Multicriterial Site Assessment of Potential Deep Geological Repository Sites in the Czech Republic: Requirements for Site Characterization Techniques

SÚRAO | RADIOACTIVE WASTE REPOSITORY AUTHORITY

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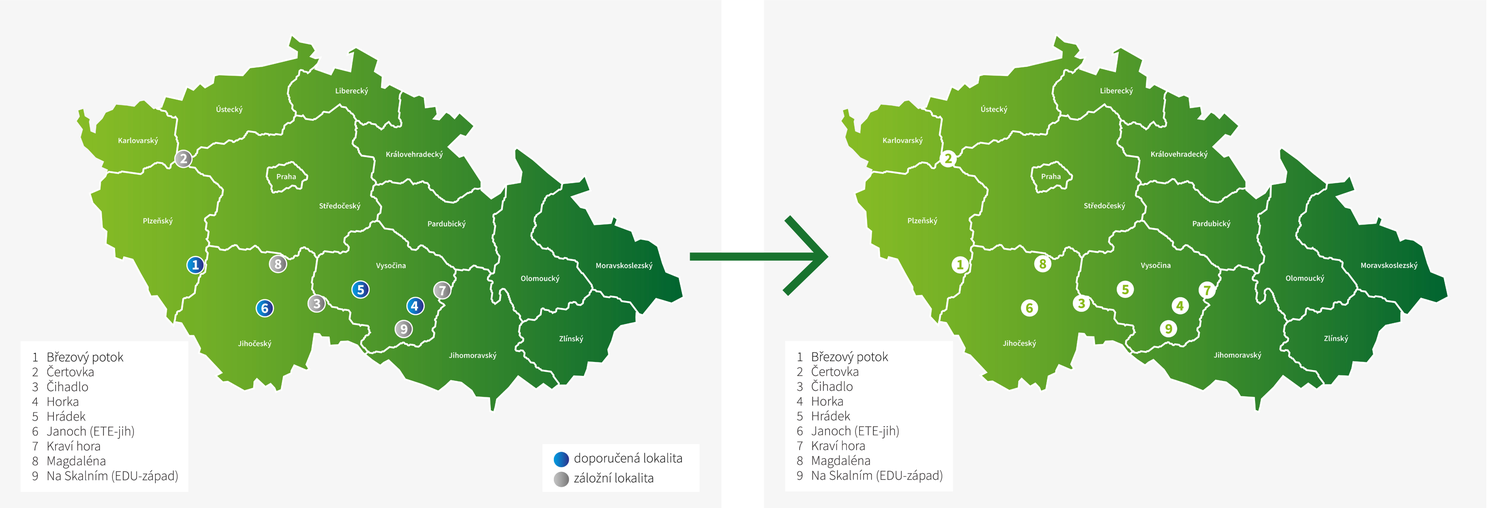
Aim: reduce number of potential DGR sites from 9 to 4

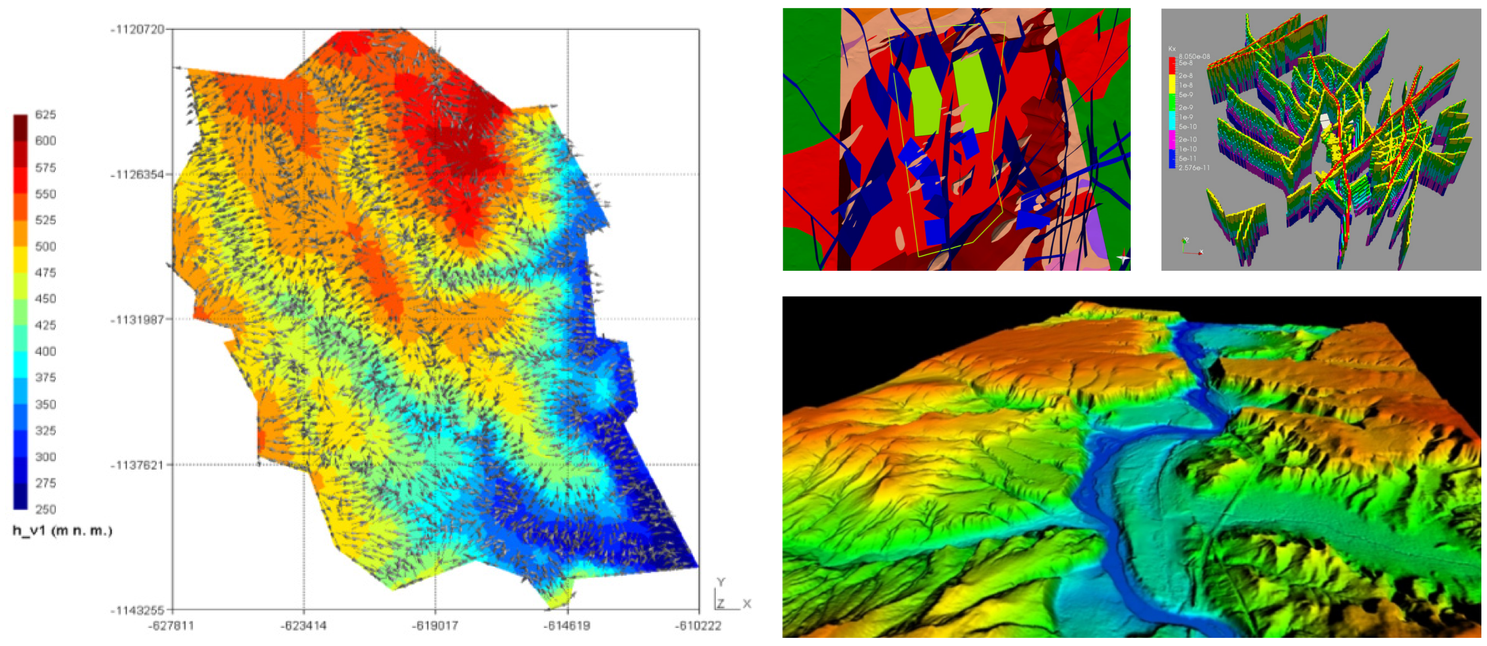
Radioactive waste disposal in the Czech Republic is managed by **SURAO,** which currently **operates three repositories** and is **responsible** for the **development** of the **deep geological repository.**

The aim of the assessment process presented herein was to **reduce** the number of DGR **sites** from **9 to 4.**



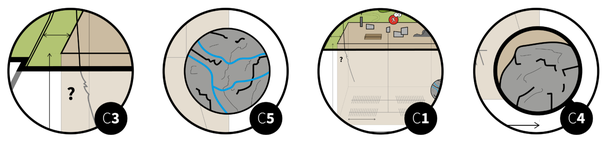
Used data

The **evaluation** was performed on the basis of data synthesed of the data in the form of geoscientific **descriptive models** of the sites and preliminary **project layout.** The assessment process was based on the assumption that all the **significant rock interfaces were identified.** Obtained data also allowed the determination of long-term predictions of sites evolution (eg. erosion, seismic). In case od environmental area, data was considered on location of the **surface area od DGR** and information provided by detailed **environmental impact studies.**

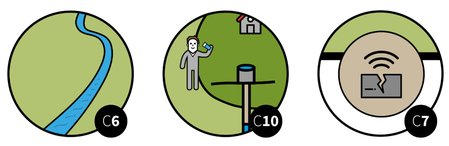


Applied critera

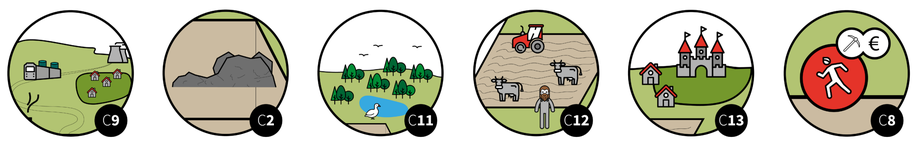
Relatively stronger criteria (10–20 %)

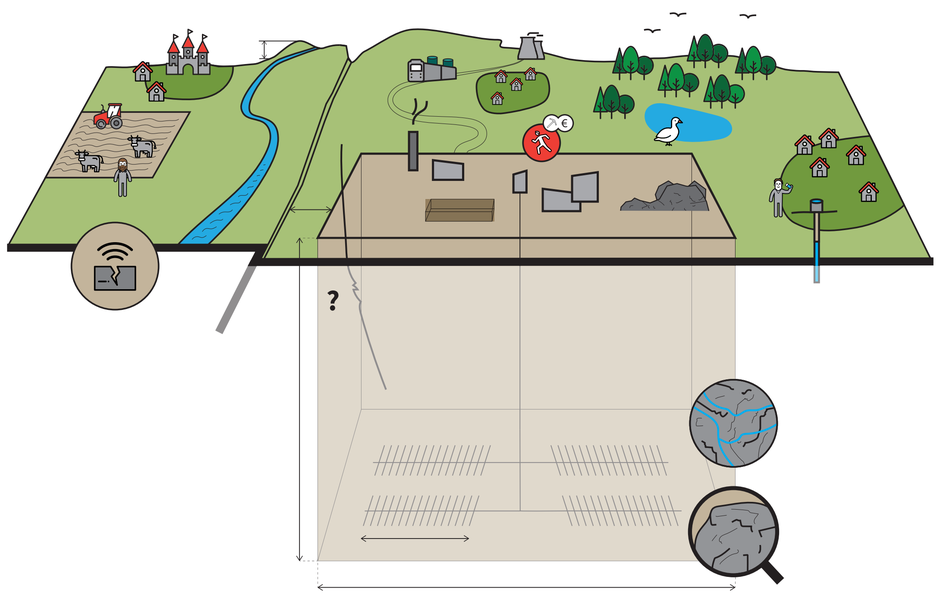


Criteria with mid importance (5–10 %)



Relatively less stronger criteria (2–5 %)





- K1 Size of the usable rock mass
- K2 Infrastructure availability
- K3 Describability and predictability of the homogeneous blocks
- K4 Variability of the geological properties
- K5 Water flow characteristics in the vicinity of the DGR and the radionuclide transport characteristics
- K6 Identification and location of drainage bases
- K7 Seismic and geodynamic stability
- K8 Characteristics that could lead to the disturbance of the DGR via future human activities
- K9 Phenomena influenced by the spread of radioactive materials
- K10 Impact on surface waters and water resources
- K11 Impacts on nature and landscape protection
- K12 Impacts on agricultural land and land intended for forestry
- K13 Impacts on the population, property and protected monuments

The **comparison** of sites employing the weighted assessment of the **key criteria further specified into indicators** according to the following areas: **technical feasibility** (C1–2), **long-term** (C3–C8,) and **operational** (C9) **safety** and environmental impacts (C10–C13).

Results

Calculation No	Variant	Weights of criteria	Weights of indicators	Values of indicators (normalization)
reference		aritmetical mean from all SAATY evaluation matrix	YES	Interval normalisation
1		statistical calculation of each evaluation	YES	Interval normalisation
2		aritmetical mean from all SAATY evaluation matrix	YES	Standard deviation
3		statistical calculation of each evaluation	YES	Standard deviation
4	a	NO	YES	Interval normalisation
	b	NO	YES	Standard deviation
5	a	NO	NO	Interval normalisation
	b	NO	NO	Standard deviation
	c	NO	NO	Estimated values

A total of **8 assessment calculations** were performed for five scenarios using differing procedures for the estimation of the weightings of criteria and for data normalisation purposes. The comparison of the sites according to the calculation resulted in the identification of the **four most suitable sites Březový potok, Horka, Hrádek and Janoch (ETE-south).** There was a significant difference in the resulting values with respect to the next less suitable sites **Čertovka, Čihadlo, Magdaléna and Na Skalním (EDU-west)** and a further significant difference between these sites and the **least suitable site Kraví hora.**

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