science summary

Environment Agency

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Guidance on the design and installation of groundwater quality monitoring points

Science Summary: SC020093/SS

The Environment Agency has published a report which offers practical guidance on the design, construction and installation of groundwater quality monitoring points (GQMP). The main objective in designing a GQMP is to ensure that representative groundwater samples can be collected. Good design and installation are essential to achieving this goal.

GQMP installation is often undertaken on an *ad hoc* basis, with little consistency of approach between and within organisations. There is, at present, no single UK document that sets out a comprehensive approach to the design and installation of GQMPs. As a result, design is often based on experience, instinct, or simply repeating what was done last time. A consequence of the lack of guidance is that many inappropriate GQMPs have been installed, leading to problems in understanding and interpreting groundwater quality data.

The Environment Agency report, *Guidance on the design and installation of groundwater quality monitoring points*, outlines existing procedures and guidance on GQMP design and installation. It is compiled from diverse existing UK guidance information, supplemented where

appropriate by international good practice guidance, and from accepted good practice within the UK. This report is designed as a stand-alone, but reference is made to other guidance documents where applicable.

This report will be of use to organisations interested or involved in groundwater monitoring schemes, and should serve to improve industry practice along with the quality of monitoring data.

The guidance concentrates on the more common procedures for GQMP design, installation, borehole development, maintenance, rehabilitation and decommissioning. Where unusual or novel practices are employed, users may need to adopt additional measures on top of the general advice in this report to ensure that the GQMP meets monitoring objectives.

It is assumed that, prior to undertaking the design process, a decision to drill and install a GQMP has been taken and that the reasons for installing that point are clearly defined. The design process requires the monitoring objectives to be clearly defined from the start, although these may be revised during the design process, where additional information and other considerations such as cost may arise

Monitoring objectives

Groundwater monitoring objectives can be divided into three broad categories.

Strategic monitoring is employed to obtain background water quality information, which can be used to determine broad groundwater quality, diffuse pollution trends, problems and long-term changes in groundwater quality.

Defensive monitoring is normally undertaken within and around an actual or potential problem site, to provide information on the impact of a known or suspected source of contamination. It can also indicate the absence of contaminants and can be used to assess the success of a clean-up operation.

Investigative drilling is used to improve the conceptual understanding of a site. It can detect contaminants on known problem sites and can identify interactions between groundwater and the greater environment, such as interactions between groundwater and surface water or a habitat.

There may be other reasons for drilling a GQMP which will also influence the design process, particularly the choice of drilling technique. It is important to determine at an early stage whether all objectives can be accommodated in a single borehole drilling operation without compromising the monitoring ones.

Design

Initial design should be a quick and relatively simple process, focussing on the design basics such as drilling method, GQMP positioning and objectives. It is undertaken primarily to identify potential pitfalls and problems, the likely budget for the work and significant health and safety issues. This stage also serves to refine the monitoring objectives to ensure they are achievable. A brief outline design should be drawn up prior to beginning detailed design – several designs may need to be created to allow for different options.

At the detailed design stage, the initial design is refined to sufficient detail for the work to be commissioned from drilling contractors. Health and safety requirements should be formalised and accurate costs produced. The user should also confirm the suitability of the design with a regulator.

Construction

This report covers the requirements of the construction process, including the need for supervision and the role of the supervisor; necessary documentation; the sequence of construction; and borehole development (the process of returning the conditions around the GQMP to as close to those prior to drilling).

Post-construction activities other than groundwater sampling include maintenance, which involves routine activities to maintain the performance of the GQMP. Correctly installed GQMPs should not, in general, need much maintenance. Rehabilitation may also be required and will involve both major and occasional work to restore the performance of the GQMP. Decommissioning may be needed to ensure that the GQMP does not become a pathway for contaminant migration.

This summary relates to information from Science Project SC020093, reported in detail in the following output(s):-

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