

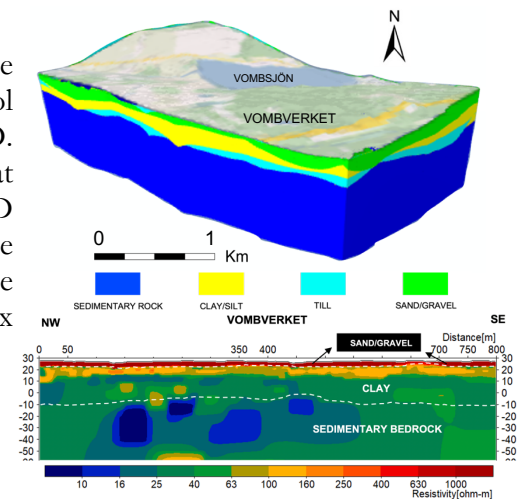
Farid Khorshidian

3D modelling of the groundwater resources in Vombsänkan, Skåne

Water is essential for life on Earth, and it is the world's most important natural resource. The project is a part of the Blue Transition which is a collaboration between seven European countries. Blue Transition targets a systematic water and soil management to ensure good-quality water in the North Sea Region.

The water flows on the surface and joins the groundwater resources through the uppermost geological units. Therefore, it is necessary to control the quality of the soil to ensure a safe and sustainable supply of drinking water. Vombsänkan is 759 km² in size and has a NW-SE-directed extension from Gårdstånga in the Northwest to Kåsberga in the Southeast. At Vombverket in South of Lake Vombsjön, 1100 l/s drinking water is produced using artificial groundwater recharge.

3D modelling is considered as an emerging and favourable technique for mapping of groundwater. A new powerful tool in geological modelling is the software Geoscene 3D. However, there is no previous research available that describes the 3D modelling procedures with Geoscene 3D using the borehole data. Lack of a 3D visualization of the northern part of Vombsänkan and an instruction for the application of Geoscene 3D in modelling of a complex geological setting such as Vombsänkan, emphasizes the importance of this thesis work.



A new 3D model and geophysical investigations reveal the hydrogeological conditions

Two major types of aquifers are identified. Aquifer 1 is the sedimentary bedrock, which is typically a confined aquifer. Aquifer 2 commonly consists of an open aquifer near the surface, which is composed of sand/gravel. At Vombverket the depth of the Quaternary deposits is 40 – 50 m. The major groundwater recharge occurs along the horst zones at higher elevations at the margins of Vombsänkan. The estimated aquifer geometry reveals the substantial hydrogeological potential of the northern part of Vombsänkan. The approximate volume is 1.2 – 18.2 km³ for the confined aquifer associated with the porous and fractured sedimentary rocks. The open aquifer within the sand and gravel unit has an approximate volume of 2.3 - 3.6 km³.

A simple hydrostratigraphic model is presented for the area around the Vombverket water treatment plant. The sedimentary bedrock is located 40 – 50 m below the surface. At some locations, such as East of the infiltration basins, a till unit covers the bedrock. However, at the location of the resistivity measurements, 25 – 30 m of clay is directly deposited on top of the sedimentary bedrock. The uppermost unit is composed of 5 to 10 m of sand and gravel.

Master's Degree Project in Geology 45 credits
Department of Geology, Lund University

Supervisor: **Dan Hammarlund, Alfredo Mendoza and Torleif Dahlin**