

# Where does the pollution go? Conceptual understanding of interaction between groundwater and stream

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## Background and purpose

At a location in the Capital Region, a pollution investigation was previously carried out, which concluded that significant pollution with chlorinated solvents flows into a sand aquifer and into a nearby stream. It was therefore assessed that there was no risk to the groundwater resource in the area. Subsequently, an initial surface water survey was carried out, which showed that no significant amounts of pollution flow from the site into the stream.

WSP was therefore tasked with confirming or denying whether the pollution from the location flows in or under the stream, to reassess the risk to the groundwater resource.

The purpose of this (hopefully) oral presentation is to emphasize that a groundwater and/or surface water investigation cannot stand alone if there is contamination in an aquifer close to a recipient. The interaction is complex, and one therefore must use several methods and lines of evidence to understand what is going on.

## Methods and data

It has been a long winding road in the attempt to reach the goal of the investigations. We have tested many methods, e.g. traditional boreholes, geoprobe soundings, geophysical surveys (MEP), water flow measurements in the stream, etc.

The research methods will briefly be reviewed, which are relevant for either/or groundwater and surface water surveys? What are the strengths and weaknesses, why some methods do not apply. The point is to show the series of surveys that together help to provide the necessary "line of evidence".

## Result

Initially, conventional boreholes were carried out, but the plume was not located. But there were challenges in finding a plume in a mighty sand aquifer with traditional boreholes. Subsequently, geoprobe soundings were carried out. Especially level-specific water samples proved to give good results and a good understanding of the distribution, composition, and strength of the plume.

To investigate whether there was a separating cover layer between the sand aquifer and the primary aquifer (limestone) at the site, a deep borehole was carried out to the maximum possible depth, according to the capabilities of the equipment. As the borehole did not provide the final answer, geophysical investigations were carried out.

During water level measurements between boreholes close to the streambank and measurements in the stream, it turned out that there is a gradient difference of 2 m from the aquifer down towards the stream, a few meters away. There were no signs of a continuous hydraulic barrier or of a spring at the streambank. The geophysical investigations could not clarify whether there was a hydraulic barrier between.

It was assessed that it was necessary to remeasure waterflow in the stream. The result can indicate whether the stream receives or loses water to the aquifer on the section past the site and in what quantities.

The investigations are expected to be concluded ultimo 2023.