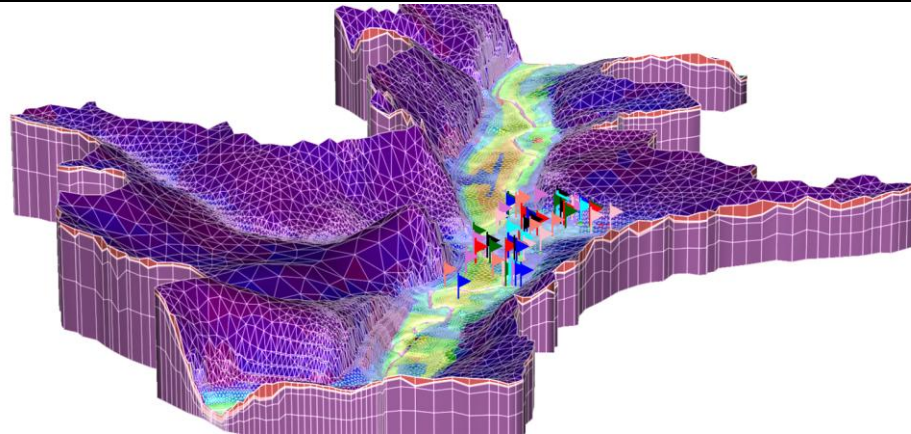


A 3D River-Valley Groundwater / Surface-Water Model

(2003-2004)

Location	Bad Kissingen, Germany
Type of project	3D river valley model with groundwater / surface-water interaction
Client	Wasserwirtschaftsamt Schweinfurt, Germany



Objective Along parts of the river Fränkische Saale, flood-control measures were planned to protect the historical parts of the city of Bad Kissingen, Germany. Given that the hydrological and hydrogeological conditions in the project area are characterized by strong groundwater-surface water interaction, the impact of the flood-protection measures on the groundwater regime as well as actions against rising groundwater levels during flood events needed to be investigated. Special attention had to be given to the protection of mineral springs and to the stability of buildings located within the project area.

Approach A three-dimensional FEFLOW[®] groundwater-flow model was built for the project area. The water levels of the river Saale occurring during a flood event were obtained from calculations with the HYDRO_AS-2D[®] software. A special coupling tool was developed to assign the water levels as transient boundary conditions in FEFLOW[®] during the simulation (one-sided coupling). Two extreme flood events were simulated to investigate the impact of the flood-control measures on groundwater levels in the river valley.

Benefit The FEFLOW[®] model allowed to design an effective pumping-well concept to protect against rising groundwater levels during flood events, keeping the mineral springs and the stability of buildings located in the project area unaffected. The model may also prove useful for further groundwater studies in the project area. In particular, an extension to a density-dependent mass and heat-transport FEFLOW[®] model is possible to simulate the mixing processes of brine and freshwater occurring in the zones around the mineral springs.