

GUIDELINES FOR DRILLING WELLS FOR PRIVATE WATER SUPPLIES

Why are these Guidelines needed?

Approximately 130,000 households in Ireland depend on their own private water supply, usually a borehole. Thousands of new water wells for private supply are drilled every year in Ireland. This well drilling is:

- widely dispersed throughout the country.
- very competitively priced.
- undertaken without any technical specifications or standards.
- completely unregulated by the state.
- largely unsupervised by professional engineers or hydrogeologists.

Many private water wells in Ireland are polluted, at least intermittently, with serious implications for human health. The main reasons for this pollution are:

- Wells are drilled too close to, and/or down-gradient of, local sources of pollution such as septic tanks, farmyards, and fields on which slurry is spread.
- The well construction does not prevent or minimize the likelihood of such pollution.

The primary aim of this information package is to prevent groundwater pollution

Background

Currently Ireland has no statutory regulations or comprehensive guidelines concerning water well drilling and groundwater abstraction. Consequently there are inconsistent standards of construction of boreholes. In contrast, many other countries require prior permission for the drilling of boreholes, specific standards of well construction, and licensing of well drillers (Ball, 1996, 2000).

The Environmental Protection Agency's report, *Ireland's Environment* (April 2004) reported that over a quarter of the groundwater samples subjected to bacteriological examination tested positive for the presence of faecal coliforms, indicating contamination from sewage or similar wastes. A high incidence of faecal coliform contamination in samples from private water supply schemes was recorded. These findings have serious implications for the users of these drinking waters. The poor quality of rural groundwater supplies in Ireland demonstrates the need for standards to regulate the drilling, construction, testing and sealing of water wells. This approach aims to improve water sources and reduce the need for 'end-of-pipe' solutions.

The EU Water Framework Directive (December 2000) requires member states to manage and protect their groundwater resources in a comprehensive manner. Its main objectives include preventing the deterioration of groundwater status, restoring groundwater bodies and ensuring a balance between abstraction and recharge of groundwater, via a river basin management approach. The Framework Directive provides for measures to be established, including "measures...to safeguard water quality in order to reduce the level of purification required for the production of drinking water" (Article 11.3(d), also see Article 7.3).

In light of the above the Institute of Geologists of Ireland (IGI) set up a working group to look at the drafting of guidelines for borehole construction, testing and decommissioning.

Intended readership

These guidelines aim to provide guidance to private well owners, well drillers, group scheme organisers, consultants, public authorities, and other interested parties.

The documents are presented for discussion as a guide to good practice, with a view to being adopted as a national standard in order to safeguard the country's groundwater resources and supplies.

Objectives

The owner of a new water well should be able to have confidence that the well has been constructed according to accepted standards in relation to the following:

- Equipment, materials and techniques used in the construction of the well
- Verticality and straightness of the well
- Sanitary security and disinfection of the well

The owner should also be supplied with the following:

- A record of an appropriate test of the sustainable yield of the well
- Documentation of the well construction, its yield and its water quality

The adoption of these guidelines should:

- Protect the environment and public health by reducing groundwater contamination via poor well construction, abandoned boreholes and cross-contamination between aquifers.
- Reduce the need to replace contaminated wells.
- Prevent wells being located in unsuitable locations.
- Improve standards of well drilling, leading to longer-lasting and more efficient wells.

Scope

These two documents are concerned with the construction, testing, and decommissioning of water wells. They draw on standards and guidance notes from other countries.

Explaining Groundwater and Water Wells provides a non-technical description of groundwater, its occurrence, the way it moves underground and the basic principles behind constructing and operating a borehole as a sustainable source of high quality water. It is written primarily for private householders who have a water well or who wish to have a water well drilled. Its aim is to demystify groundwater and boreholes and give the private householder enough information to understand the principles needed to site, construct and pump a borehole.

Water Well Construction Guidelines deals with the location, construction, testing, sampling and sealing (decommissioning) of wells. It is written for well owners, well drillers, engineers, planners, architects and anyone else concerned as a practitioner or customer:

Section 1 provides guidelines for the siting new water wells in relation to potential sources of contamination.

Section 2 addresses water well construction, wellhead completion and protection, well development and disinfection.

Section 3 provides guidelines for water well pumping tests.

Section 4 reviews analytical sampling and analysis.

Completing a well in line with these guidelines will improve the likelihood of good groundwater quality but does not guarantee that the groundwater in the well will meet drinking water standards.

Essential Recommendations and Proposals

1. Water wells should be drilled in locations which minimize the likelihood that the well will be polluted by, for example, septic tanks, farmyard runoff or slurry spreading.

Reason: so that wells will be drilled in appropriate locations, and avoid inappropriate locations where pollution is likely.

2. Wellheads should be constructed so as to ensure that surface water and shallow groundwater, which are likely to be polluted, cannot enter the well. Wells must be cased and grouted to an adequate depth, the casing and grout must meet certain minimum standards, and the placing of the casing and grout must be meet a certain specification.

Reason: to prevent pollution of wells and protect human health.

3. Water well drillers and their equipment and methods should meet certain minimum standards. The equipment should be clean, and drilling should not introduce any polluting matter into the ground.

Reason: to prevent pollution of wells and aquifers and protect human health.

4. Water wells should be cleaned and disinfected before being brought into use. The methods and materials should meet certain minimum standards.

Reason: to protect human health.

5. Water wells should be tested for yield and quality. A mandatory list of tested chemical and bacteriological parameters should be specified.

Reason: to protect human health and protect the consumers' interests.

6. Water well drillers should be facilitated to form a self-regulatory organisation which would certify the competence of drilling companies and individual drillers to meet the above requirements.

Reason: to ensure that drillers are trained to carry out all aspects of well construction to the required specifications, and to underpin consumer confidence.

7. Water wells no longer required for any purpose should be sealed (decommissioned) to specified standards.

Reason: to prevent pollution of aquifers.

8. Drilling of water wells should be brought within the planning system and Building Regulations, just like, for example, septic tanks.

Reason: to ensure that appropriate conditions and specifications can be attached and enforced, in order to protect human health.

These guidelines primarily address the problems of unsatisfactory siting and construction of wells for domestic and farm water supply, where (at present) no consultants are likely to be involved and no public regulation is involved except possibly the payment of a grant.

The guidelines are *not* concerned with observation wells or monitoring wells, since these are normally designed and supervised by competent consultants.

