Risk analysis of potable water abstractions in the catchment areas

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VÝZKUMNÝ ÚSTAV VODOHOSPODÁŘSKÝ T.G. MASARYKA

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Project TA ČR SS05010210 – Tools for risk analysis of the catchment areas for abstraction points of water intended for human consumption

Project duration: January **2022** – December **2024**

Main project company: T. G. Masaryk Water Research Institute

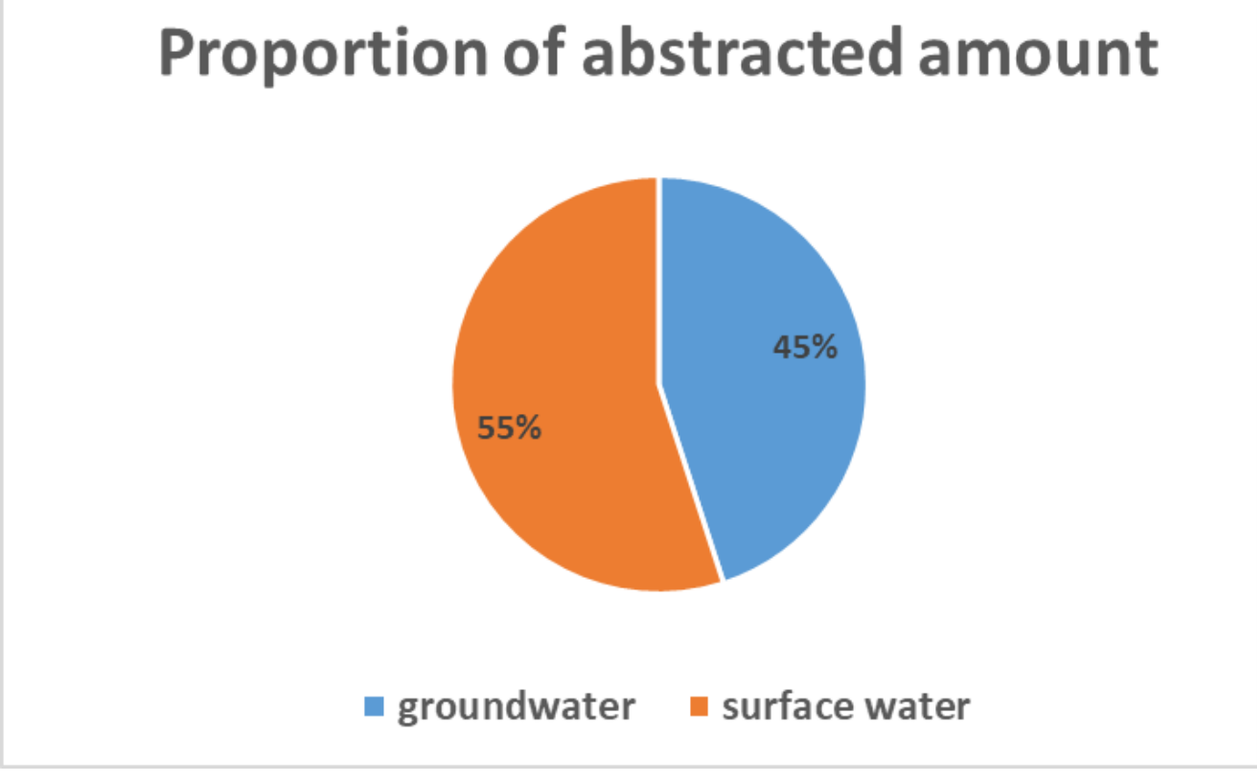
The main outputs:

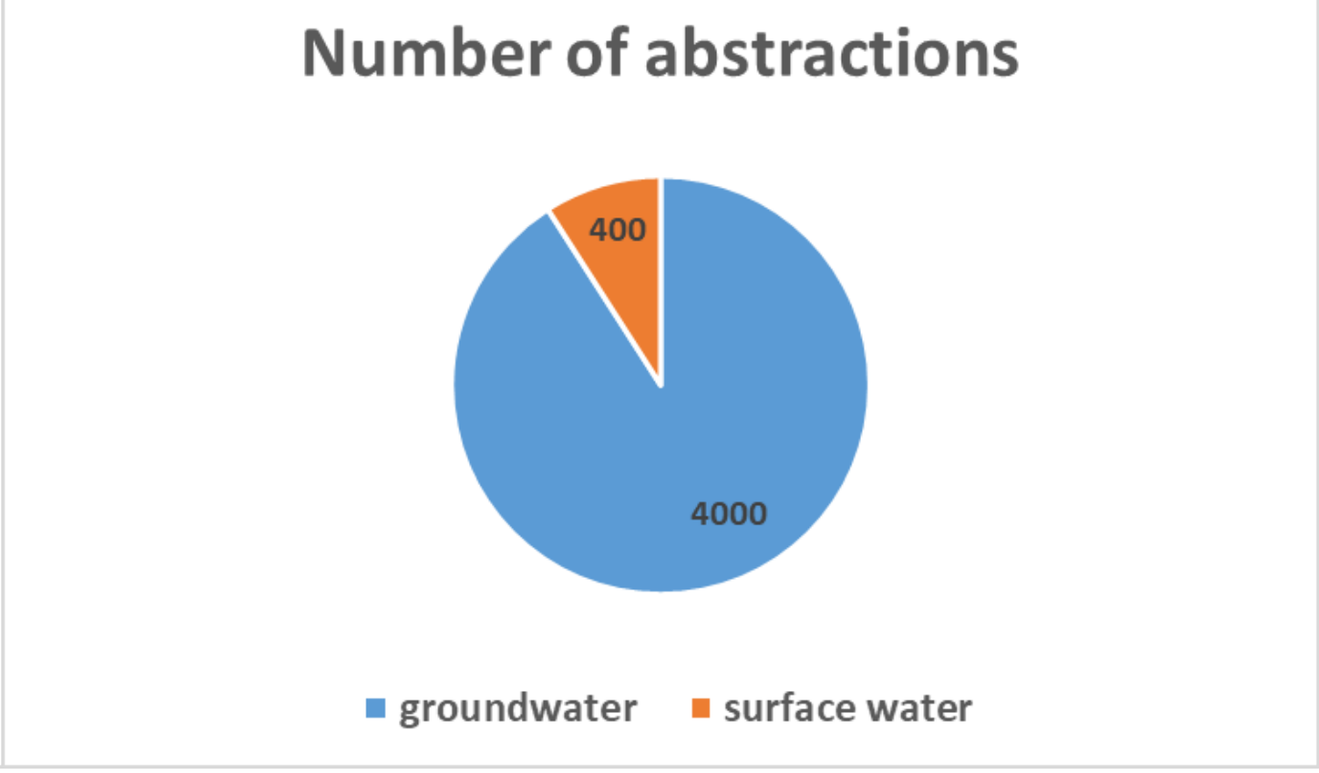
- Methodology of risk analysis of the catchment areas for abstraction points of water intended for human consumption.
- Risk analysis of different pilot abstractions.

A few numbers to get you started...

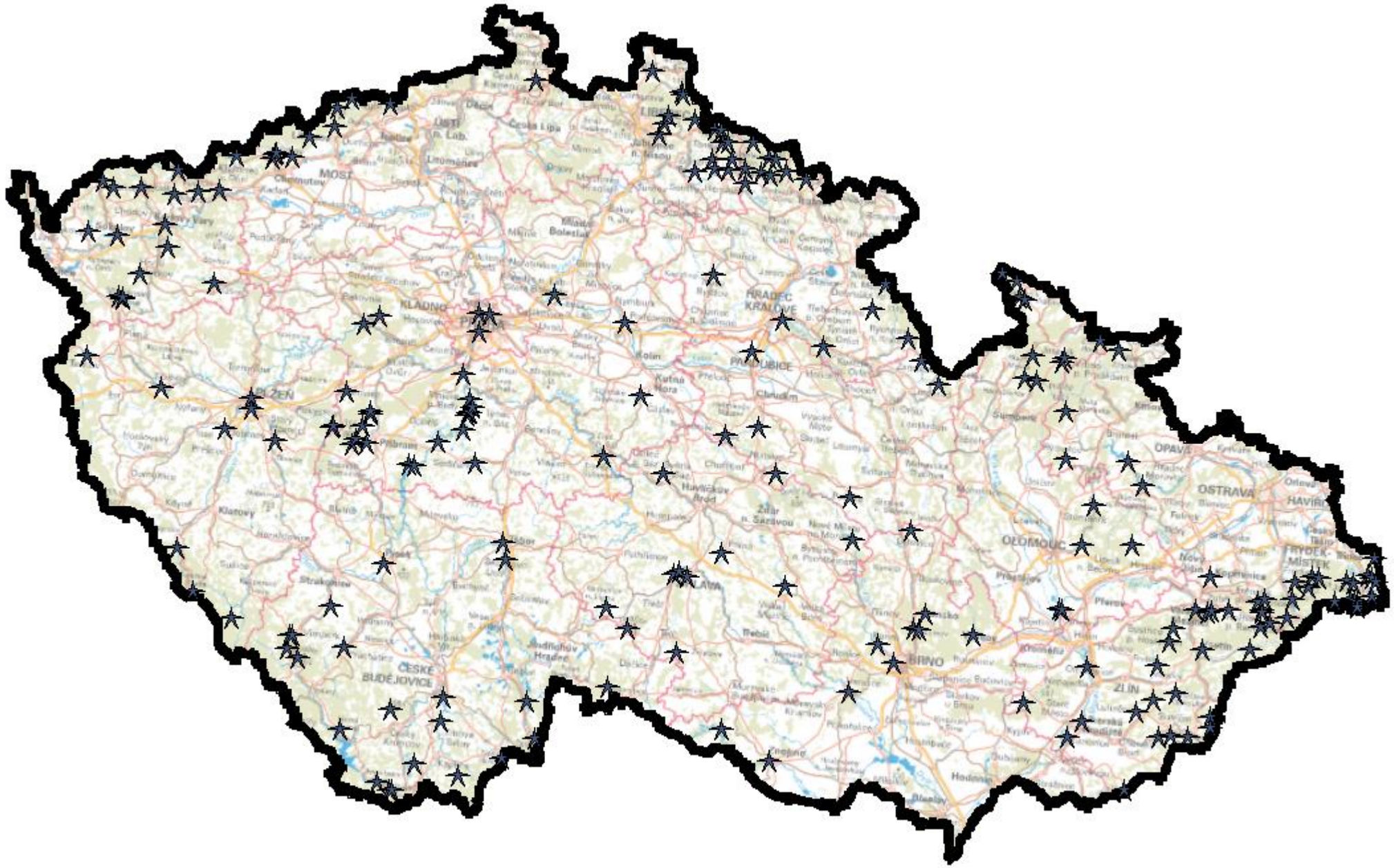
Proportion of **groundwater** and **surface water** for drinking water (abstracted amount): **45%** to **55%** - the whole Czechia.

Number of groundwater and surface water abstractions above 10 m^3/day (rough estimation): **4 000** to **400**.

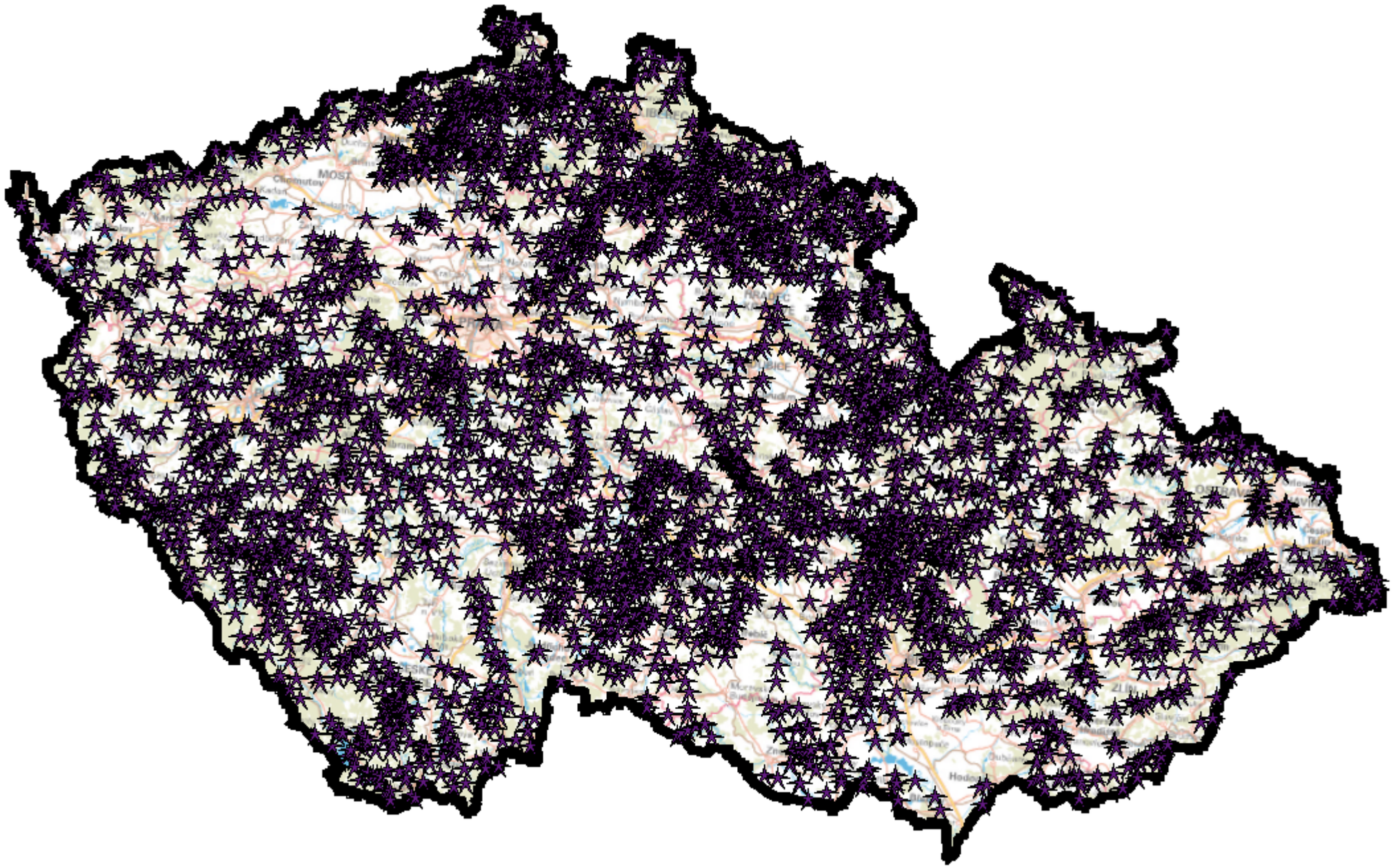




Surface water abstractions above 500 m³/month



Groundwater abstractions above 500 m³/month



How to do it?

- Too many abstractions.
- The risk analysis should be done by **state companies** („**Podniky Povodí**“). They manage surface water but their knowledge and human resources for groundwater are limited.
- Short time – **Risk analysis** should be finished in **July 2027**.

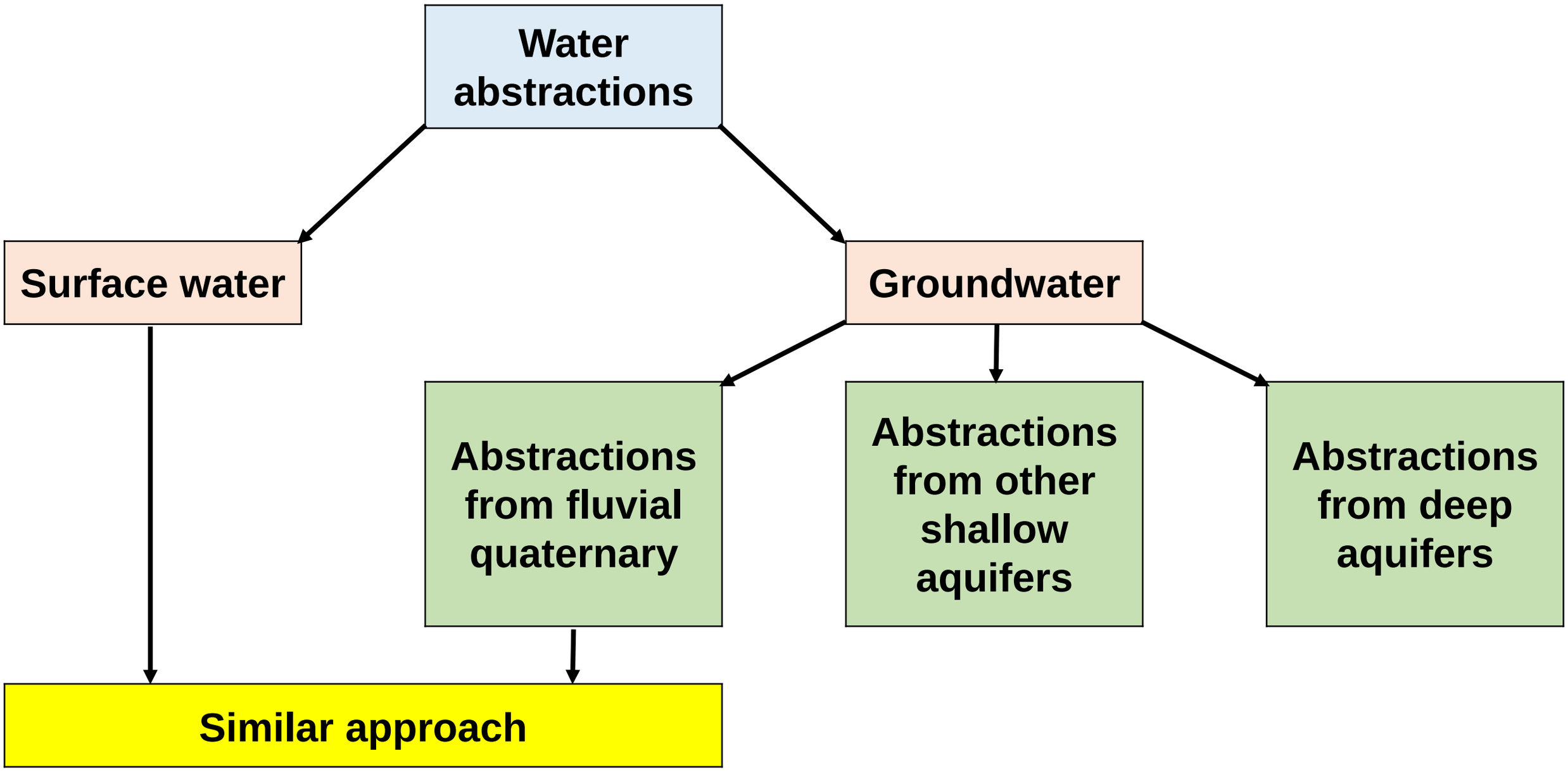
The methodology has to **be simple**, but the results must provide all **relevant information**.

What info we need?

- **Type of water abstraction.**
- **Abstracted volume.**
- **Hydrological/hydrogeological conditions.**
- **Likely sources of pollution.**
- **Catchment of water abstractions – is safeguard zone compliant?**
- **Which pollutants should be monitored?**

Proposed Czech approach

Types of water abstractions and their hydrogeological conditions:



Abstractions from fluvial quaternary

- Abstractions from delineated **fluvial quaternary groundwater bodies.**

- Abstractions from **river alluvial sediments (geological map).**

These abstractions could be polluted mainly from surface water.

Catchments of abstractions are **hydrological basins** above the abstractions (or safeguard zones).

Abstractions from of the valley floodplain (geological map)

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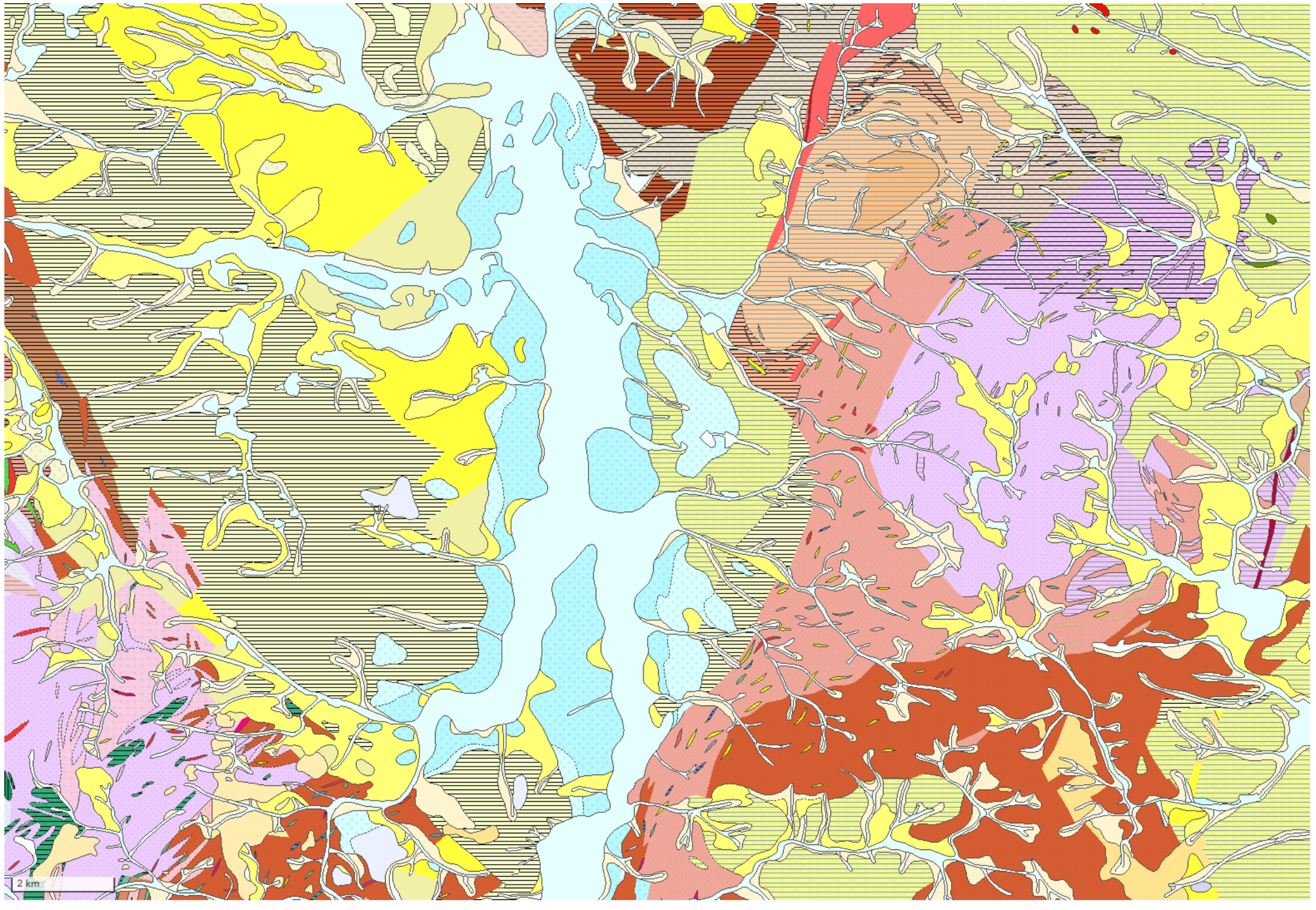


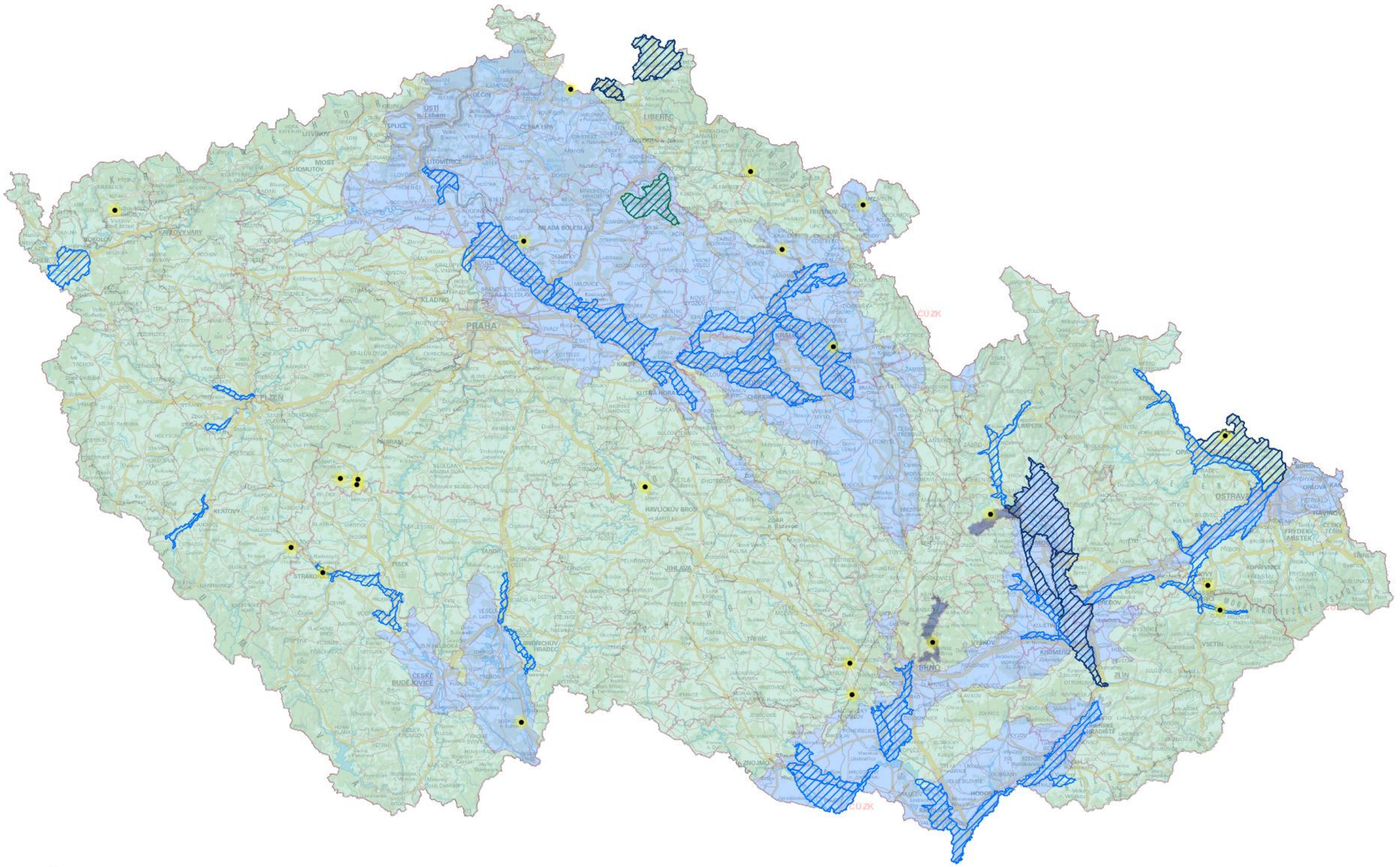
Abstractions from deep aquifers

- Abstractions from **cretaceous** and **tertiary sedimentary basins**.
- Abstractions from **carst groundwater bodies**.
- Abstractions from **glacial quaternary groundwater bodies**.

Catchments of abstractions are **hydrologeological groundwater bodies** or their parts, reduced by the direction of groundwater flow and/or infiltration areas (or safeguard zones).

Remaining abstractions belong to the other shallow aquifers and their catchments are **4th order hydrological catchment areas**.

Types of groundwater abstractions



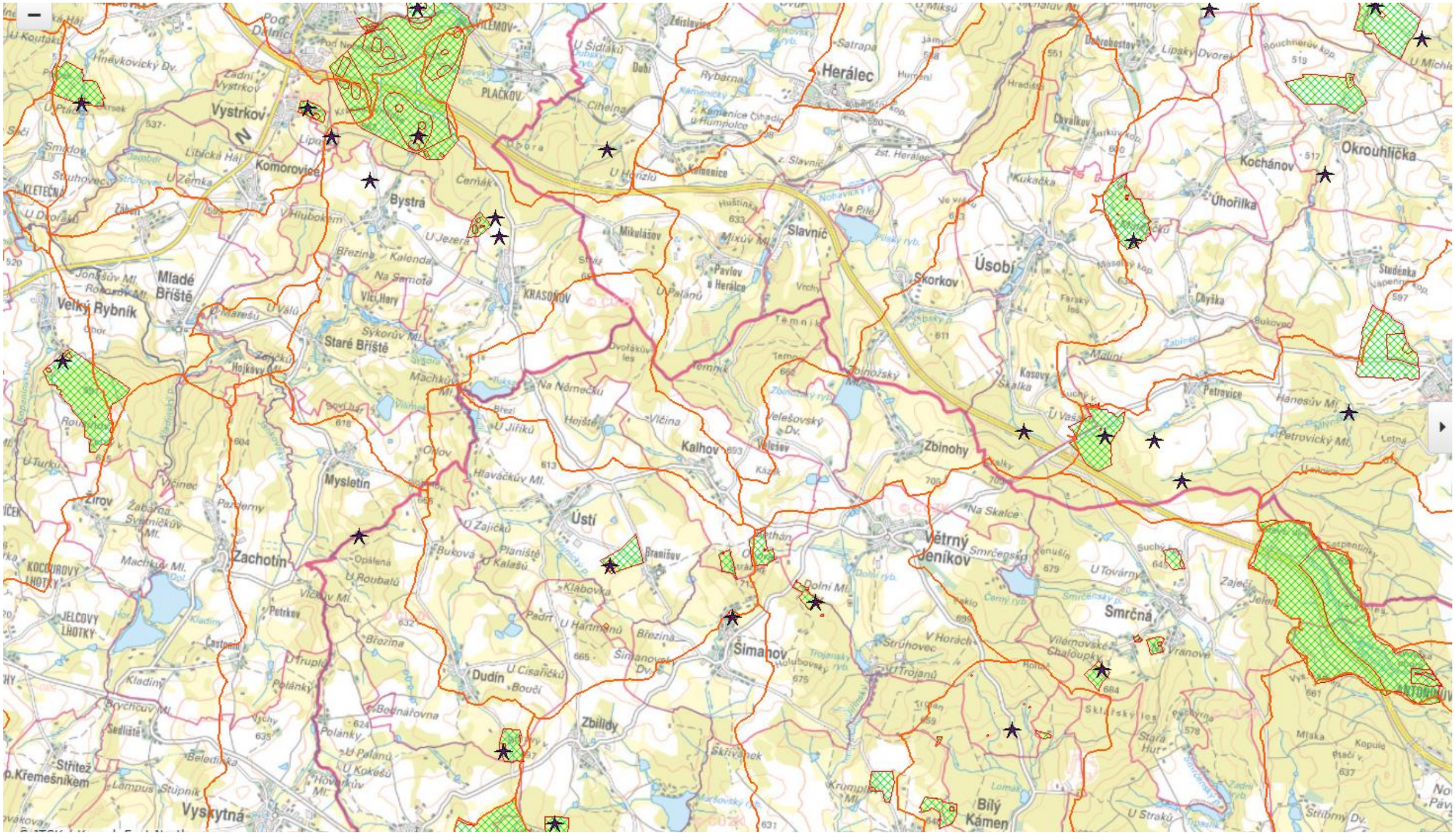
Abstracted volume

- Maximal yearly abstracted volume from the time period **2019 – 2021**.

- Boundary: 1,2 l/s (cca 100 m^3/day).

All smaller abstractions, regardless of the aquifer type, will be assessed with a higher simplification. Catchments of these abstractions are the **4th order hydrological catchment areas**, or **safeguard zones**.

GW abstractions, hydrological catchments and safeguard zones



Likely sources of pollution; missing monitored pollutants

- **Diffuse pollution** on the catchment area – agriculture (fertilisers, pesticides), atmospheric deposition (metals, PAHs), metals and PAH in erosion (later).

Important output: Selection of pesticides likely to occur according to the crops grown in the area

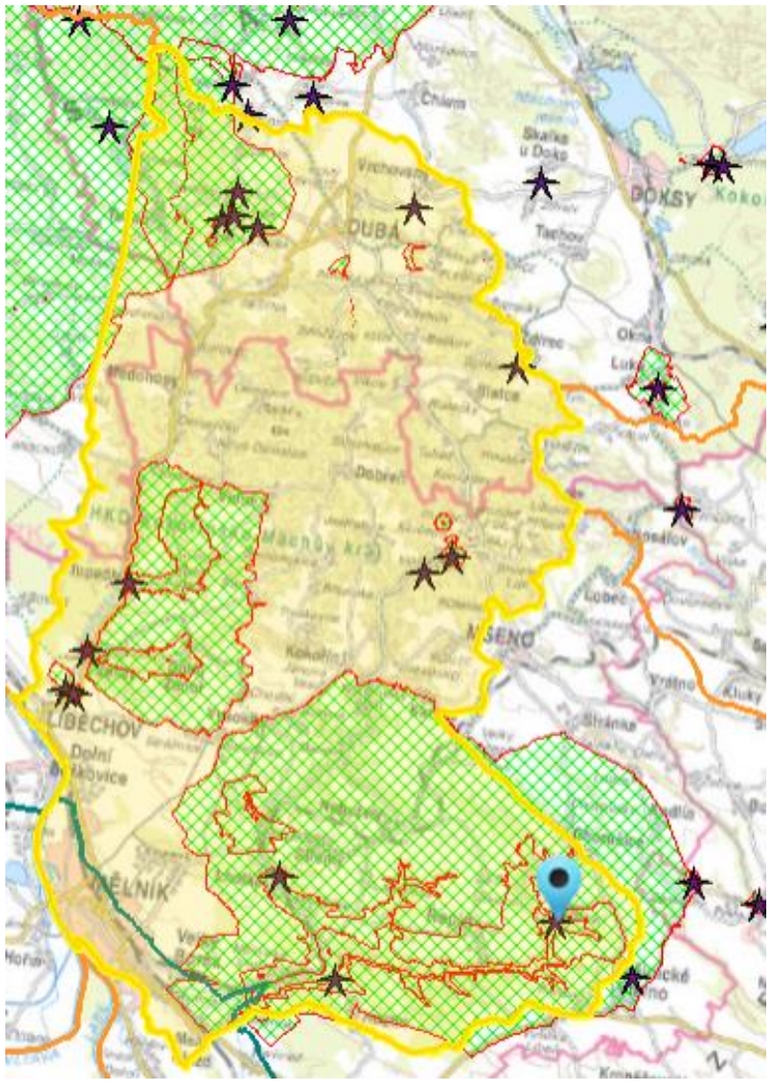
- **Point sources** – groundwater: mainly old contaminated sites (metals, PAHs, other pollutants).
- **Point sources** – surface water: municipal and industrial wastewater treatment plants, other pollution from urban areas (later).

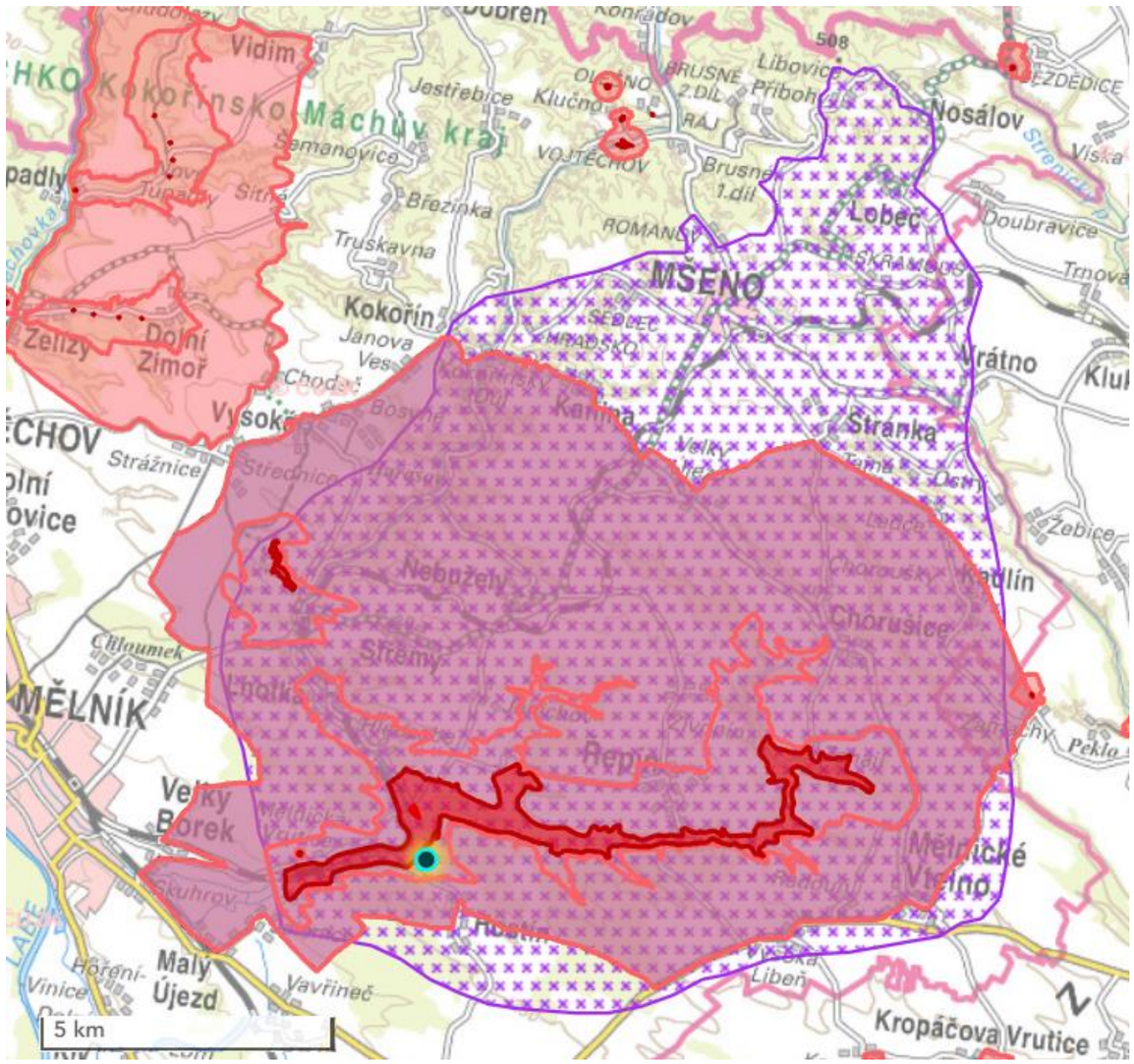
Example from pilot abstractions - Mělnická Vrutice

One of **the greatest groundwater abstractions** from cretaceous sedimentary basin, mean yearly abstracted volume is 343 l/s.

Left side: abstraction, safeguard zone and groundwater body

Right side: abstraction, safeguard zone and recommended infiltration area





Main findings

- **Types of abstractions** according to the water abstracted (surface, groundwater), hydrogeological characteristics (abstracted aquifers) and abstraction volume (less or more than 1,2 l/s).
- **Abstractions less than 1,2 l/s** and **abstractions from other shallow aquifers** will be assessed in the (part of) 4th order hydrological catchment areas, or safeguard zones (if they are compliant).
- **Abstractions from river alluvial sediments** will be assessed in the same way as surface water abstractions (catchment above abstraction).
- **Abstractions from the deep aquifers** have to be assessed in the area of hydrologeological groundwater bodies or their parts or safeguard zones.

Main findings

- **Likely pollutants** will be selected from existing national database (and some of them will be added later from finished projects).
- Based on the analysis of monitored water pollution indicators in the catchment areas and likely sources of pollution, additional **monitoring** will be recommended.
- **The new pollutants** (PFAS and pharmaceuticals) have to be assessed in the River Basin Management Plans.

Thank you for your attention

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