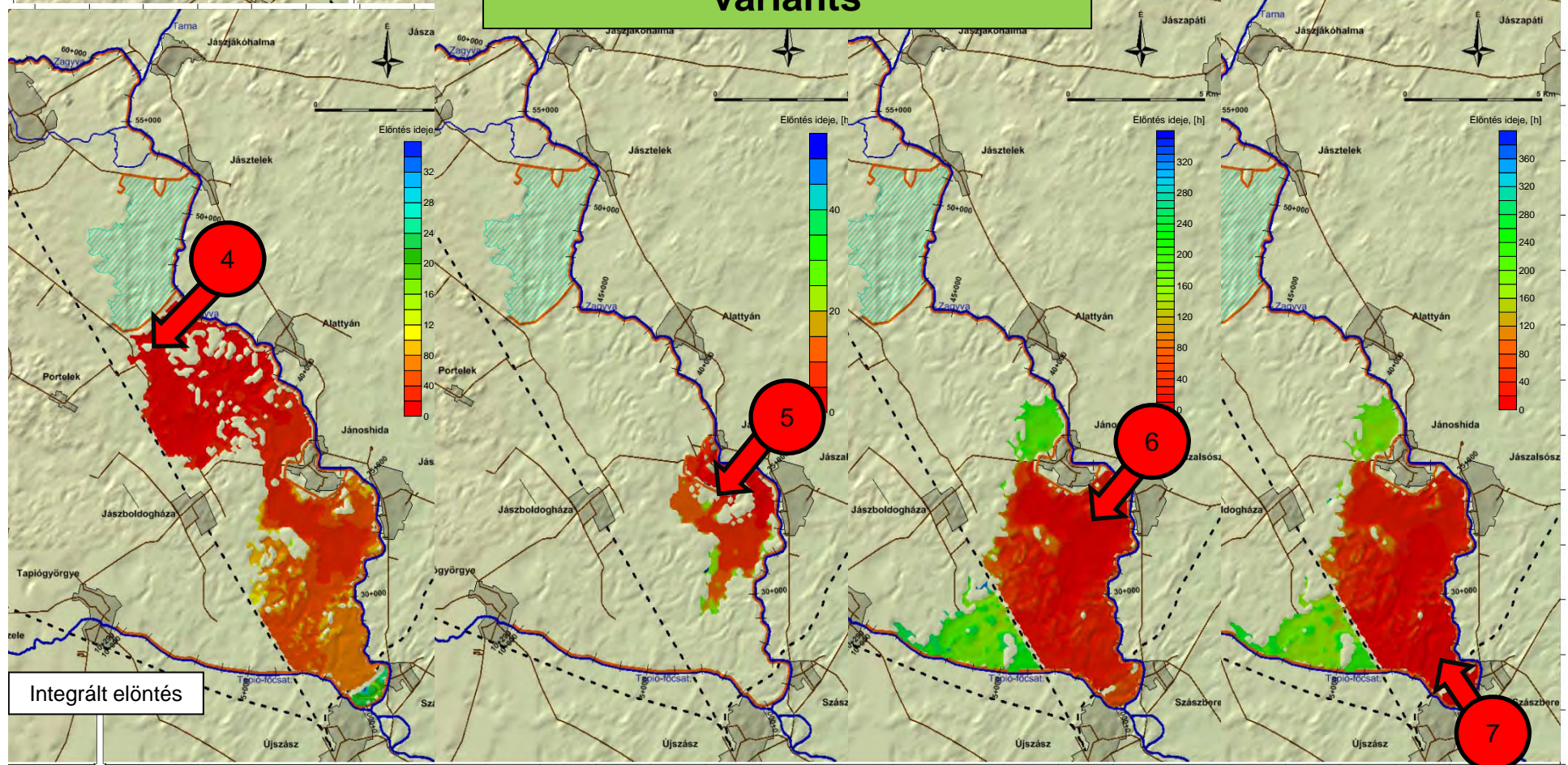


Elöntési képek



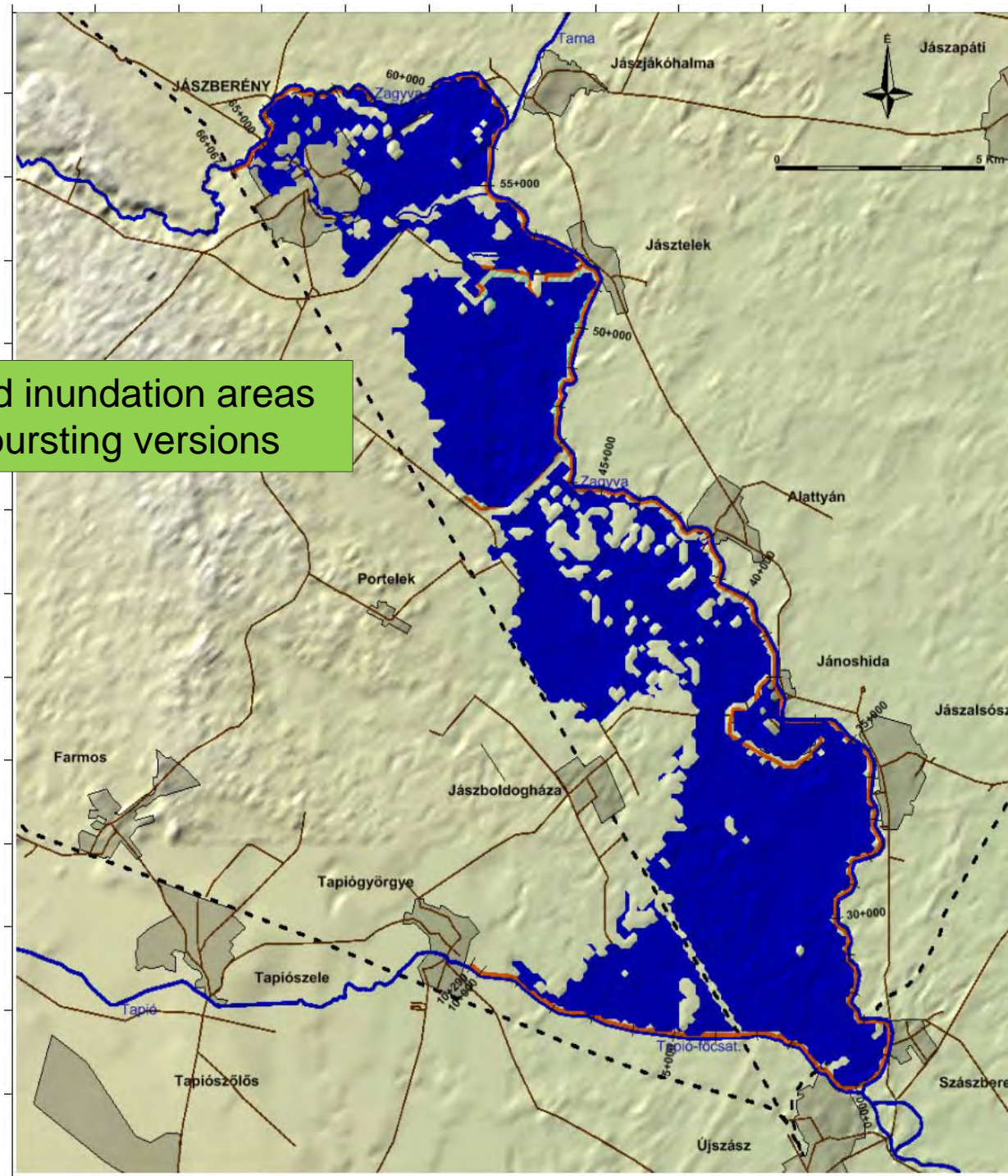


## Inundations of bursting variants





Integrated inundation areas  
of 0-7 bursting versions



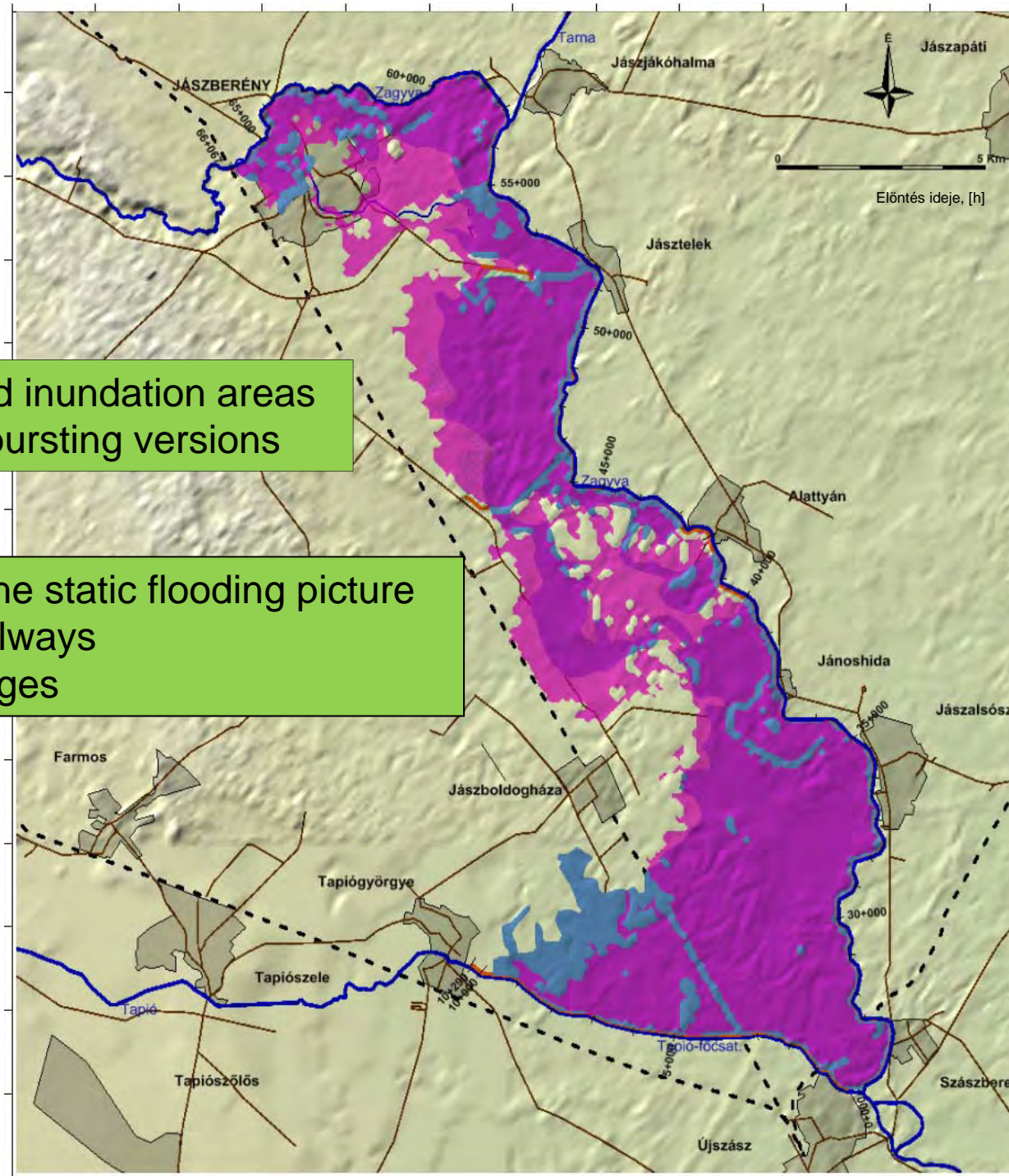
Összehasonlítás



Integrated inundation areas  
of 0-7 bursting versions

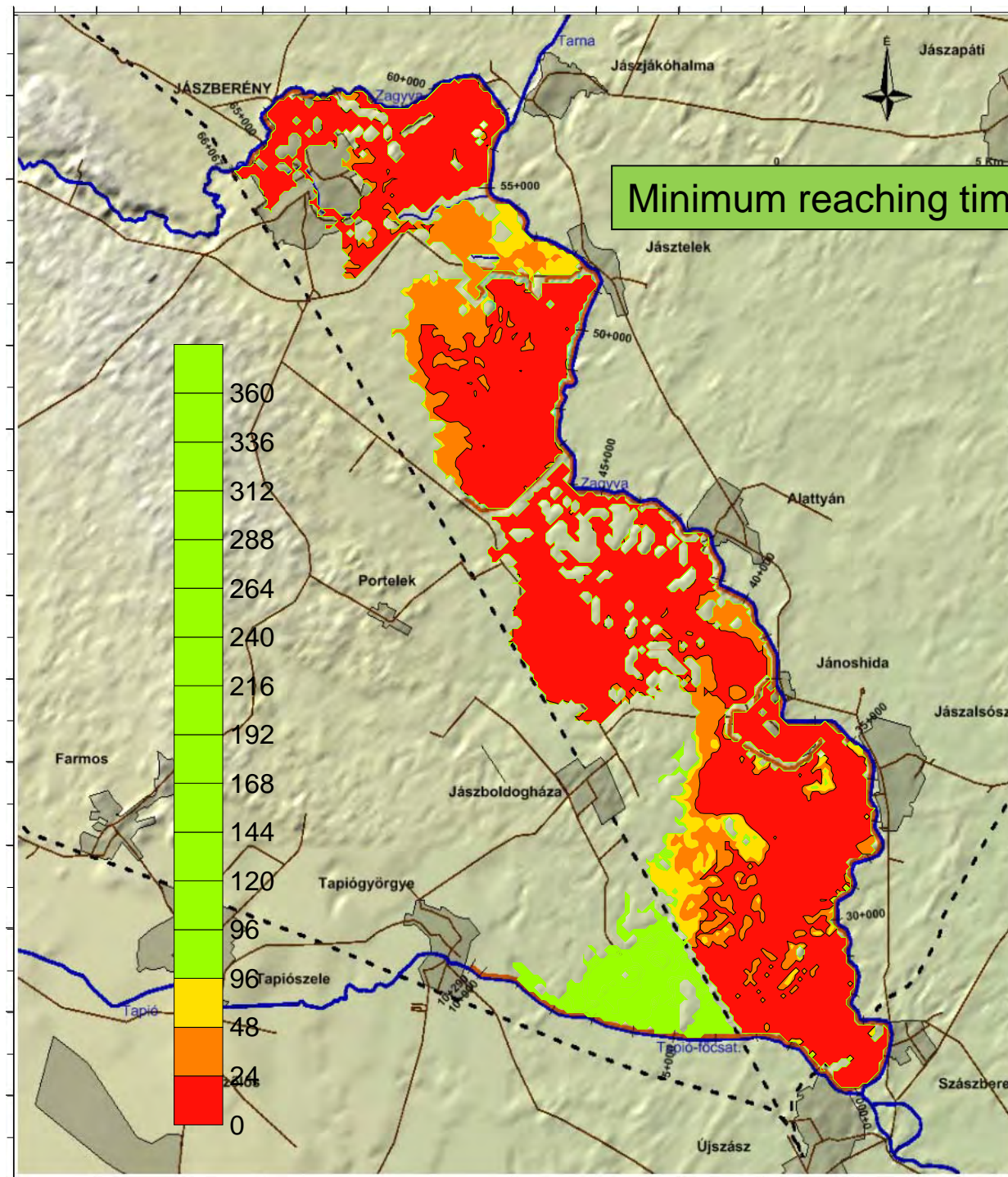
Differs from the static flooding picture

- Roads, railways
- Dikes, ranges



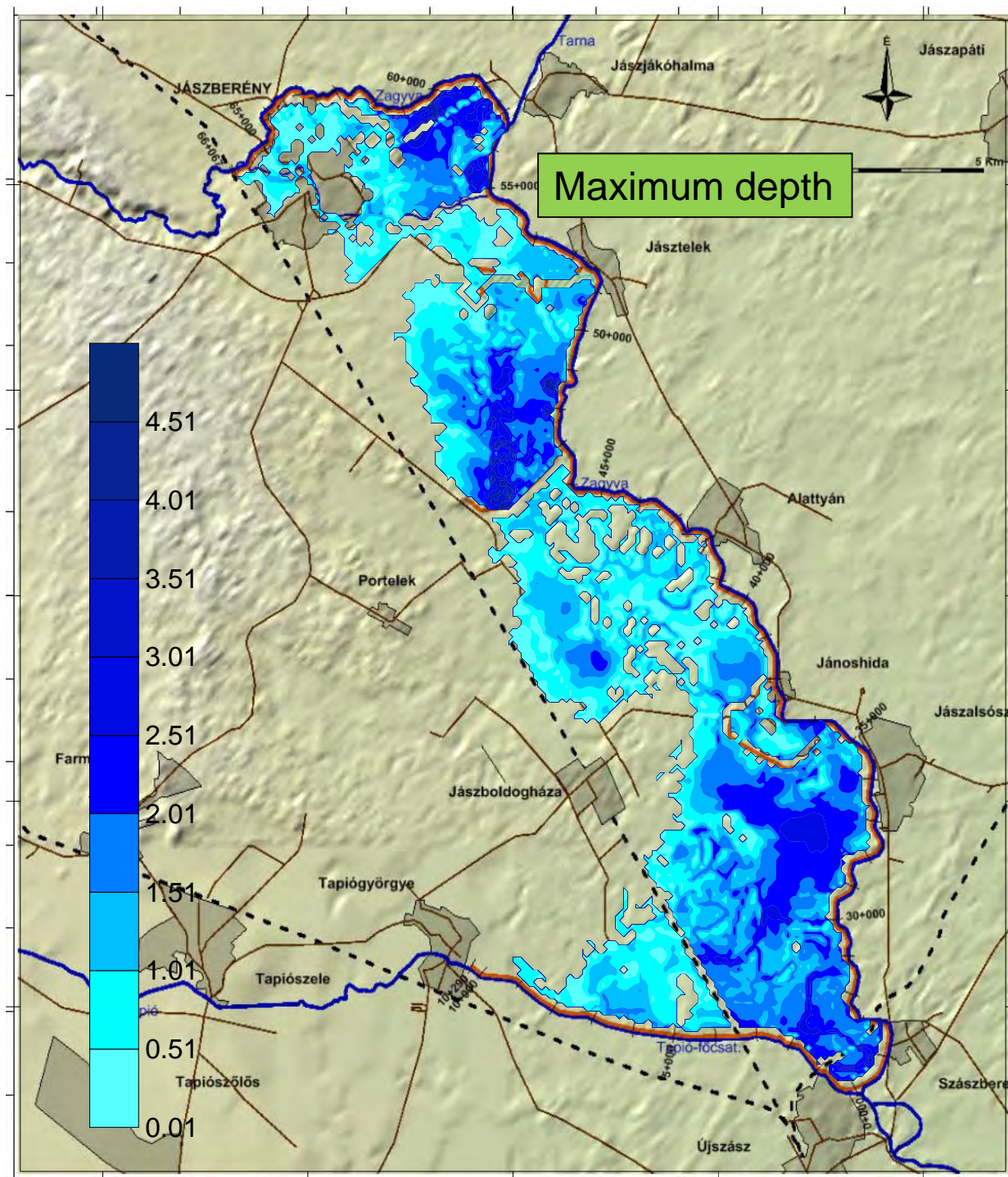
Min elérési idő





Max vízmélység

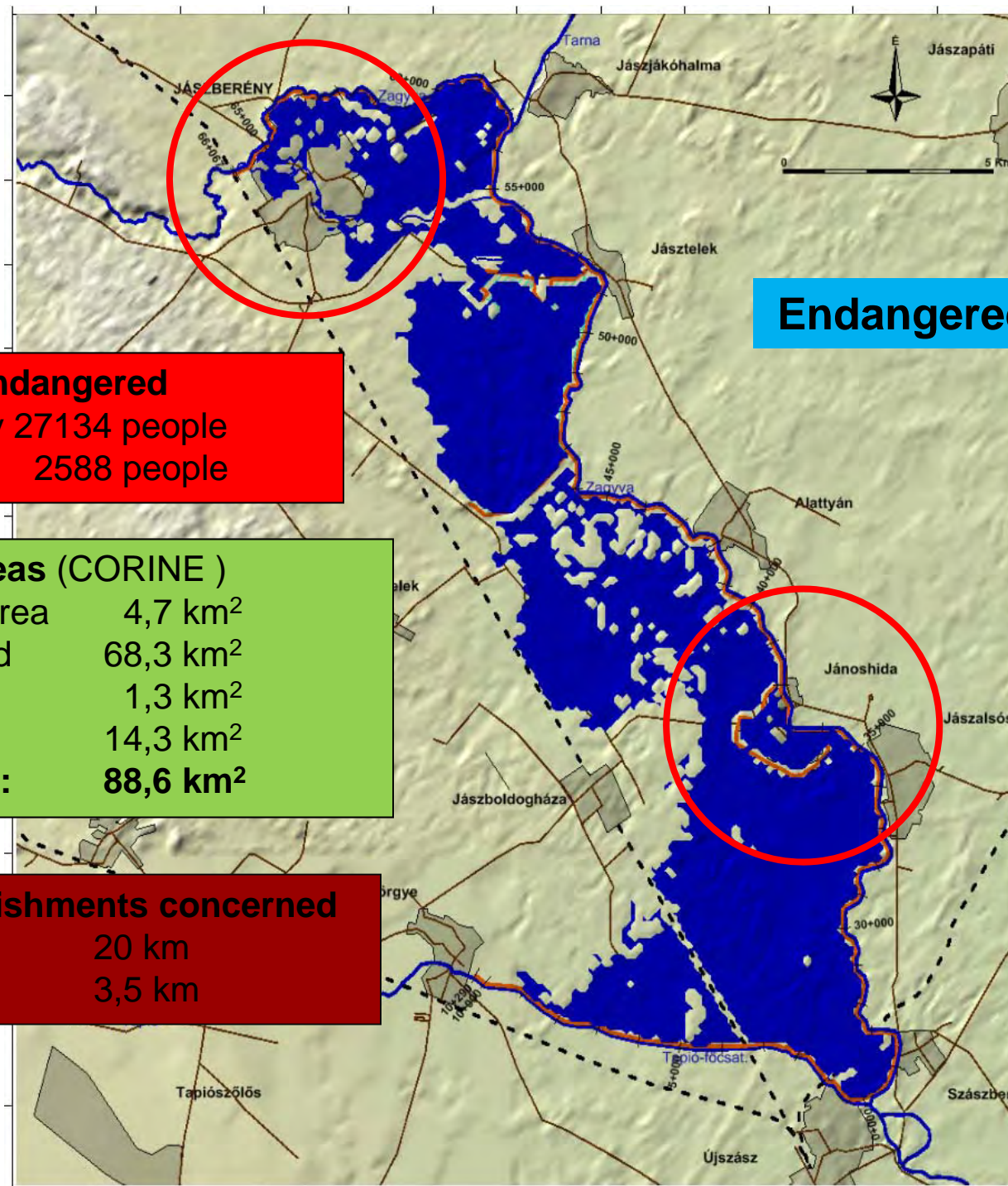




Maximum depth

Veszélyeztetettség





**Endangered territories**

**Population endangered**

- Jászberény 27134 people
- Jánoshida 2588 people

**Inundated areas (CORINE )**

- Inhabited area 4,7 km<sup>2</sup>
- Plough-land 68,3 km<sup>2</sup>
- Forest 1,3 km<sup>2</sup>
- Meadow 14,3 km<sup>2</sup>
- **Altogether: 88,6 km<sup>2</sup>**

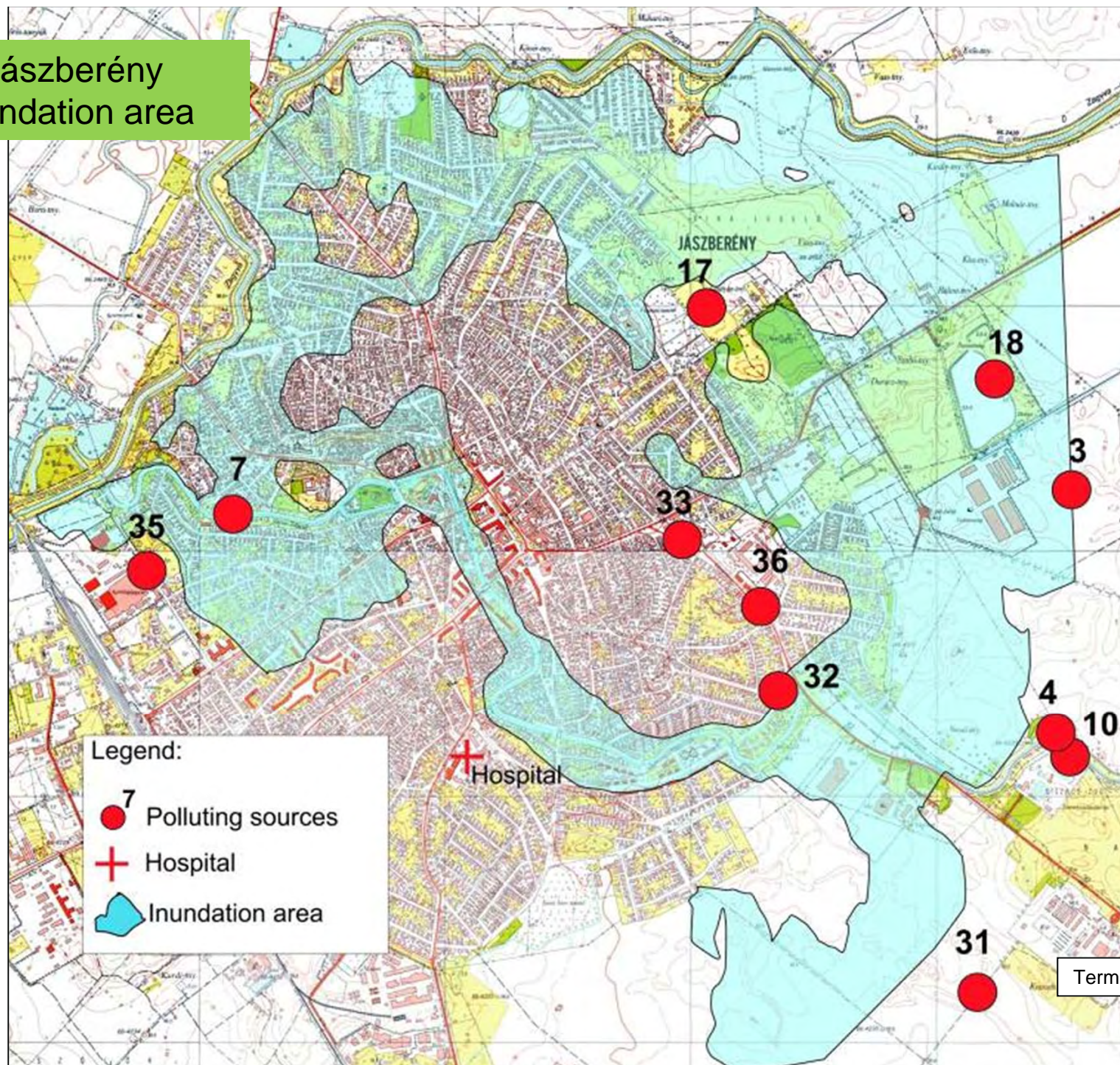
**Traffic establishments concerned**

- Road 20 km
- Railway 3,5 km

Jászberény



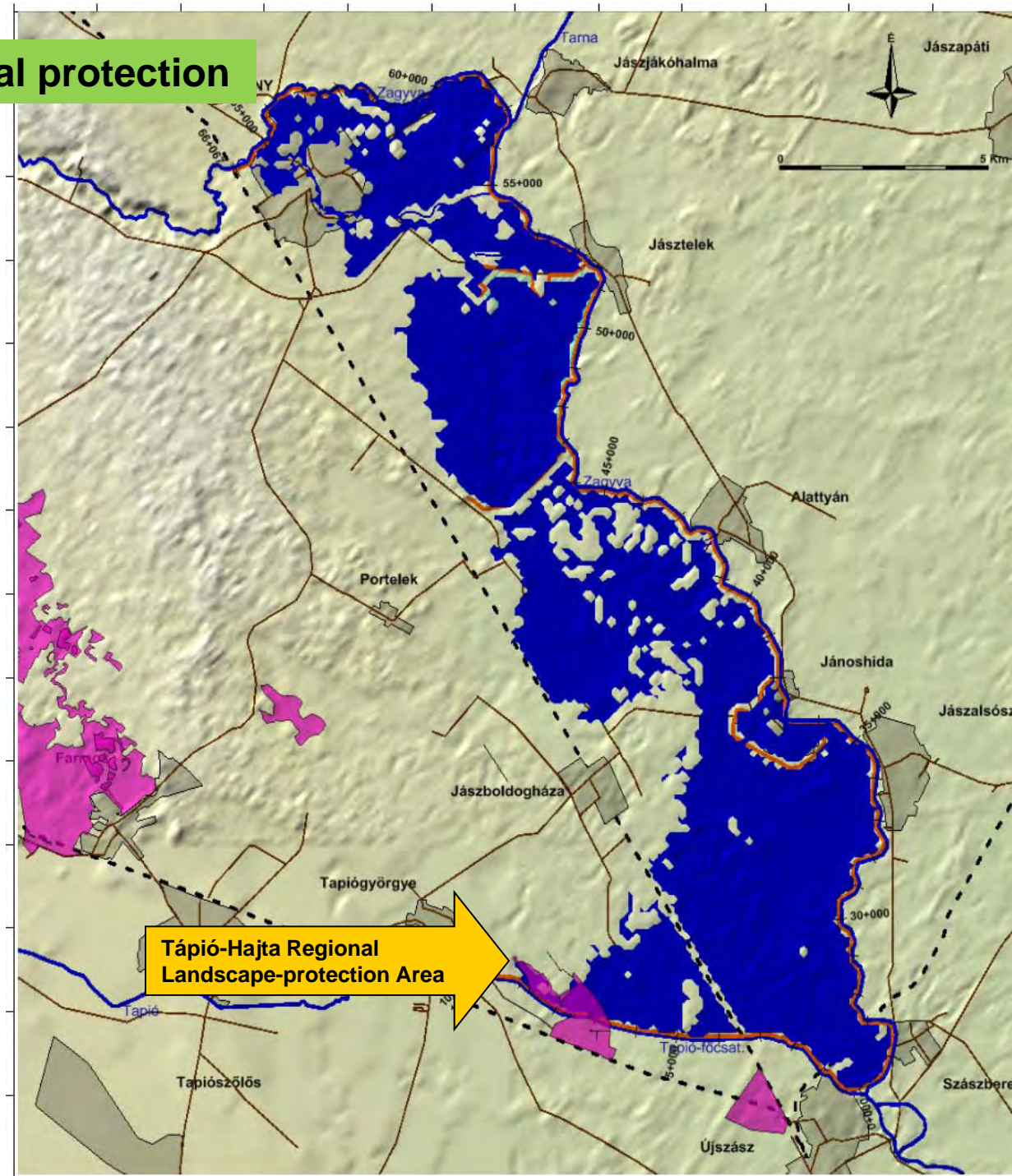
## Jászberény inundation area





## Environmental protection

Landscape  
-protection  
Areas

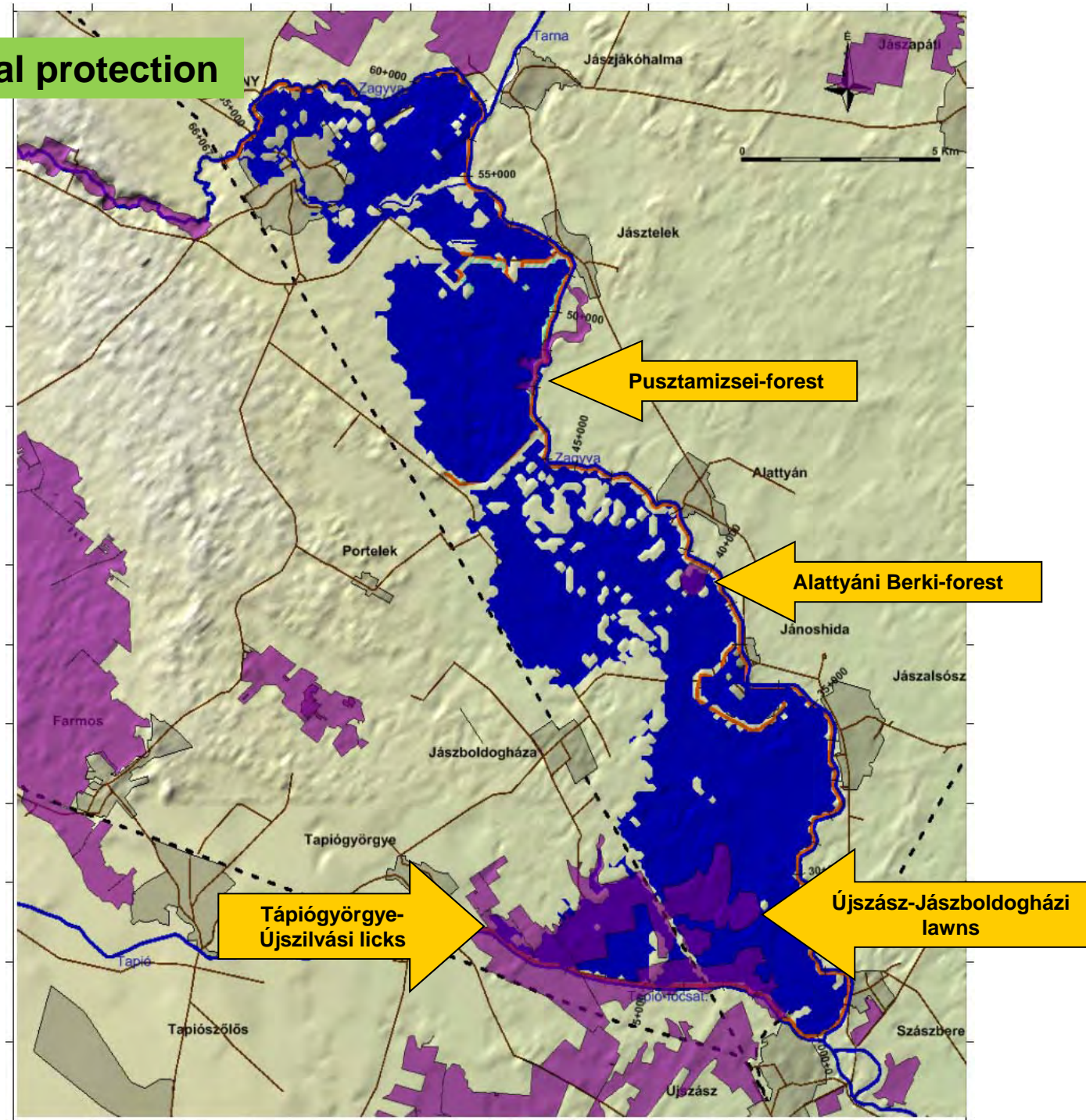




## Environmental protection

NATURA  
2000 Areas

Special  
nature-  
preservation  
territories

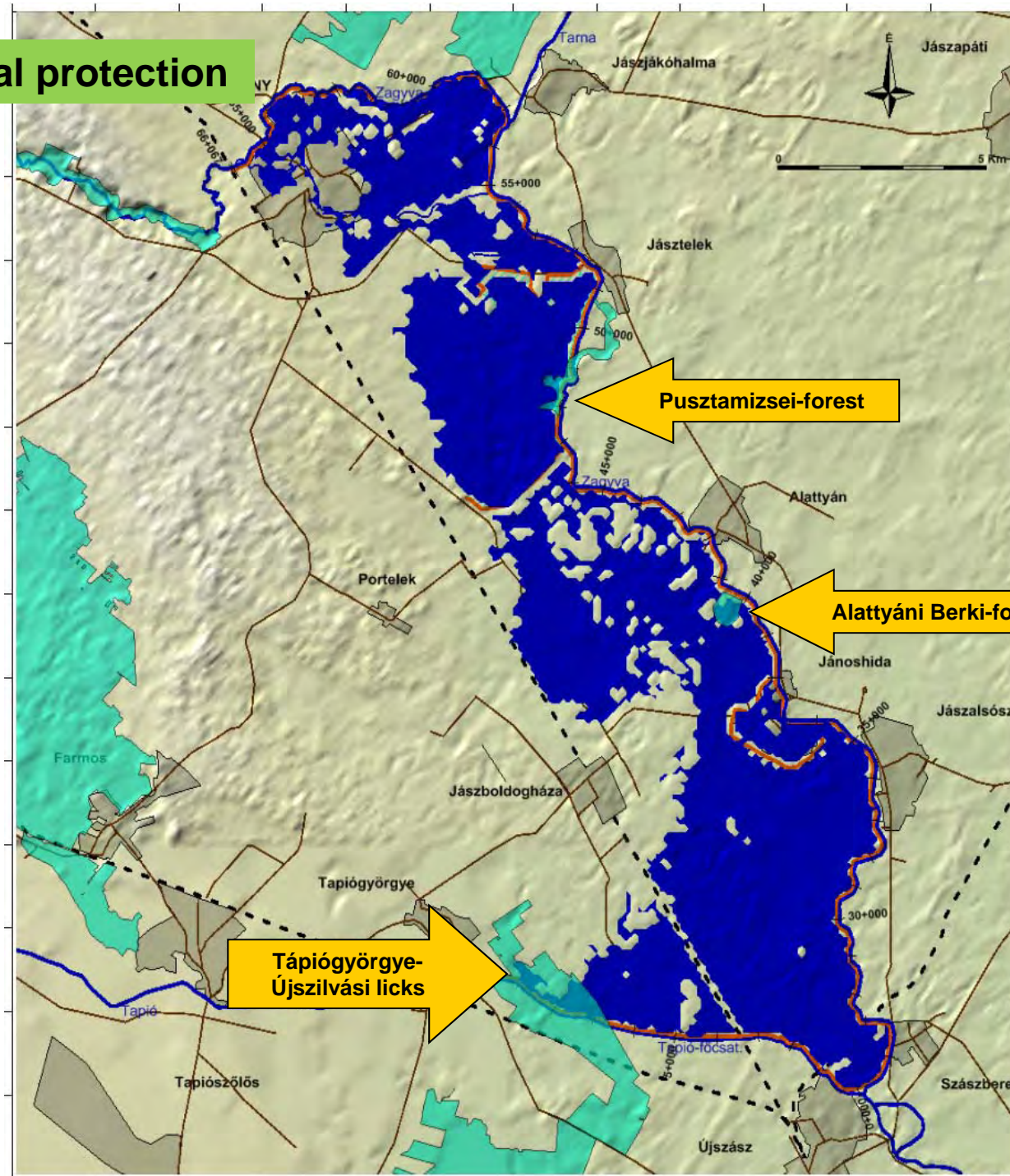




## Environmental protection

NATURA  
2000 Areas

Special  
aqueous  
nature-  
preservation  
territories

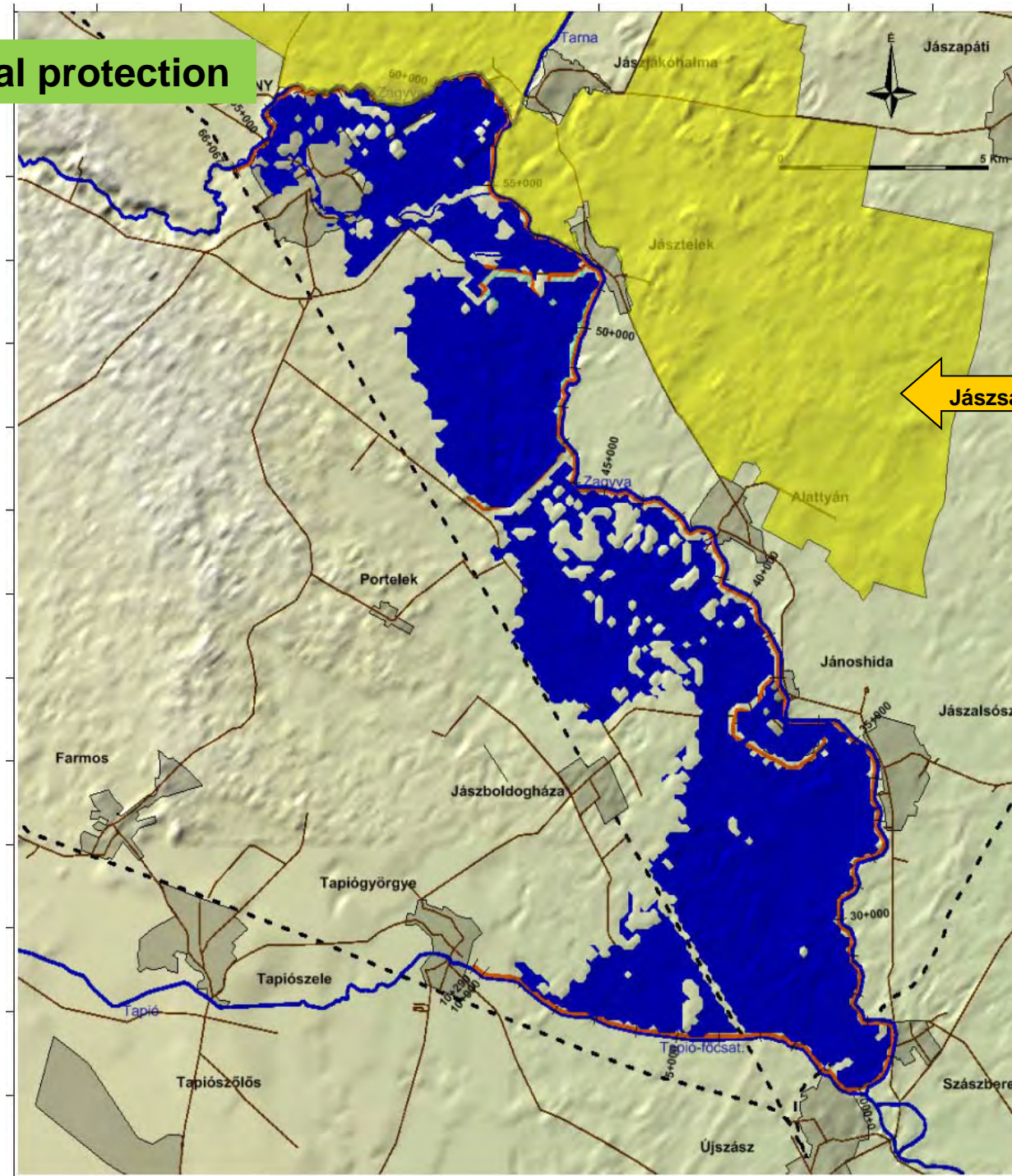




## Environmental protection

NATURA  
2000 Areas

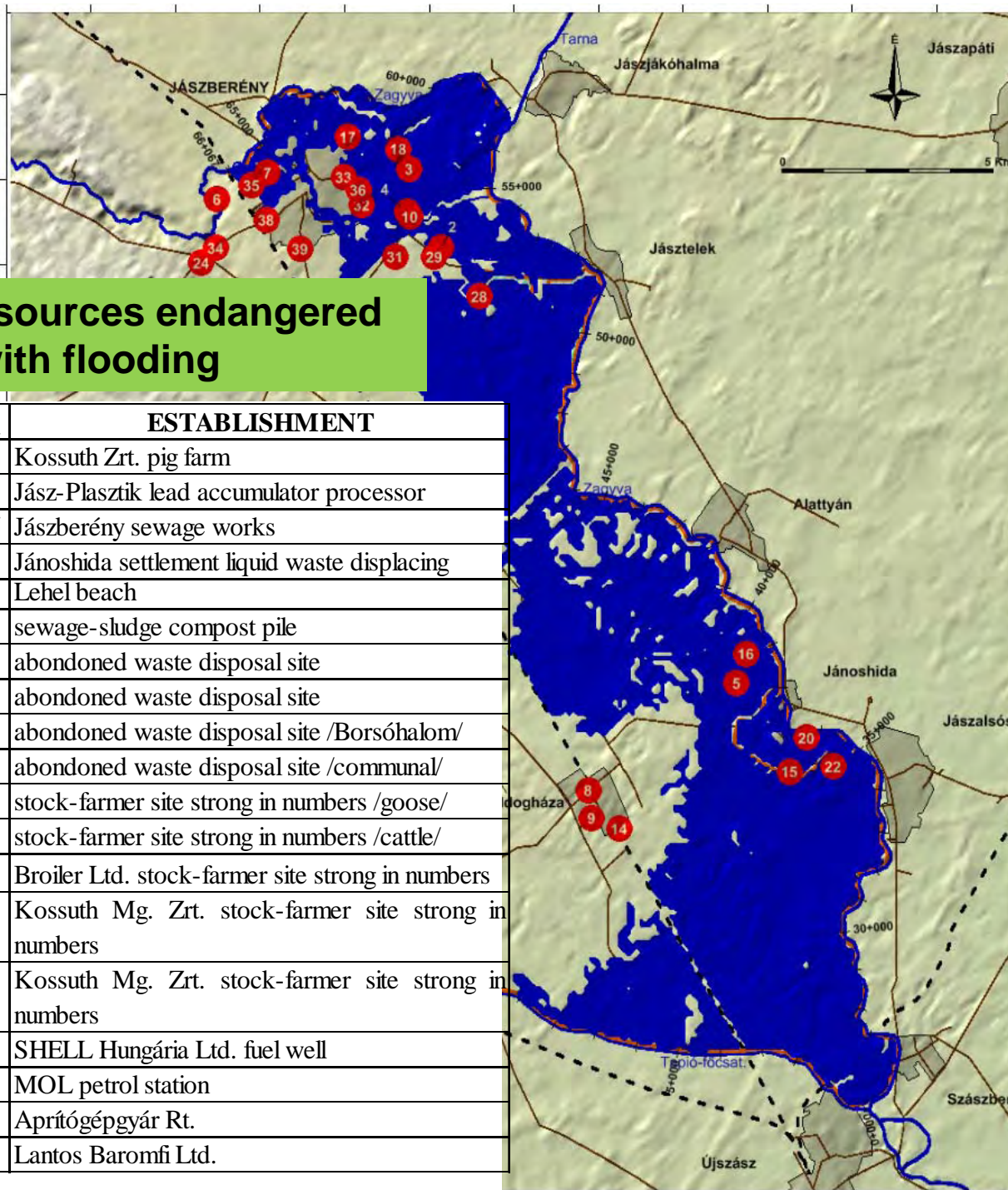
Bird protection  
Territories



Jászság

Szennyezőforrások





## Polluting sources endangered with flooding

No.	Settlement	ESTABLISHMENT
2	Jászberény	Kossuth Zrt. pig farm
3	Jászberény	Jász-Plasztik lead accumulator processor
4	Jászberény	Jászberény sewage works
5	Jánoshida	Jánoshida settlement liquid waste displacing
7	Jászberény	Lehel beach
10	Jászberény	sewage-sludge compost pile
15	Jánoshida	abandoned waste disposal site
16	Jánoshida	abandoned waste disposal site
17	Jászberény	abandoned waste disposal site /Borsóhalom/
18	Jászberény	abandoned waste disposal site /communal/
20	Jánoshida	stock-farmer site strong in numbers /goose/
22	Jánoshida	stock-farmer site strong in numbers /cattle/
28	Jászberény	Broiler Ltd. stock-farmer site strong in numbers
29	Jászberény	Kossuth Mg. Zrt. stock-farmer site strong in numbers
31	Jászberény	Kossuth Mg. Zrt. stock-farmer site strong in numbers
32	Jászberény	SHELL Hungária Ltd. fuel well
33	Jászberény	MOL petrol station
35	Jászberény	Aprítógépgyár Rt.
36	Jászberény	Lantos Baromfi Ltd.

További



# Further continuation

Preparing risk maps for  $Q_{0,5\%}$ ,  $Q_{0,2\%}$  cases

Definition of damage functions

Definition of damage values per (data)cells

Preparing risk maps for the certain  $Q_{p\%}$  cases

Development of risk management principles

Application of risk management methods

Informing and having the  
public involved



