

Engineering geological mapping in Wallonia (Belgium) : present state and recent computerized approach

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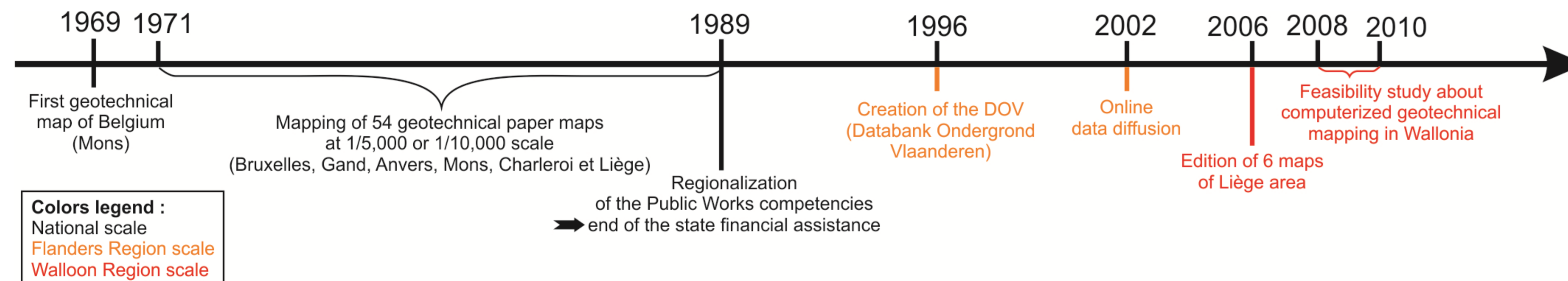
Context

An **engineering geological map** (also called **geotechnical map**) can be defined as a geological map with a generalized representation of all the components of a geological environment which are strongly required for spatial planning, design, construction and maintenance of civil engineering buildings (IAEG, 1976).

Engineering geological mapping localizes and synthesizes information about mechanical properties of the different subsoil layers located from the surface to about 50 m depth.

These documents are mainly used during feasibility studies **for spatial planning and civil engineering projects**. They are used to reduce risks related to additional costs and building delays.

Geotechnical mapping history in Belgium :

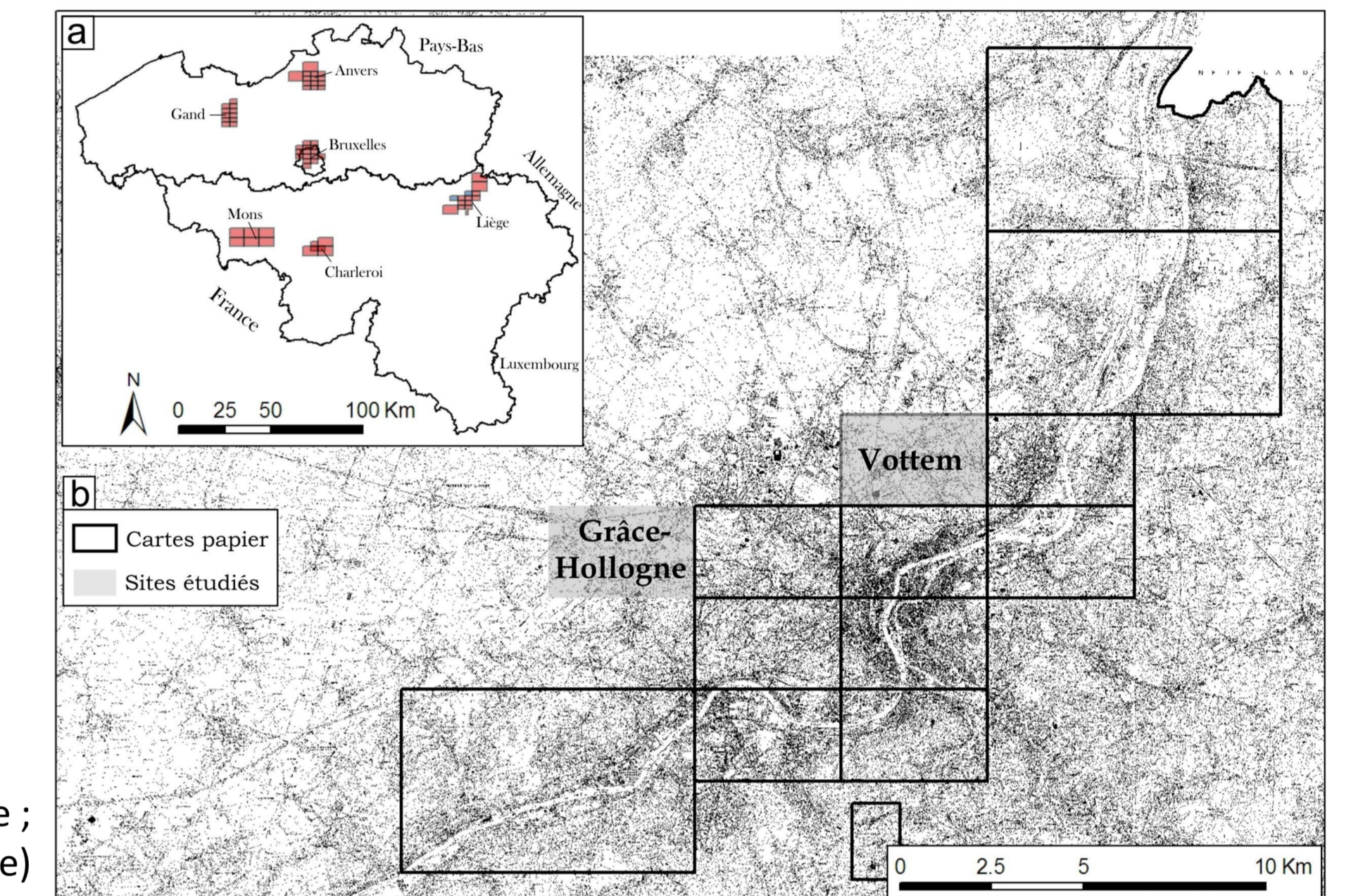


Objectives

Due to **lack of geotechnical data** in Wallonia, the Ministry of the Walloon Region and the University of Liège have recently initiated a study to evaluate the feasibility to **develop engineering geological mapping with a computerized approach**.

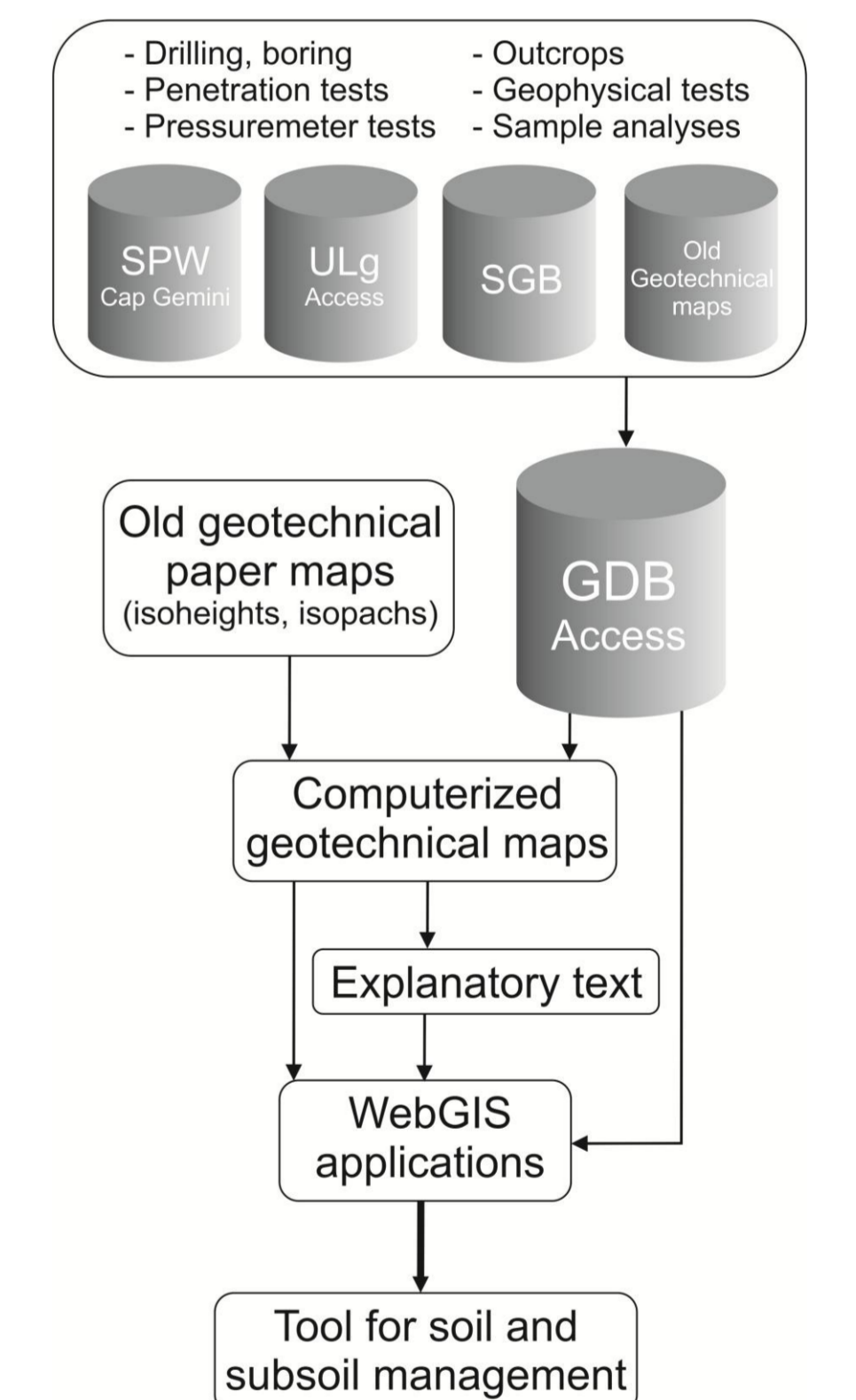
The feasibility study includes the following aims :

- Adaptation of the paper maps with GIS-tools (Vottem map)
- GIS-mapping of new areas (Grâce-Hollogne map)
- Creation of a computerized Geotechnical Database (GDB)
- Diffusion of the data on the Web
- Updating maps and GDB



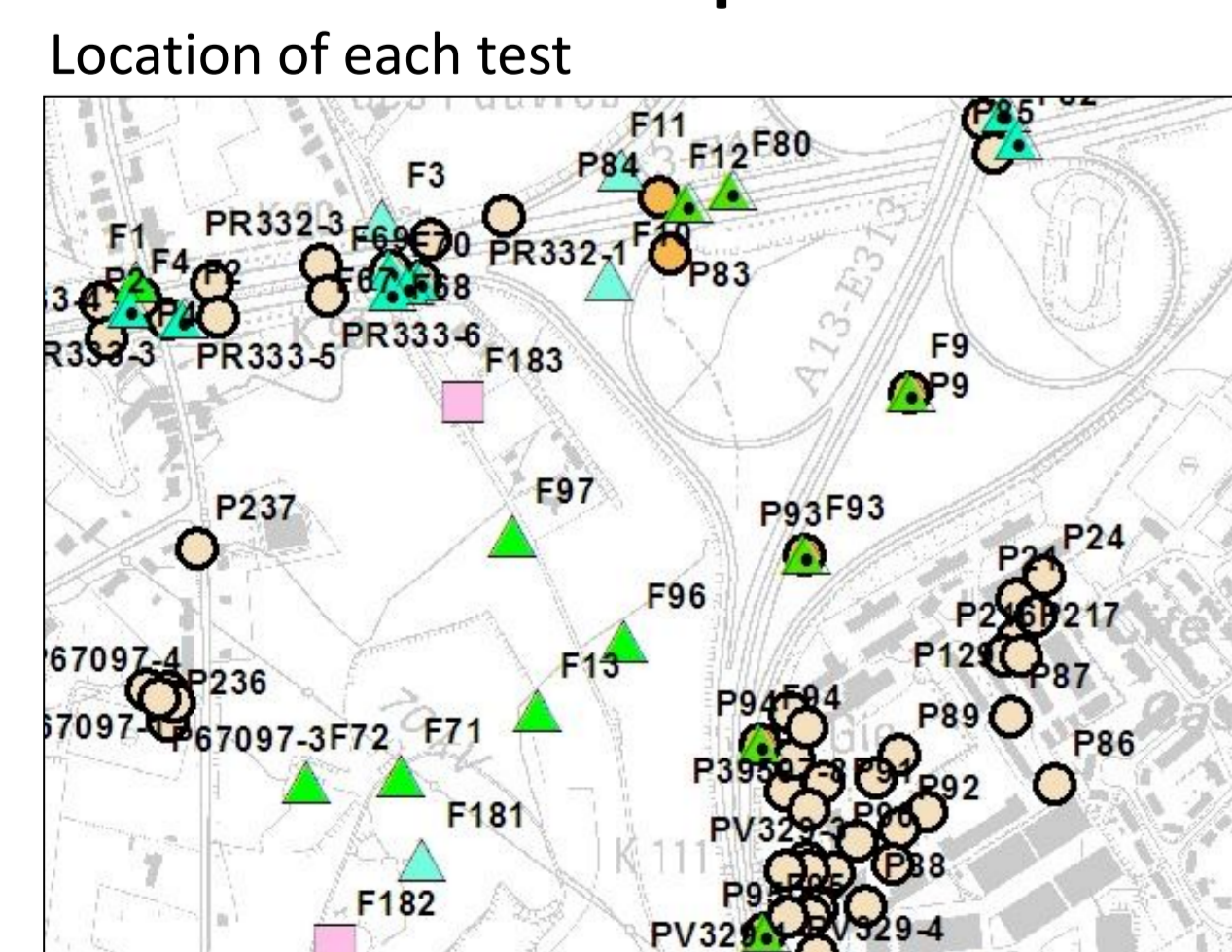
Methodology

1. Geotechnical maps are created from **numerous and various soil and subsoil data** (borings, penetration tests, geophysical tests, outcrops, laboratory tests...) which come from different existing databases.
2. A **geotechnical database (GDB)** is created on Access (Microsoft®) to collect and store all the data which are geographically referenced with Belgium Lambert coordinates and are treated using ArcGIS (ESRI®). Before to be stored, **each datum is checked** and validated or rejected to limit further additional errors.
3. The validated data are then used to **map the different subsoil layers** and are **synthesized in an explanatory text**. The isopachs (contour lines of equal thickness) and isoheights (contour lines of equal altitude) coming from the old paper maps are also used. **Interpolation methods** as kriging are investigated to compute the new **isopachs and isoheights**.
4. Maps and data related to test results are then **published on the Web**. Standardized **technical reports** are produced to describe each test results.



Results (for the map of Vottem)

Documentation map:

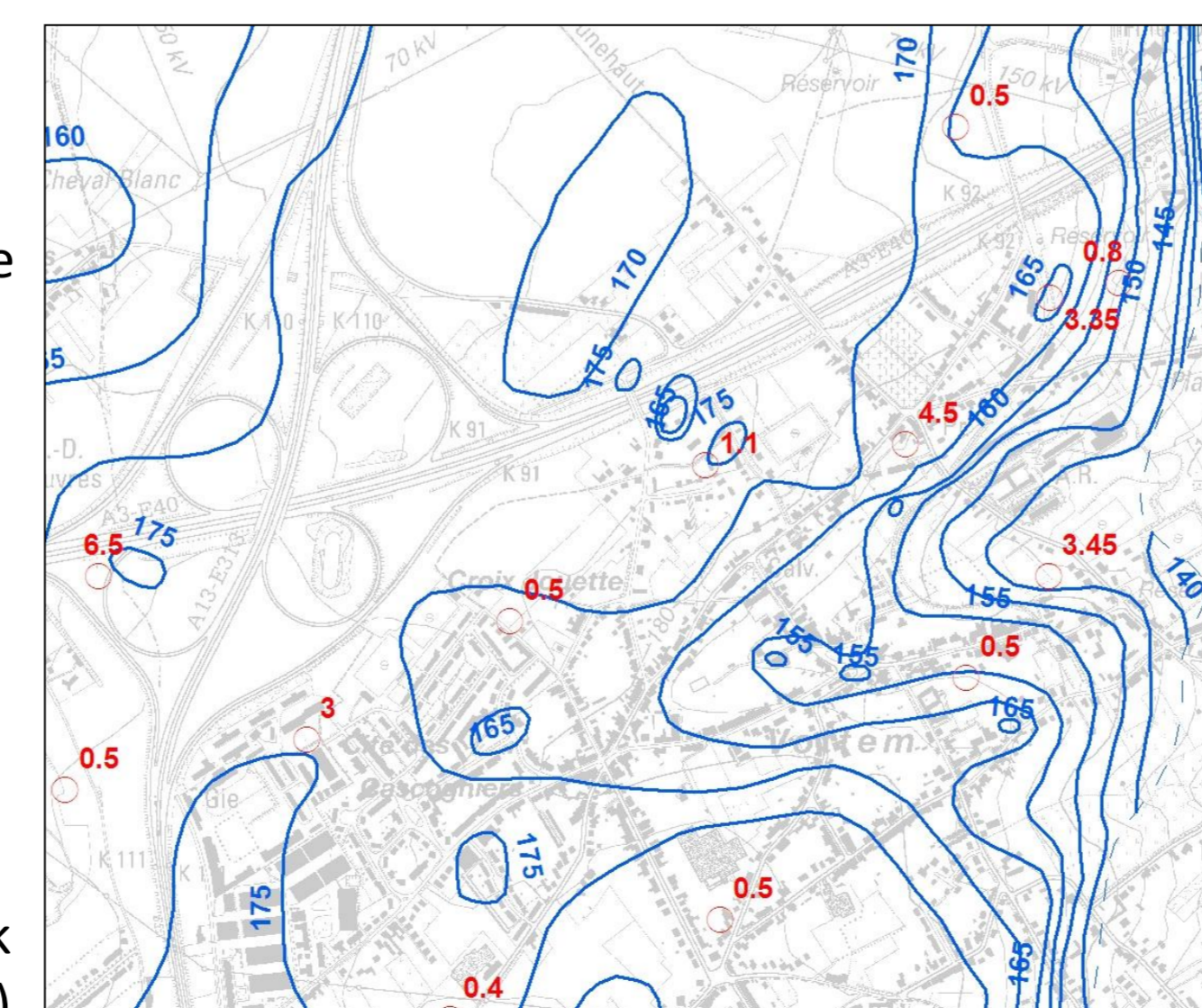


Maps of the different subsoil layers :

- Embankment thickness (punctual or isopach)
- Altitude (isoheight) of the top of each subsoil layer up to the bedrock
- Location of dumps, old quarries, old mines, old mining wells
- Location of karstified areas
- Data on the bed-rock structure (lithology, faults, deeping...)

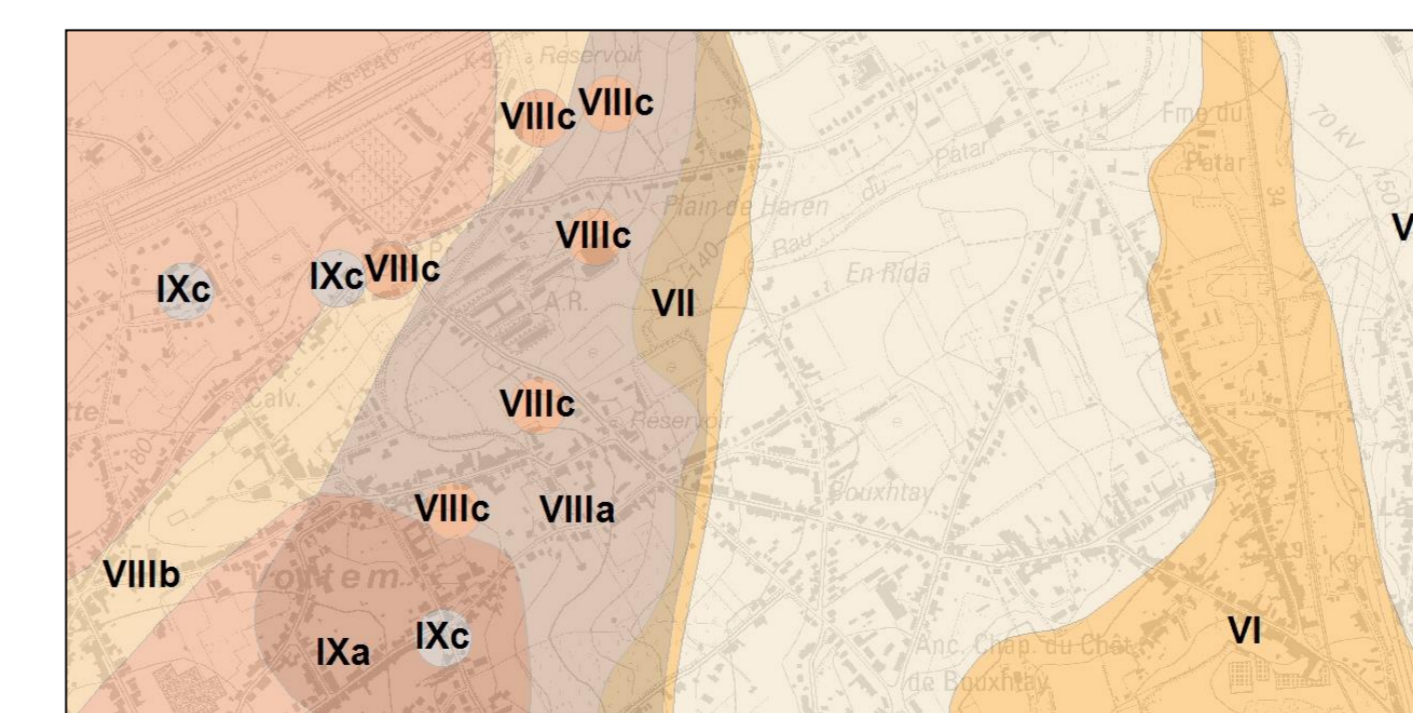
Including the possibility to visualize the results of each test on standardized technical reports

Map of the top of the chalk layer (isoheights)



Zonation map:

Synthetic map illustrating the geotechnical unities (areas characterized by a same vertical succession of subsoil layers)



Geological cross-section :

