

Groundwater Quality & Water Treatment



Groundwater Pollution Risk

Groundwater quality problems can arise due to the natural conditions in the ground or by pollution from most common human activities.

The groundwater quality problems in Ireland are caused by iron, manganese, hydrogen sulphite and hardness. Iron and Manganese are commonly found in gravels and rocks principally in an insoluble form. Dissolved Iron and Manganese in well water oxidize when in contact with air, which can form tiny rust particles that cause discolouration of the water. The concentration of sulphate in water is readily reduced to sulphide causing pungent odour when aerated at surface. Hardness is a natural characteristic of groundwater causing scaling and blockages in pipes, when levels exceed 200mg/ltr. Human activities have not yet caused the same degree of pollution problems to groundwater in Ireland as in other E.C. countries. However an increasing number of localised problems are coming to the attention of the G.S.I. and groundwater researchers where wells are polluted by point sources such as septic tank systems and farm-yards. This can result in localised pockets of pollution. This will have an impact on any development requiring water in such areas. So although the actual quantity of polluted groundwater is small in most areas, it can result in significant health risks. There are some areas, particularly in the West of Ireland, where pollution is more widespread. This situation occurs where the bedrock is close to the surface for example in karst or cavernous limestone areas. In these areas up to 50% of the wells can be polluted at some time during their use. The main groundwater contaminants are faecal coliforms, ammonia, nitrate, potassium chloride, iron and manganese.

Groundwater pollution risk depends on the interaction between:

- a) The natural vulnerability of the groundwater.
- b) The pollution loading that is, or will be, applied to the subsurface environment as a result of human activity.

The main problems arise where there is a high groundwater vulnerability and a high pollution loading. Vulnerability is fixed, it is an intrinsic characteristic of an area, whereas the pollution loading can usually be controlled or modified by good land-use planning and monitoring. The natural vulnerability of an area is not given due consideration at present when locating potentially polluting developments.

The principle groundwater contamination sources are considered to be farm-yards and septic tank systems. Typically groundwater is vulnerable to:

- 1) Organic Wastes in Farmland
- 2) Land Spreading of Organic Wastes
- 3) Inorganic Fertilizers
- 4) Septic Tank Systems
- 5) Landfill Sites (Not complying with current legislation)
- 6) Certain industrial practices in the area.

The EPA in conjunction with GSI and Department of the Environment have recently issued a publication entitled: *Groundwater Protection Schemes* which provides guidelines for planning and licensing authorities to establish a framework to assist decision making on location, nature and control developments and activities in order to protect Groundwater.

Water Treatment Bridging The Gap Water as it is, and water as you need it to be.

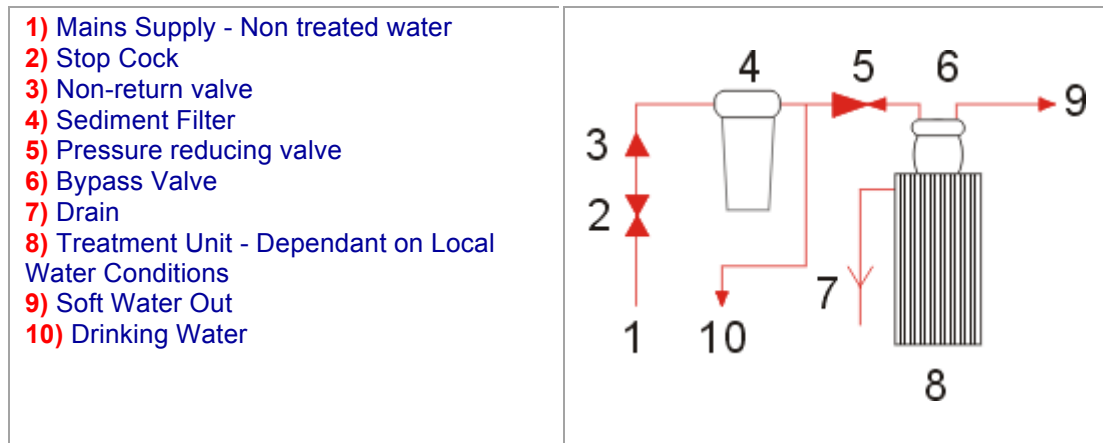
With the technologies available today, there is virtually no water quality problem that cannot be overcome. In fact, for any given case, there may be various technologies worthy of consideration. The challenge is therefore to find the most effective solution for each individual requirement. *Analysis and Assessment*: whether you suspect you might have, or know you do have a water quality problem, standard practice is to start by screening the water with an appropriate set of analysis. It is only experience in both water chemistry and water treatment that allows the nature and consequence of any potential problem to be identified.

System Design and Service Support

Various water treatment companies have been solving domestic and individual water quality problems throughout Ireland. Ideally, recommended water treatment companies have the in-house capability to design, supply, install, commission and service water treatment equipment of all sizes and also provide training and technical support for all equipment and treatment systems that they manufacture/ assemble and supply.

TYPICAL PROCESS FOR DOMESTIC WATER TREATMENT UNIT

Typical Process for Domestic Water Treatment Unit



Acknowledgement: modified after Mr. Donal Daly, G.S.I/ Ms. Carola Patterson, Water Technology Ltd.