



Case Study

Management Groundwater Monitoring Network 'Haaglanden', the Netherlands

CHALLENGE

Obtain reliable and accurate groundwater level data in a large monitoring network owned by six separate municipalities, incorporating historical data dating back to the year 2000.

SOLUTION

Install, automate and maintain a groundwater monitoring network consisting of 400 telemetric and 200 stand-alone monitoring points. Collect, validate and manage groundwater data and disclose on a (public) web portal.

RESULTS

Easily available groundwater data informing both the local council and the public in compliance with BRO legislation.



City of Delft (source: Wikipedia)

Winning the tender

Last year, Van Essen Instruments and consultancy firm Ingenieursbureau Land won a tender issued by the Haaglanden municipal partnership. This concerns a tender for the management of the groundwater monitoring networks of the municipalities of Delft, Den Haag (DSM monitoring network), Midden-Delfland, Pijnacker-Nootdorp, Rijswijk and Westland. The monitoring network consists of more than 600 groundwater monitoring points in total. Currently approximately 2/3 of the measuring network consists of telemetric measuring points. The other measuring points are stand-alone (equipped with non-telemetric data loggers).

Import of historical groundwater data

We initially imported the historical groundwater data into the Diver-HUB database. Many of these groundwater measuring points have been automated with loggers since 2000. In total, this involved 75 million groundwater level datapoints. In addition, all metadata of the measuring points are also imported into Diver-HUB. Finally, the groundwater measuring points were also supplied to the BRO. The BRO is the 'basic registration for the subsoil', a national database to which local governments are obliged to provide their data.

Automating the groundwater measuring network

At the same time, Ingenieursbureau Land started automating the groundwater measuring points. The telemetric measuring points are equipped with Diver-NETZ telemetry. The Diver-Link modem is connected to a TD-Diver via a DXT communication cable. The manual measuring points were already equipped with Diver data loggers suspended from steel wire. We have replaced the steel wire in these measuring points for a DXT cable. The main reason for this is that reading the data from the Diver is much more efficient and in addition, the manual measurement can be compared with the Diver directly in the field.



All data is visualized in the Diver-HUB portal. In addition, a public portal is also available to citizens: www.diver-hub.com/public/

For a number of municipalities, a link has been set up between Diver-HUB and their own database or GIS application via the Diver-HUB API.

Managing the groundwater measuring network

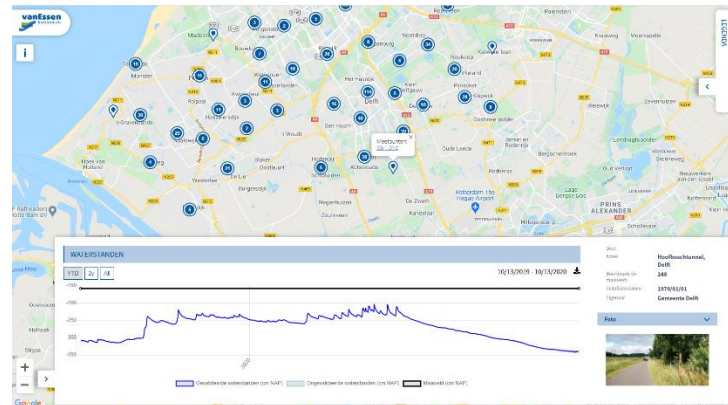
The project is currently in the management phase. The management of the groundwater measuring network consists of carrying out minor maintenance, manual measuring rounds and manually reading out stand-alone measuring points. In addition, specific requirements have been set by the client for resolving malfunctions of the measuring equipment. At the request of the client, additional activities are carried out, such as major maintenance and installing new groundwater measuring points.

Validation of groundwater levels

Finally, we are responsible for validating the groundwater levels. Specific requirements are set regarding the validation and data guarantee (percentage of validated data available) within this project. The data guarantee for the telemetric measuring network is, for example, 97% per year.

Data flow from field to office

For the efficient management of this groundwater monitoring network, it is essential that the various data flows are properly connected to each other. The first data stream consists of the telemetric data. The hourly Diver measurements are sent daily by the Diver-Link to a server of Van Essen Instruments. The data is then loaded by Diver-HUB and compensated for groundwater levels. An automatic validation of the water levels also takes place. In addition to the Diver measurements, the Diver-Link sends information about the status of the equipment. In the event of malfunctioning, the user will be notified by Diver-HUB. With this information we can anticipate and plan additional field visits for prevent data interruptions.



www.diver-hub.com/public

The second important data flow consists of manual measurement rounds and reading the stand-alone measurement points. For this we use Diver-Field software on a field tablet. The necessary information is loaded into Diver-Field from Diver-HUB to start a manual measurement round. This not only concerns the measuring points to be visited, but also the current cable length of the measuring points. This information is needed to be able to check the manual measurement directly in the field with the Diver measurements. The collected data is uploaded to Diver-HUB at the end of these reading rounds.



The last data stream consists of the validation of the groundwater levels. For validation we use ArtDiver from Artesia Water. In ArtDiver the metadata and Diver data are read from Diver-HUB. In addition, the Diver-Field data can also be read directly into ArtDiver. Validation is carried out using this data. The validated data is then uploaded from ArtDiver into Diver-HUB.

Interested in our approach?

In addition to the quality of the measuring equipment, the design of the data flow is important for successful management of the groundwater monitoring network. In many cases, this data flow will have to be adapted to the specific requirements of the client. If you would like to know more on how we approach this kind of project or whether this approach is interesting for your groundwater monitoring network, please feel free to contact us at diver@vanessen.com