The construction of the riverbed sill in the Danube at Paks

Working Group on Technical Matters
10–12 November 2026
Danube Commission Secretariat, Benczúr utca 25, 1068 Budapest

Ágnes Takácsné Tóth

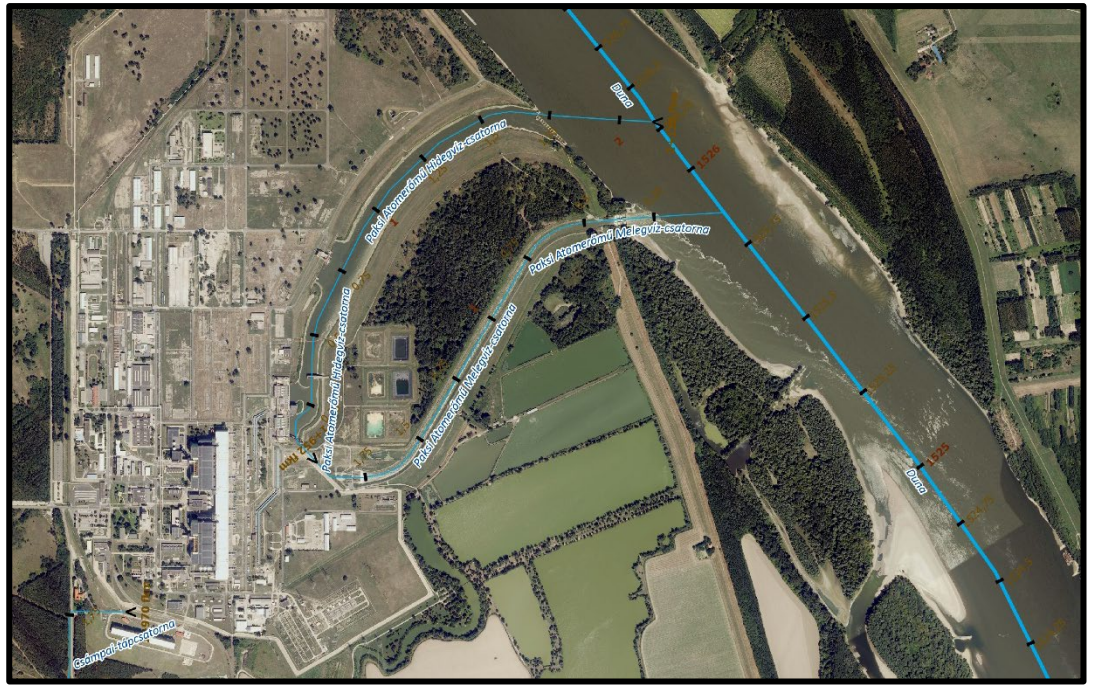
General Directorate of Water Management (Hungary)

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The Nuclear Power Plant at Paks

Four operating units
Capacity: approx. 2,000 megawatts
Exceptionally low water levels in the Danube in August → close to a complete shutdown.

immediate intervention and effects was necessary to safeguard the operational safety of the Paks Nuclear Power Plant



Government Decree No. 122/2026 on 12 August 2026
riverbed sill as **priority investment**





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Construction of the riverbed sill at Paks



Location and alignment of the riverbed sill M= 1:10 000

Fairway

Cooling-water supply of the Paks Nuclear Power Plant

riverbed sill at 1526,330 rkm

Dunaszentbenedek

Javasolt megközelítő

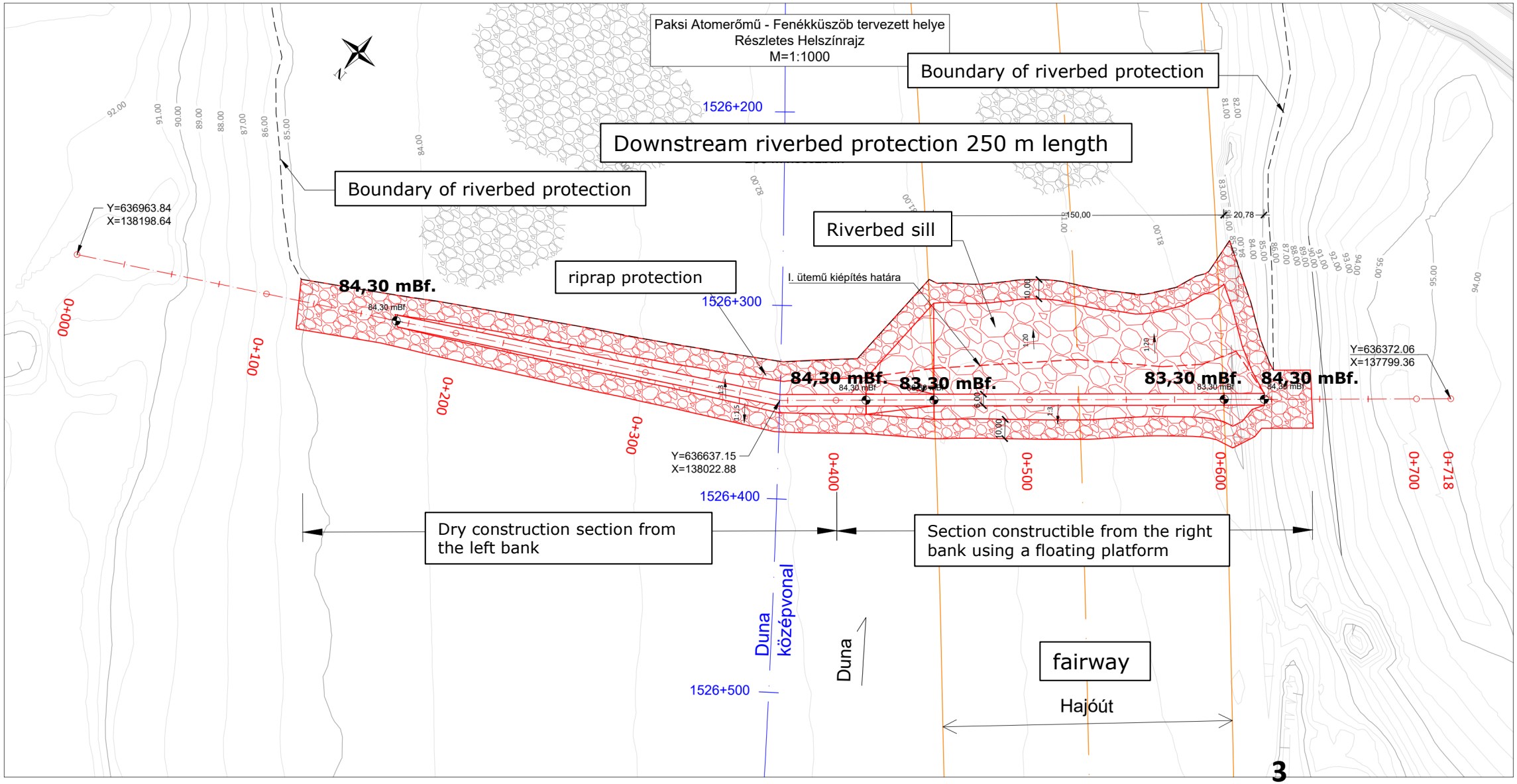
Javasolt megközelítő út

Tervezett Paks II Melegvíz-csatorna

Paksi Atomerőmű Melegvíz-csatorna

Duna

Location and alignment of the riverbed sill
M= 1:1 000



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Materials, quantities, and placement method

Materials
for the bottom sill: **quarrystone** (crushed stone in mixed sizes, e.g. LMA 40/200 kg and LMA 10/60 kg)

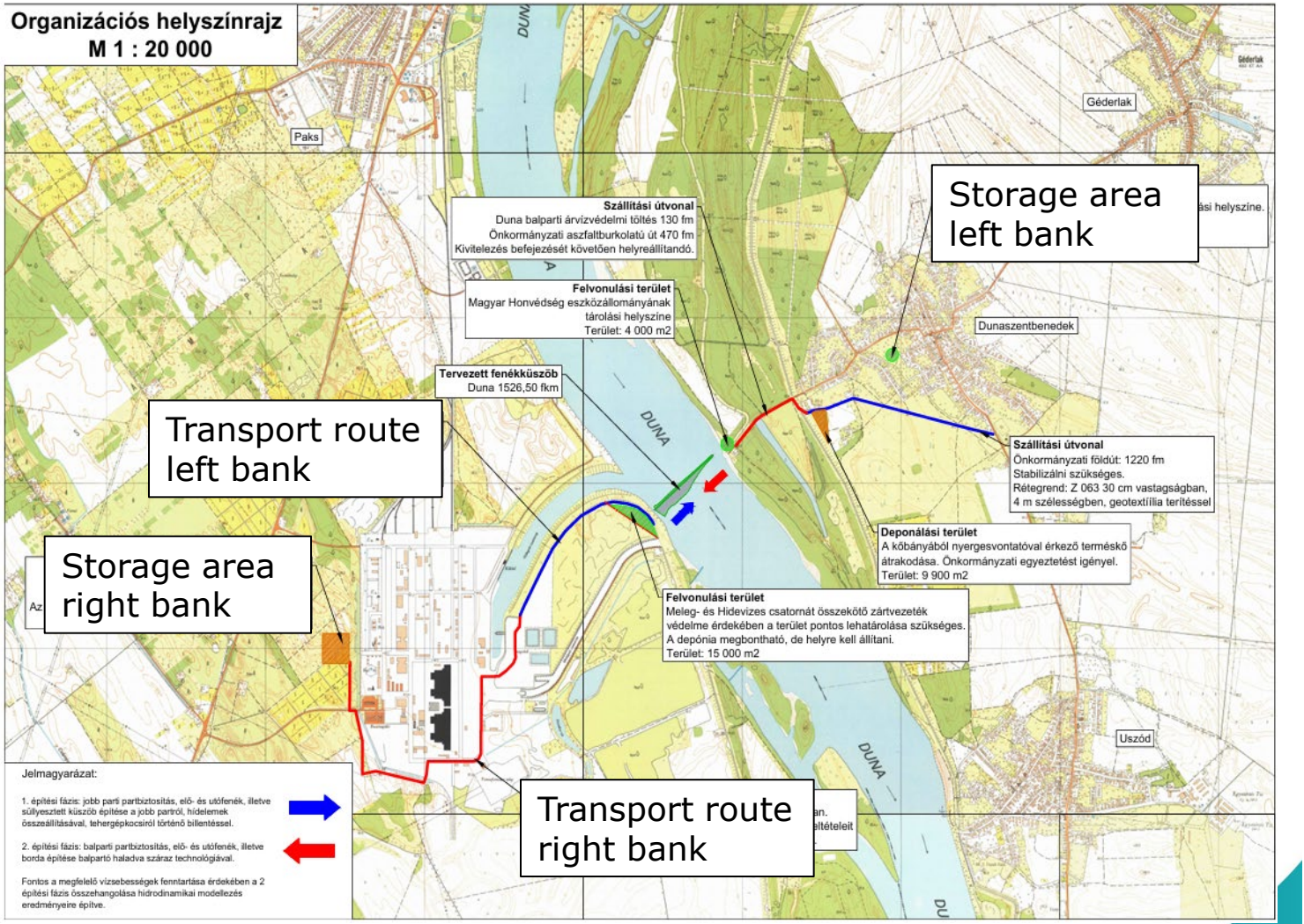
600 g/m² **geotextile** to be installed beneath the bottom sill constructed using the dry construction method

Concrete blocks
1 m³ weighing 2.7 tonnes

Quantities:

Phase I. 35,000 m³ of quarry stone
Phase II: 110,000 m³ of quarry stone

Placement method and organisation
The construction will be carried out from both banks at the same time. The two work areas meet towards the centre of the Danube, at the edge of the deepening riverbed. This is where the two sections of the bottom sill will be joined to form a single structure.



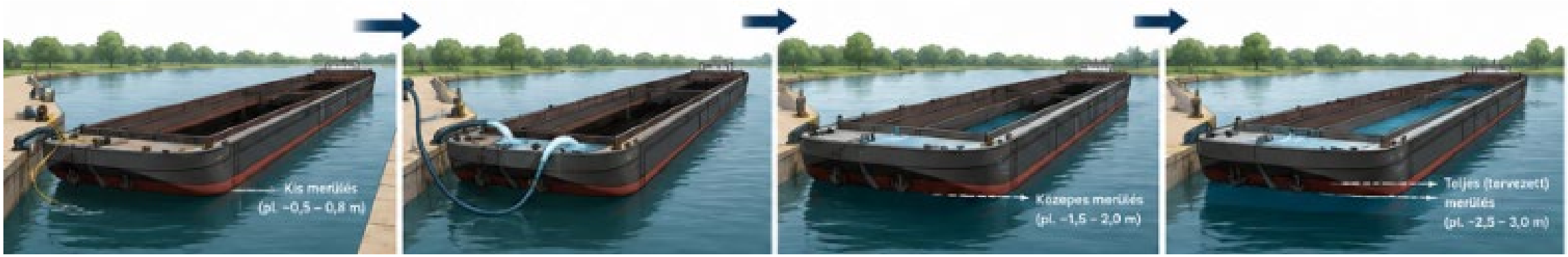
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Calculated effect of the riverbed sill on water level elevations at different reference discharges



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Immediate effects on water levels → barge ballasting (not sunk!)



Empty barge
Shallow draught
(approx. 0.5–0.8 m)

Water is pumped into the ballast tanks

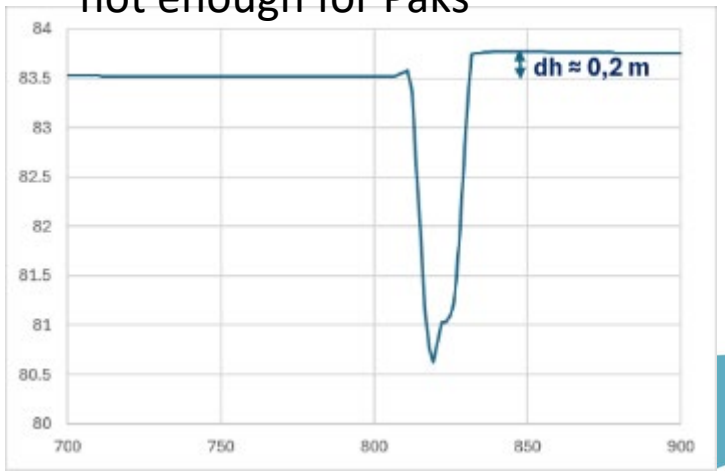
Tanks filling up, draught increasing
Medium draught
(approx. 1.5–2.0 m)

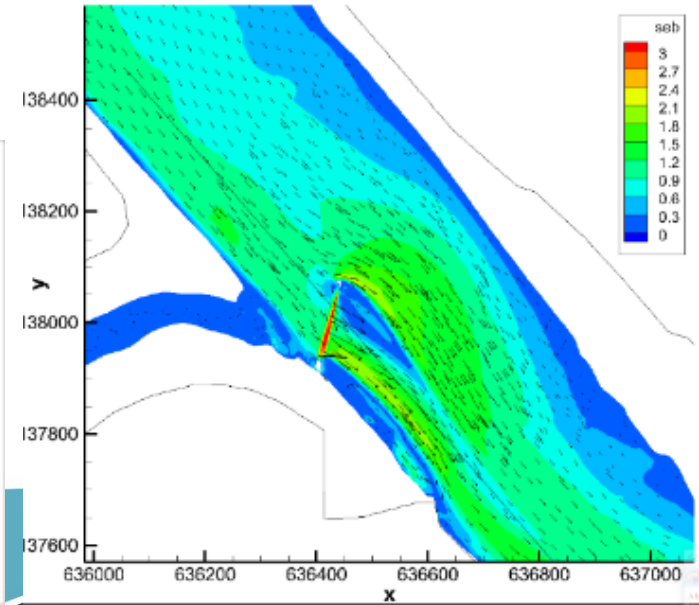
Fully ballasted condition
Full (design) draught
(approx. 2.5–3.0 m)



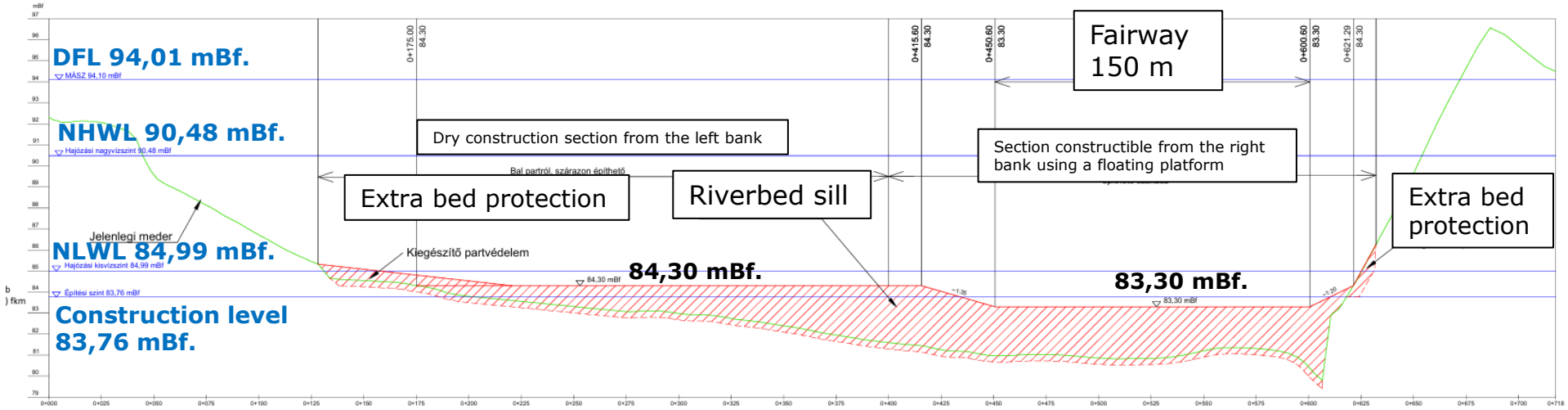
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Backwater effect: 20 cm →
not enough for Paks

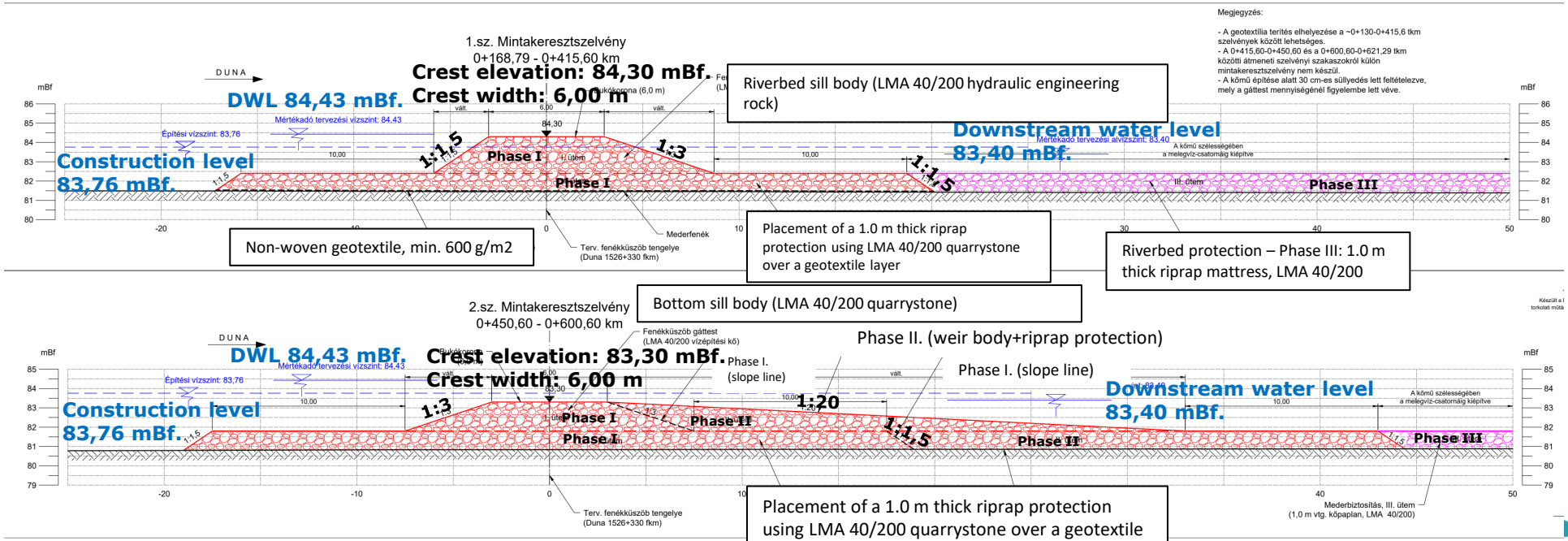




Longitudinal profile

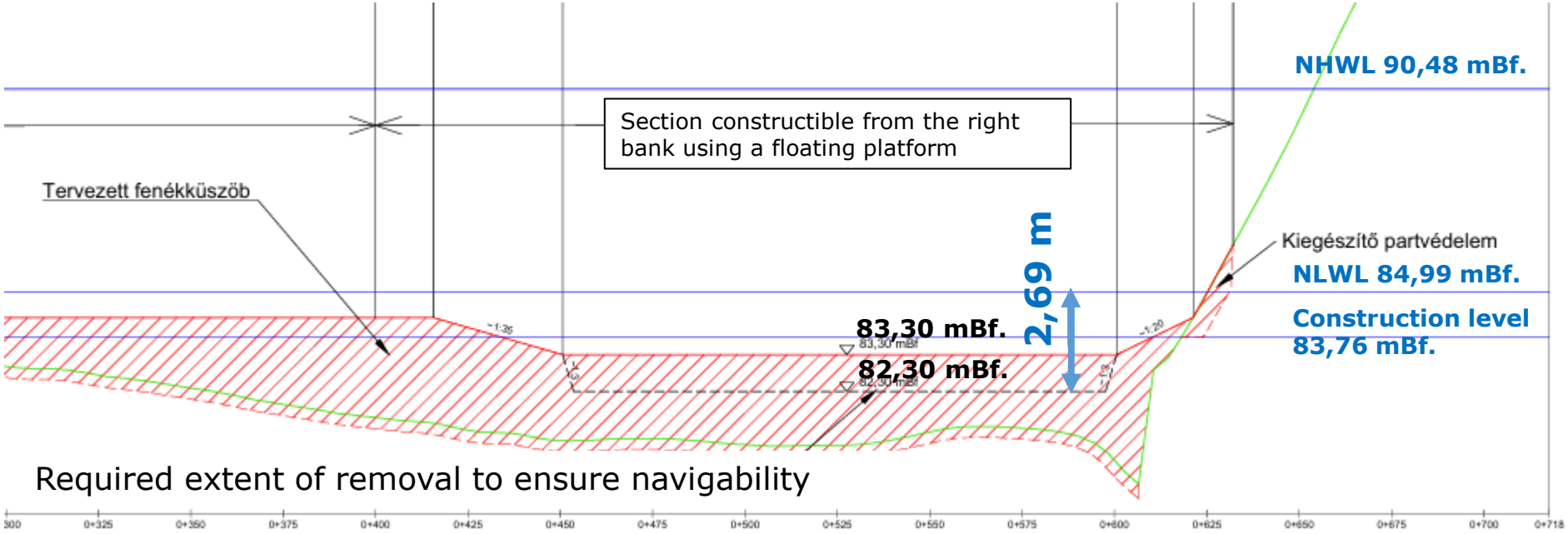


Characteristic cross-sections M=1:100



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Partial stone removal of the riverbed sill to ensure navigable fairway conditions



Riverbed sill elevation: 83.30 mBf

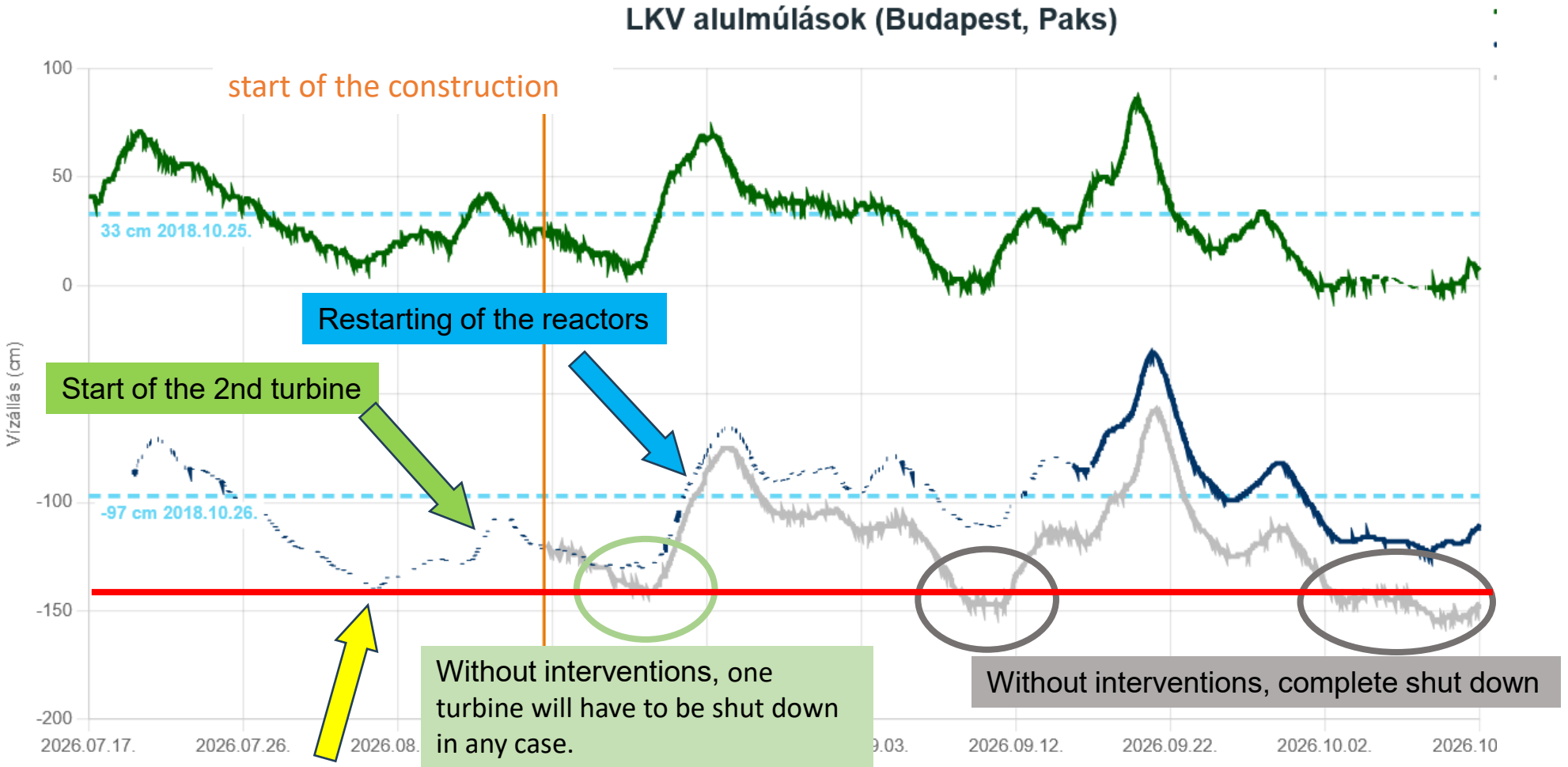
Based on the modelling results, navigable conditions are available at a discharge of 2,200 m³/s, corresponding to **182 navigable days per year**. This is significantly below the 240 days required under the AGN Agreement, as well as the 343 days recommended by the Danube Commission. If this geometry is maintained over the long term, this site would become the critical navigation bottleneck on the Hungarian section of the Danube.

Partial removal of the riverbed sill to an elevation of 82.30 mBf

(navigational low-water level → Danube Commission recommendation: 30-year discharge with 94% exceedance → 343 navigable days)

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The effects on waterlevels

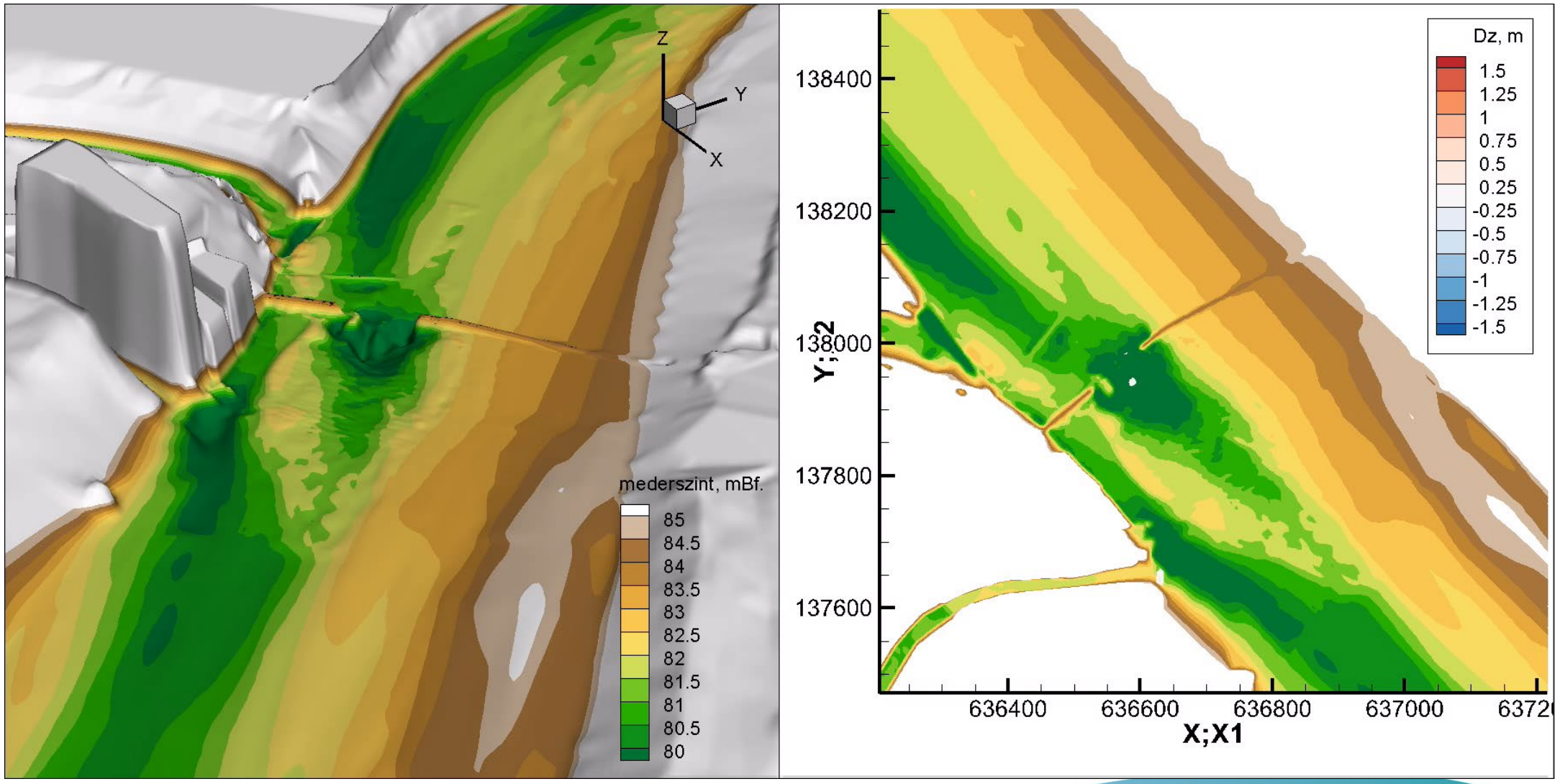


The nuclear power plant is close to a complete shutdown

Paks NPP shutdown level (−145 cm)

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Riverbed changes and scour during the construction



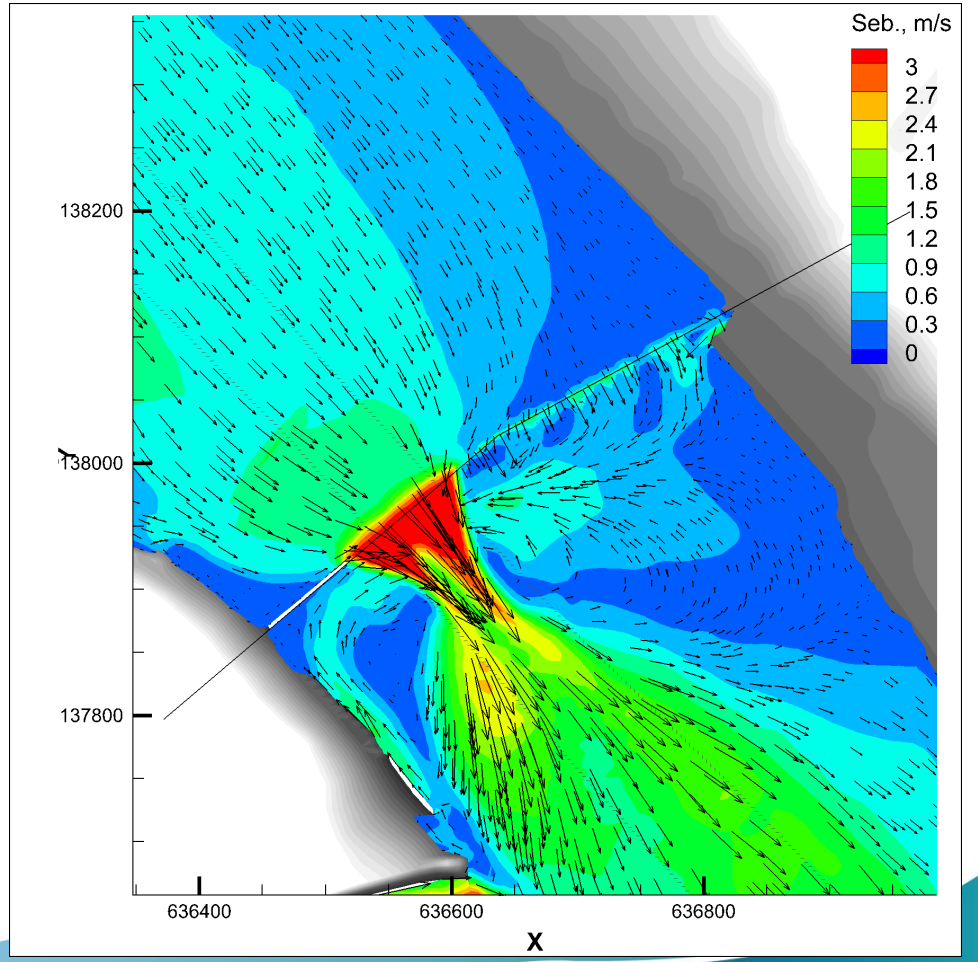
Source: Budapest University of Technology

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The impact of scour on the construction of the bottom sill

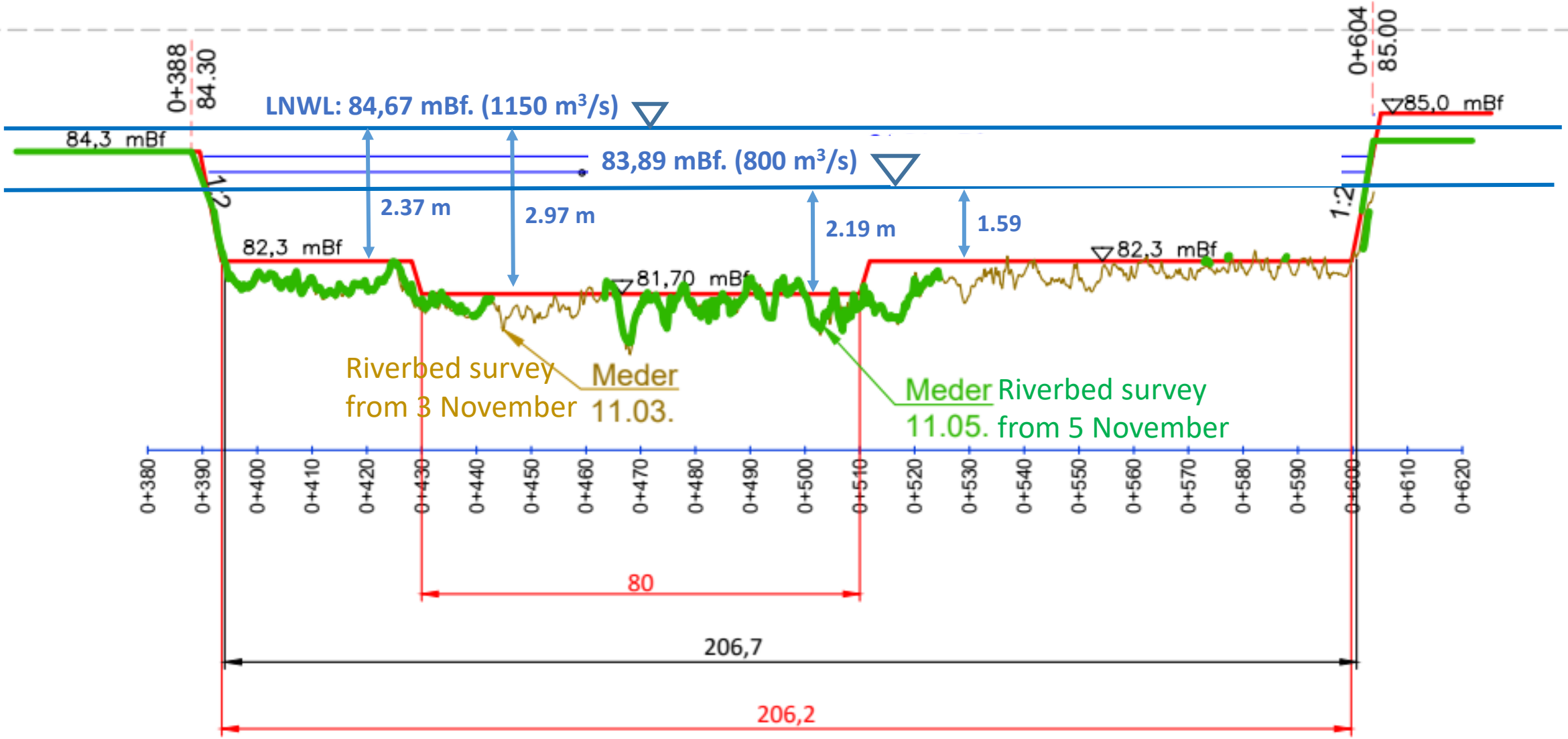
In the locally deepened riverbed, the surface slope of the Danube reaches approximately **15 m/km** at discharges close to LNWL, compared to **6–10 cm/km** under natural conditions. The flow velocity is **2.8 m/s**, which no longer allows safe manoeuvring.



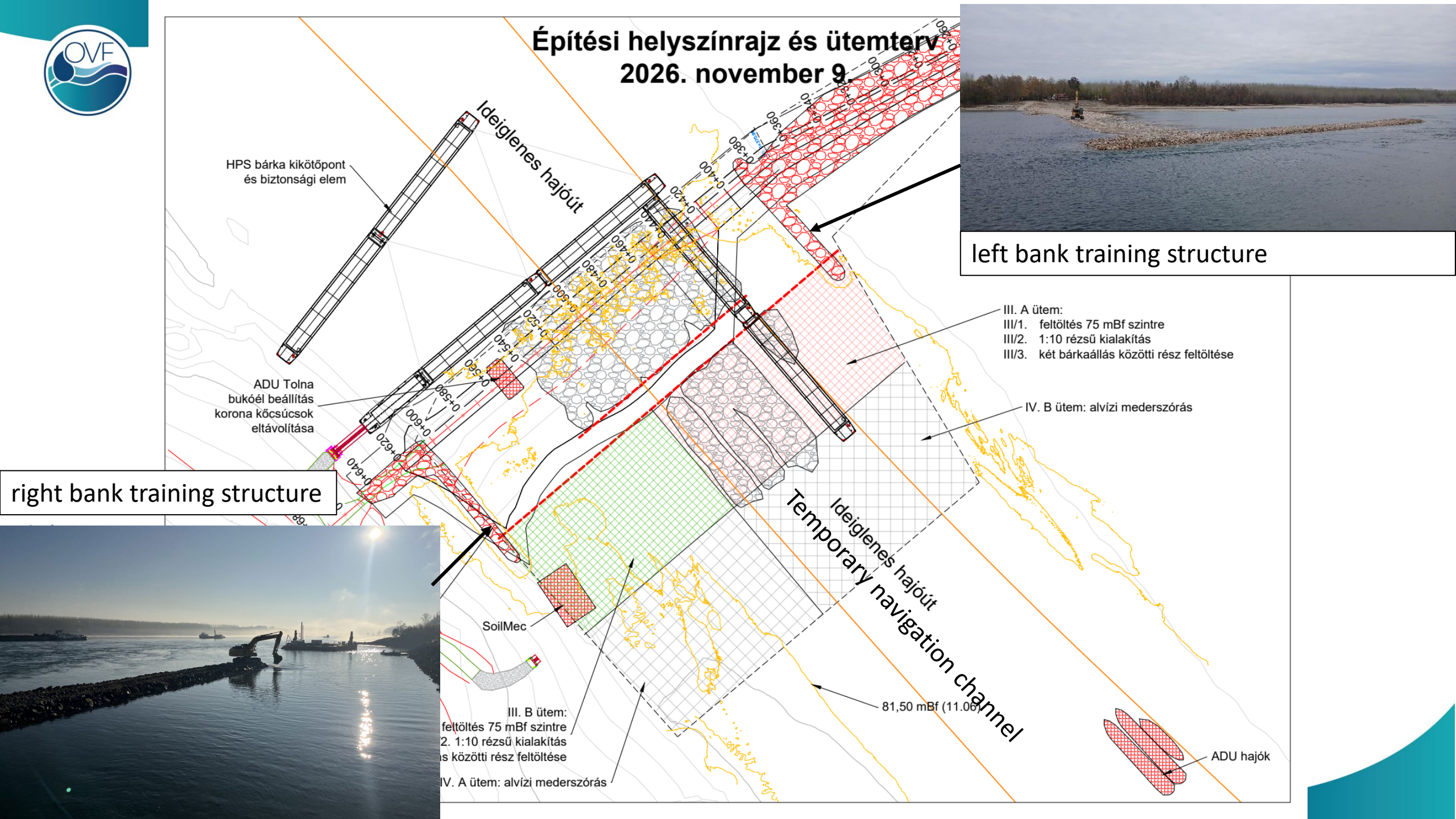


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Final fairway parameters



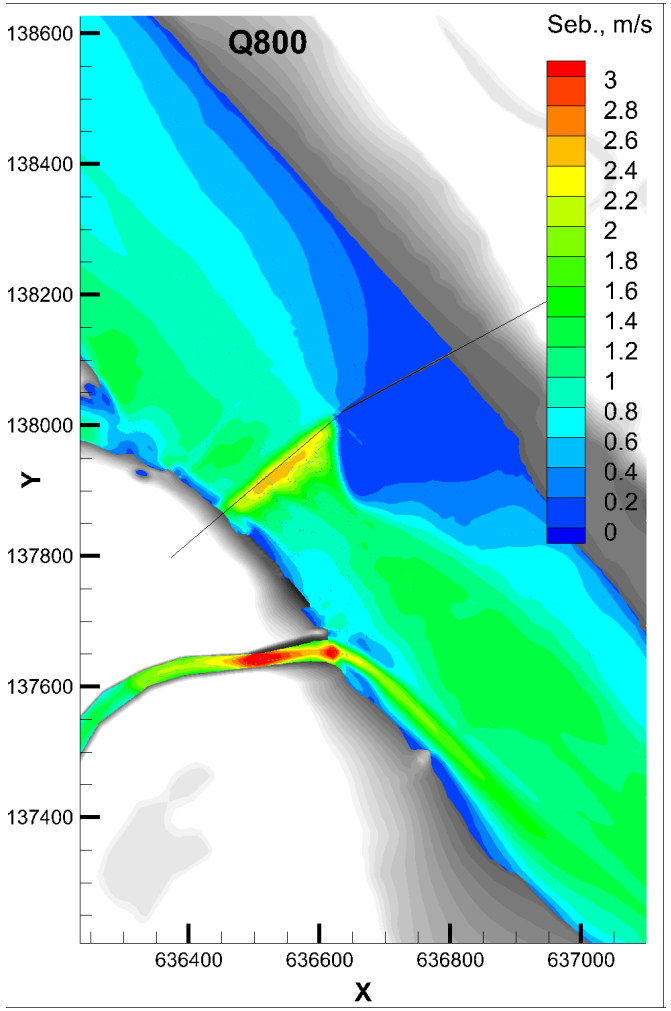
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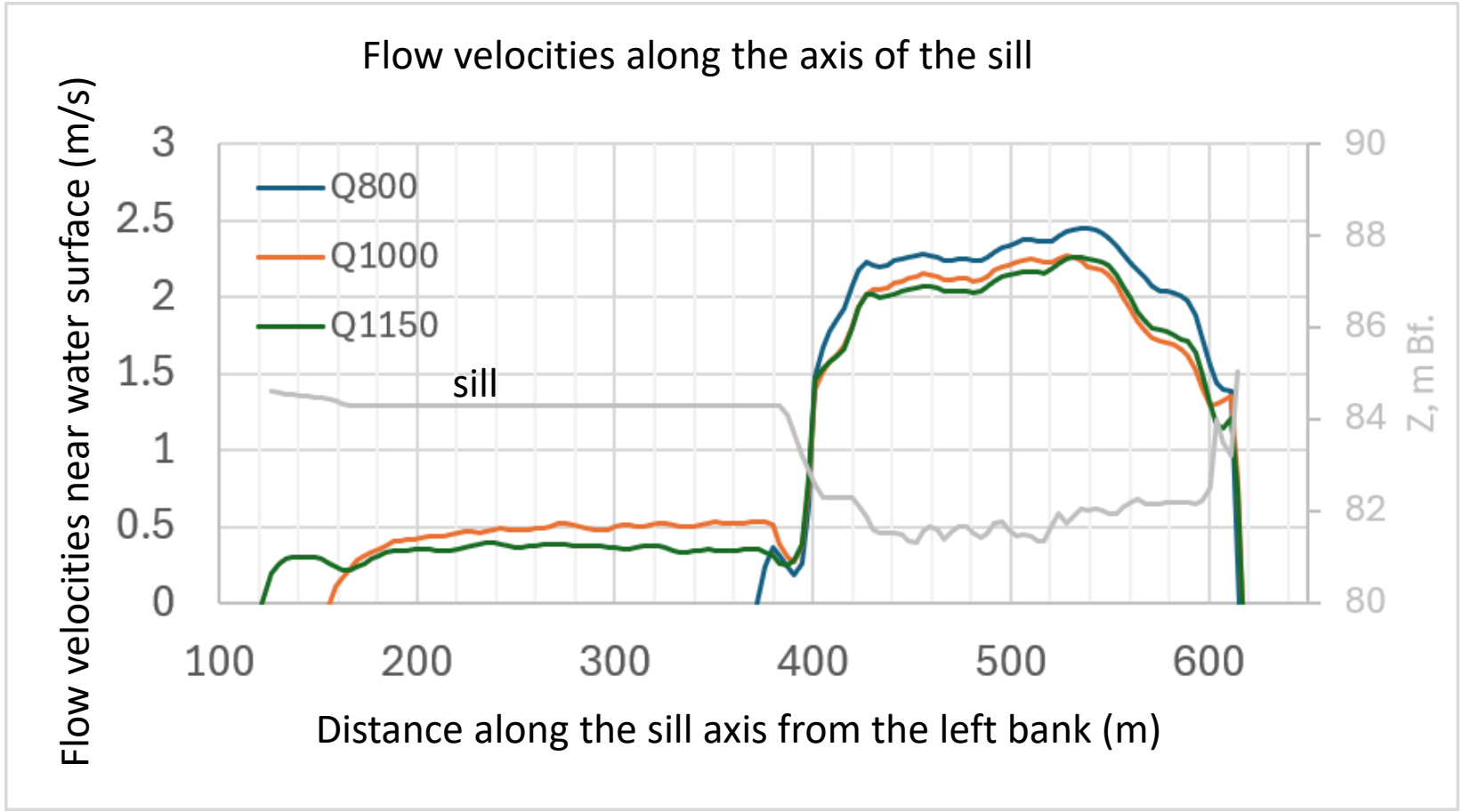
left bank training structure

right bank training structure

Flow velocities along the axis of the sill

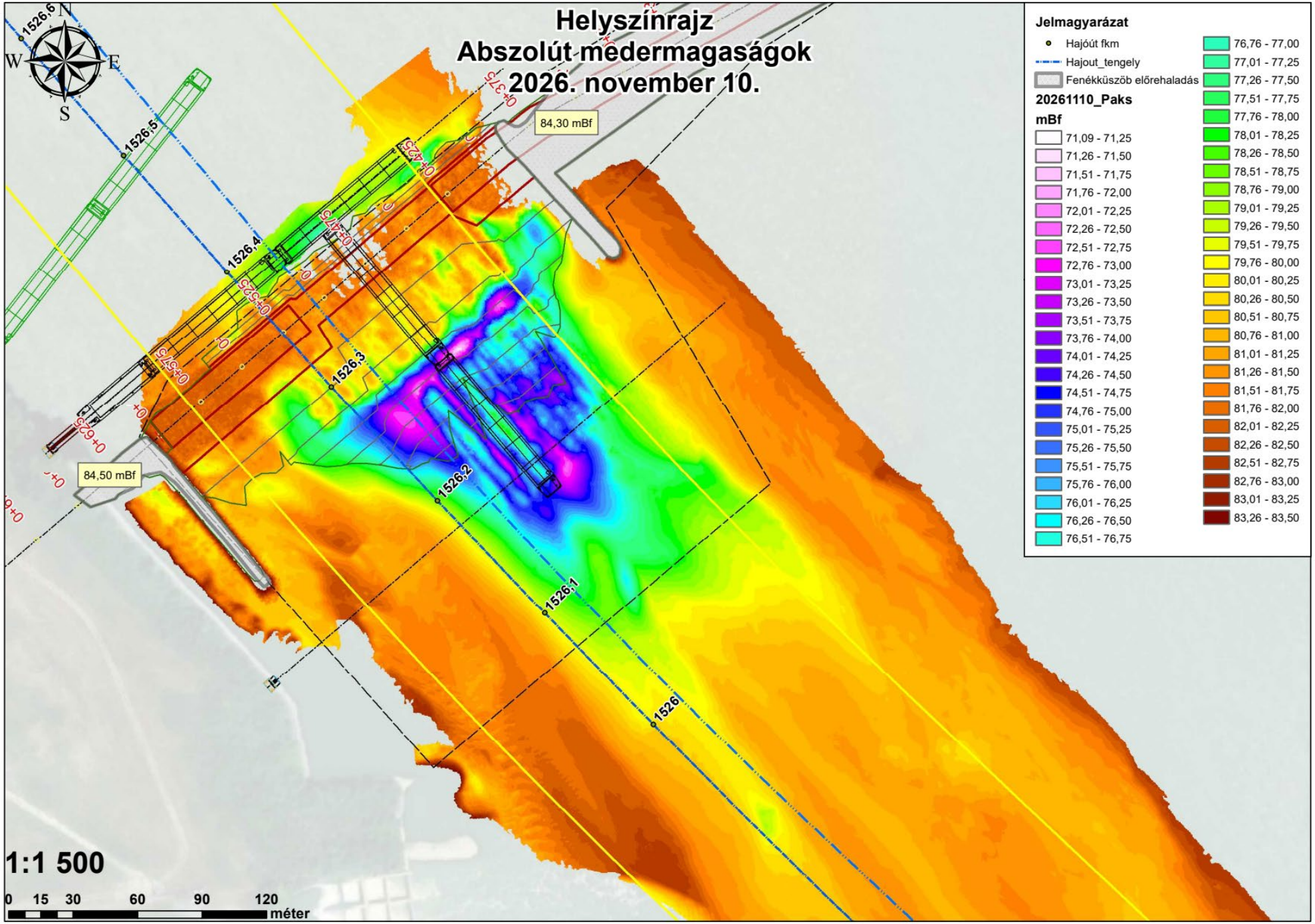


source: Budapest University of Technology



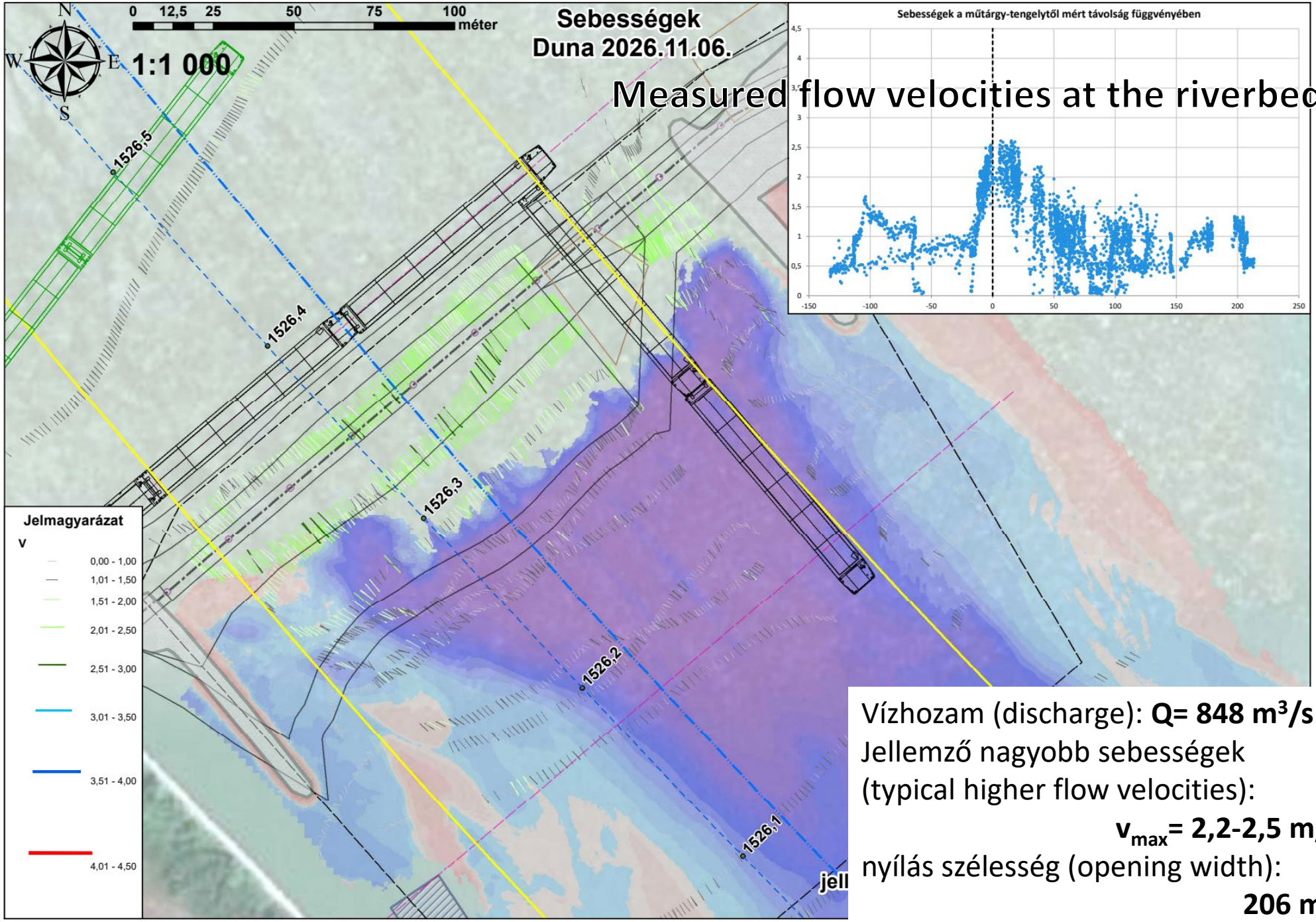
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Multibeam riverbed survey 10 November



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Measured flow velocities at the riverbed sill (6 November)



Sebesség (flow velocity) m/s

v

- 0,00 - 1,00
- 1,01 - 1,50
- 1,51 - 2,00
- 2,01 - 2,50
- 2,51 - 3,00
- 3,01 - 3,50
- 3,51 - 4,00
- 4,01 - 4,50

Vízhozam (discharge): **Q= 848 m³/s**

Jellemző nagyobb sebességek (typical higher flow velocities):

v_{max}= 2,2-2,5 m/s

nyílás szélesség (opening width):

206 m

Temporary fairway during the construction

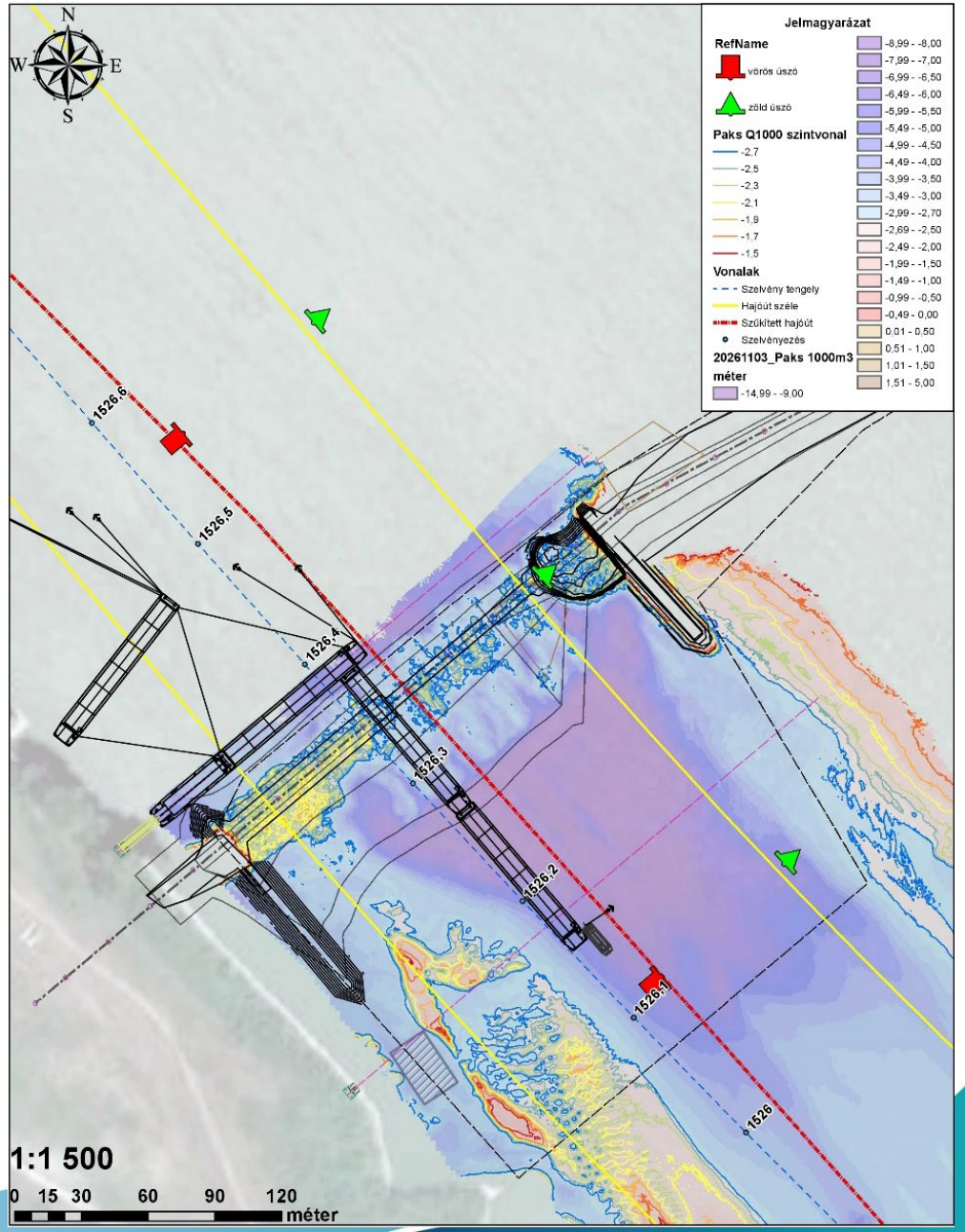
Full closure to navigation since 12 August

1 day „navigation window” at 20 of August

Planned temporary opening after 25 of November







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Thank you for your attention

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