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Monitoring and Management of the Aquifer System Fuhse/Wietze (Phase I-IV) for a Discharge of 40 Mio. m^3/a

Client: Enercity AG

Location: Hannover, Lower Saxony

Scope of Work: Integrated Management of aquifer systems, monitoring of groundwater levels and surface waters, conjunctive use of water resources, integrated approach including artificial recharge,

Method: Longterm measurements, coupled 2D groundwater-surface water models, field experiments in the unsaturated zone, natural groundwater recharge

INTRODUCTION

Since 1960 Enercity AG is operating a groundwater discharge of 40 Mio. m^3/a at "Fuhrberger Feld" (Fig. 1) with respect to the EU Water Framework Directive" (WFD). The aquifer system is situated 30 km north of Hanover – the municipal of Lower Saxony / Germany.

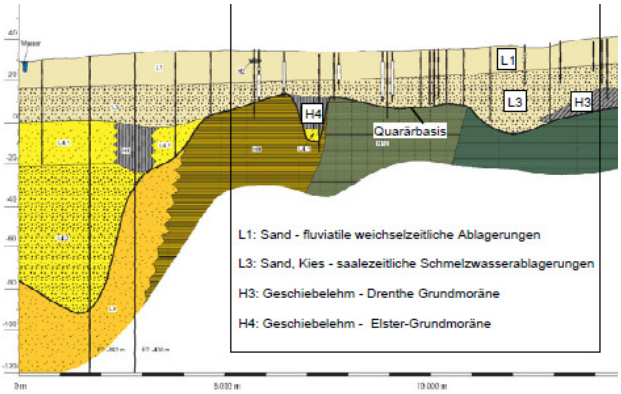

Fig. 1: Hydrogeological Cross Section of the Aquifer System Fuhrberger Feld

METHODOLOGY

In Phase I we developed a framework for an operational monitoring. In Phase II different scenarios for a resubstitution of discharge by means of a higher infiltration from surface water during winter were evaluated. Phase III was a field experiment to test best measures in-situ for one year. In Phase IV we are evaluating the longterm behavior of the aquifer for an annual infiltration of 2 Mio. m^3.

In Phase I a 1D hydrodynamic model of rivers and streams (320 km) was setup. This hydrodynamic model was coupled with a 2D groundwater model (Fig. 2).

The coupled models were calibrated for the period 1998-2007.

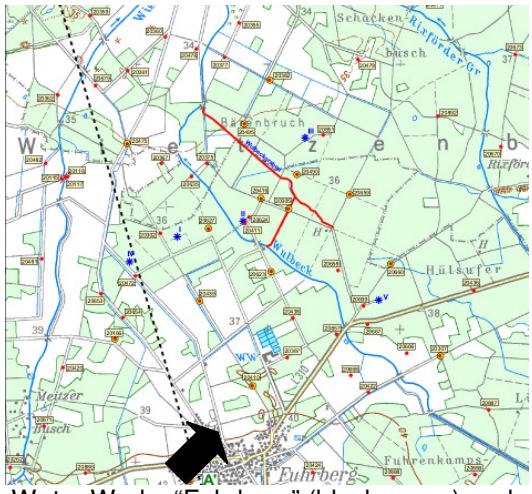

Fig. 2: Water Works "Fuhrberg" (black arrow) and Observation Wells

RESULTS

Results indicate that 2 Mio. m^3/a during winter months can easily be stored in the aquifer system (Fig. 4).

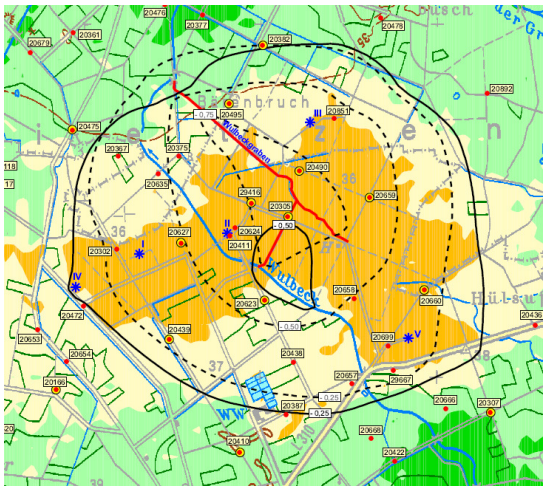

Fig. 4: Isolines of Groundwater Increase in February (dotted line) and April (solid line)

The experiment showed also that rising demand under climate change can be balanced.