HOW TO DIG AND TAKE CARE OF WELLS

Common knowledge

When centralised water supply is absent, provision with water, first with drinking water, is very important. Dug and drilled (artesian) wells are used for extraction of drinking water from water-bearing layers. Drilled wells allow to extract bigger amounts of water, water quality is often better here; however, they are quite expensive but usually not affordable for a single household.

Considerably easier and cheaper is to install a dug well. Most dwellers have already installed such wells a long time ago, but some, especially those who have got back privatised land may have a need to dig out a new well-installed well in a more convenient location. Then it is possible to inquire about requirements necessary for good drinking water quality and especially that the water would be of no harm to human health. Also those who are not prepared to dig new wells should inquire about what should be done in order to improve water quality in their wells.

Selection of location

It is best to dig out a well in a higher place where flood- and rainwater could flow down. Water will be of poor quality if wastewater from fertilised kitchen garden or fields, barn or contaminated yard gets into the well. Barn, toilette, fertilised kitchen garden, greenhouses, dumps and other contamination hot spots have to be below and farther from a well. In Lithuania minimal hygienic distances are controlled by legislation (RSN 151-92). The minimal distances between pit wells and:

- dwelling house 7 m
- garage 10 m
- greenhouse 10 m
- household block 10 m
- barn 25 m
- manure storage, compost site 25 m

One should draw attention that these distances are the smallest allowed. They should be enlarged whenever there is an opportunity.

Installation of well

The most important element of well construction is its curb that must prevent water leakage despite of the material it is made of. Water flows to the well only through the bottom. Water filtering layer is made out of sand, thick sand and gravel (Fig. 1).

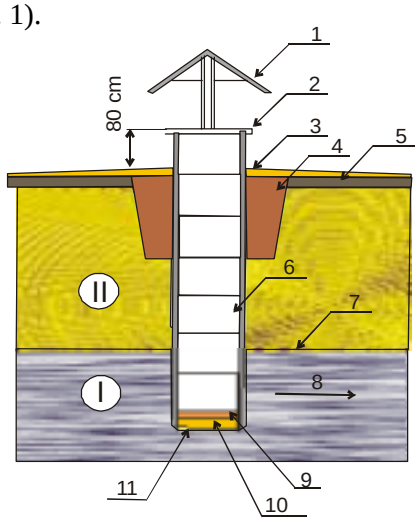

Fig.1. Installation scheme for pit well:

I – water saturated zone; II – water unsaturated zone; 1 – roof, 2 – lid, 3 – gravel, 4 – soil, 5 – clay, 6 – concrete ring, 7 – groundwater level in well and soil, 9 – gravel (15 cm), 10 – thick sand (15 cm), 11 – sand (10 cm).

Well's curb has to be lifted up 0.8 m above land surface. Around the well there has to be 1-2 m wide ground with 0.1 m inclination towards the well. Around the curb there has to be 1.5-2 m deep and 0.5 m wide layer of rammed clay and above it – drainage layer for splashed- and rain-water to flow down. The well requires a lid and a roof above (Fig. 2).

Fig. 2. Well with tin-covered roof

Taking care of well

As ground layer that feeds the pit well is near the land surface, chemical and microbiological water quality indicators deteriorate in polluted environment.

Owners themselves usually contaminate water in the pit wells. Traditionally the pit wells are installed in central part of a farmstead, closer to dwelling house and household buildings, nearby kitchen garden. A sanitary protection zone has to be arranged around the well. Its width has to be not smaller than the indicated minimal distances to buildings, but one should try to make it even wider. In this zone one must not apply fertiliser and other chemical substances, litter, pasture animals, wash. The best is to plant perennial grasses and decorative shrubs in this zone.

If the territory around the well was not heavily polluted for long time and the water became contaminated, slight effort may be enough to restore good water quality in the well. For example, in V.Liutkevicius farmstead's well rather bigger amount of nitrate than is allowed was determined. In 1997 year when it was assured that water was bad, measures needed for water improvement were discussed and explained for the farmer. The farmer V.Liutkevicius removed the greenhouse that had been built nearby the well, improved surrounding environment, and warned his family numbers about the danger. We see the results of improved management in Fig. 3 – water started to improve soon and no health risk is present any more.

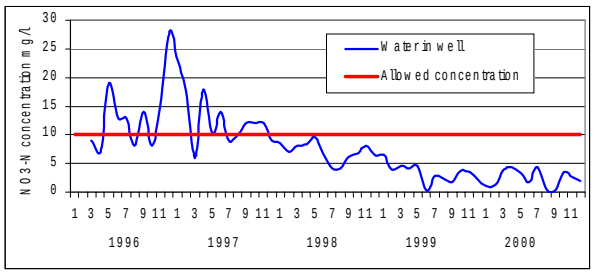

Fig. 3. Changes in well's water quality when environment is improved

When the zone around the well is contaminated by the big amount of fertiliser or other chemical substances (e.g. when storing fertiliser or piling up manure nearby well), water-bearing layer may be contaminated for decades and then it will not be possible to expect good water in this place.

In general, private pit well's water quality is not controlled because it is not goods but the matter of users themselves. However, it is drinking water and one should follow if its quality satisfies the requirements for drinking water. Most often wells' water is polluted with nitrogen compounds – nitrates (in Lithuania half of the installed wells are such). Nitrates themselves (NO_3) are not poisonous. Poisonous are nitrites (NO_2) that are formed in human organism out of nitrate. Infants are especially sensitive to nitrates. Haemoglobin present in infants' red corpuscles of blood combines with nitrites, forms methemoglobin and oxygen dearth begins. In stomach nitrite forms dangerous compounds – carcinogenic nitrosamin.

The highest allowable nitrate concentration for drinking water is 50 mg/l or 10 mg/l if expressed as pure nitrogen (NO_3-N).

It is very important that infective bacteria would be absent in well's water. Coliformic bacteria ('intestine sticks') that are resistant to heat have to be absent at all.

If any doubts concerning well's water quality occur, it is necessary to examine the water. Regional human health centres perform such analyses for comparably low fee.

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