

Why is iron in groundwater a problem?

- The World Health Organisation does not set a health-based guideline value for iron as it is not of health concern at the levels commonly found in drinking water.
- However, the presence of iron may affect the acceptability in terms of taste and appearance of drinking water.
- The Irish drinking water standard for iron (in treated water) is less than or equal to 200 µg/l (micrograms per litre, which is approximately 200 parts of iron per one billion parts of water).
- Iron can also collect in and block pipes or fixtures and produce colour, taste and rust flakes in water.
- Water with a high concentration of iron may cause staining of plumbing fixtures or laundry.
- Iron can also increase the growth of unwanted bacteria that form a slimy film (biofouling) in the well, pump and water pipes.
- Iron deposits and biofouling can clog the intake of a well or affect the pump, making the well less efficient.

What can I do?

- Private well owners
 - Inspect the well periodically. Servicing may be required.
 - Get the water tested and seek advice from a hydrogeologist and a water treatment specialist.
 - Water softeners can be effective for dissolved iron up to concentrations of 200 µg/l to 300 µg/l. Filtration can be effective for removing particles of iron. There are other more complex treatment options, including aeration or chlorination plus filtering.
 - There are well maintenance or remediation options that can be discussed with a hydrogeologist where yield has become an issue.
 - It may be feasible to operate boreholes for longer periods, or continuously, at a lower pumping rate in conjunction with installation of an appropriately-sized pump and buffer tank.
- For further information or advice contact Geological Survey Ireland.

For more
information,
contact us:

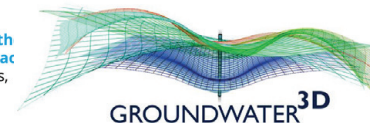
Geological Survey Ireland, Beggars Bush, Haddington Road,
Dublin D04 K7X4, Ireland.

Suirbhéireacht Gheolaíochta Éireann, Tor an Bhacaigh, Bóthar Haddington,
Baile Átha Cliath D04 K7X4, Éire.

T: +353-1-678 2000 E: Groundwaterinfo@gsi.ie [@gsigroundwater](https://twitter.com/gsigroundwater) www.gsi.ie



Roinn Cumarsáide, Gníomhaíth
ar son na hAeráide & Comhshac
Department of Communications,
Climate Action & Environment



Geological Survey
Suirbhéireacht Gheolaíochta
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Iron in Groundwater



What is iron?

- Iron is an essential element required in small amounts by all living organisms.
- Iron is a metallic element naturally present in many types of rocks.
- Iron is commonly found in Irish groundwater.

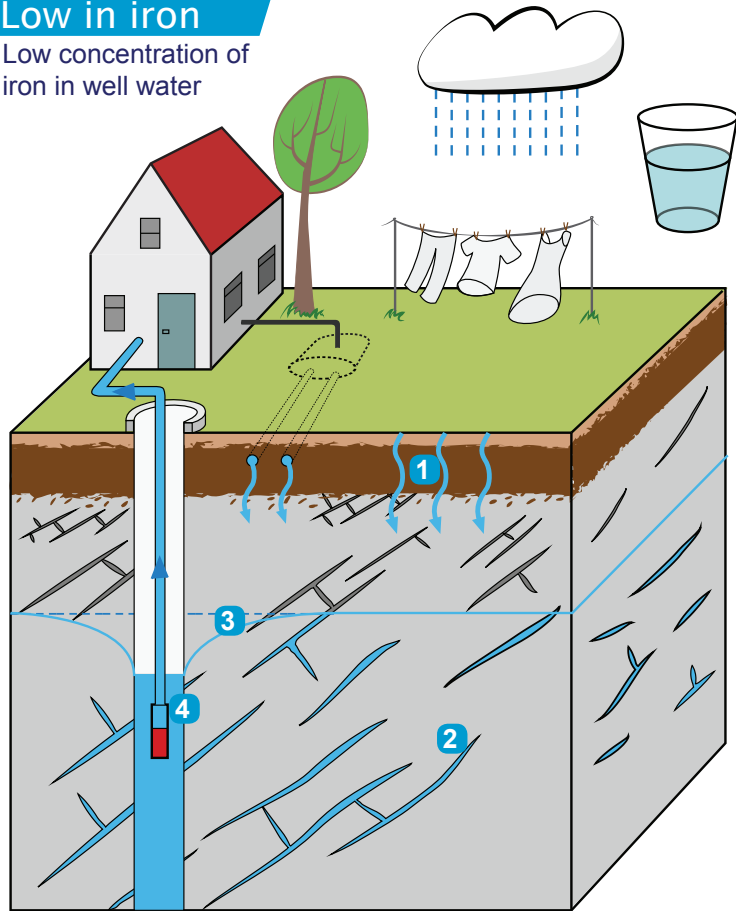
Where is the iron coming from?

- The most common sources of iron in groundwater are naturally occurring, coming for example from the weathering of iron-bearing minerals in rocks.
- Groundwater that is acidic or low in oxygen may have higher iron concentrations. This may arise from overlying peat or thick clays, or effluent seeping from septic tanks, silage clamps, slurry pits, landfills or other sources of pollution.
- In many wells, both private and public, high iron concentrations are related to “on/off” pumping patterns, which introduces oxygen when the water table is lowered around the well.
- The iron may be found as particles or can be dissolved in the water.

Why is there iron in my well?

Low in iron

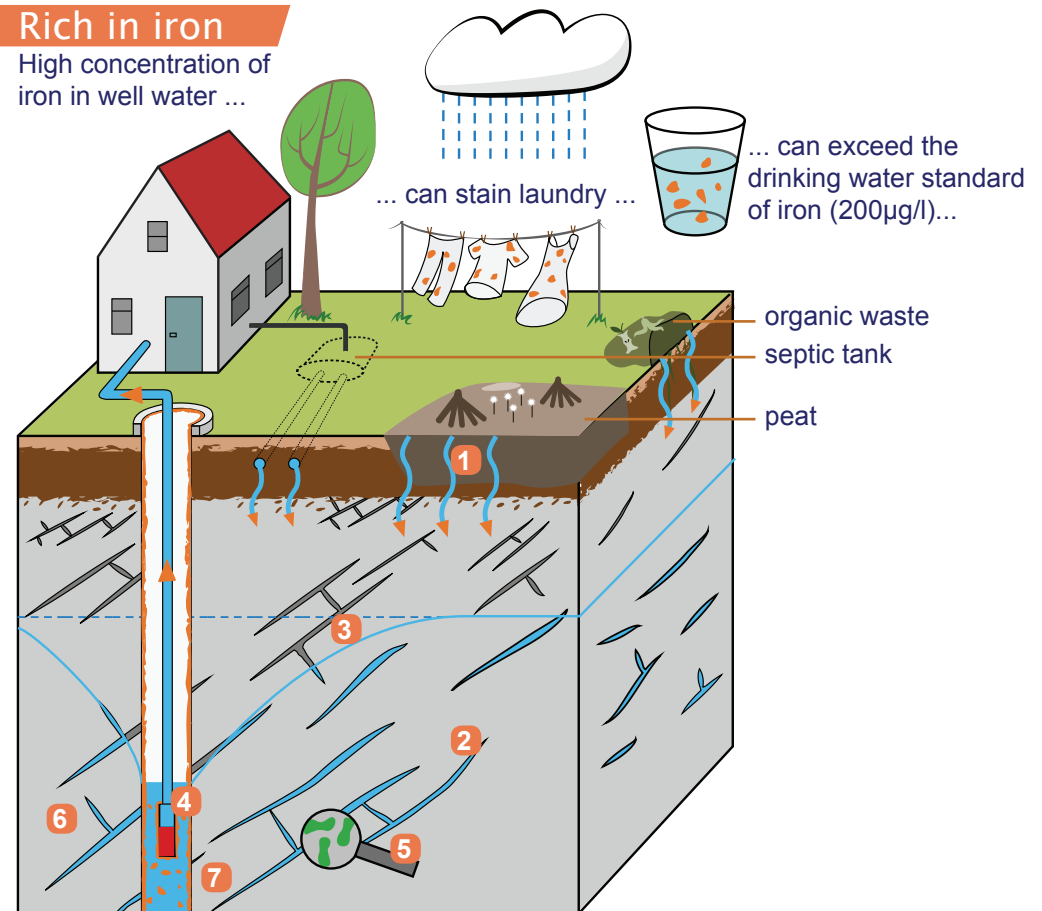
Low concentration of iron in well water



- 1 Rainwater infiltrating the ground is neutral (neither acidic nor basic) and contains oxygen (oxic).
- 2 The neutral and oxygen-rich groundwater dissolves only a small amount of naturally-occurring iron from the bedrock.
- 3 Carefully managed pumping introduces less oxygen, meaning more iron stays dissolved and less is dropped out of the water (as rust).
- 4 Iron is not deposited on the well and pump, and does not decrease the well efficiency.

Rich in iron

High concentration of iron in well water ...



- 1 Rainwater passing through peat bogs and some types of waste becomes slightly acidic and/or oxygen-poor (anoxic).
- 2 The slightly acidic and/or oxygen-poor groundwater can dissolve more naturally-occurring iron from the bedrock.
- 3 Pumping may introduce oxygen to the borehole and cause dissolved iron to precipitate as rust. Certain pumping conditions can make this an excessive problem.
- 4 The insoluble form of iron (rust) is deposited on the well and pump (incrustation).
- 5 Specially-adapted bacteria get energy from the oxidation of iron and deposit a slimy film on the well and pump (biofouling).
- 6 Groundwater may be sufficiently acidic and oxygen-poor to corrode the well casing and pump, particularly if constructed of mild steel. The by-products of corrosion add to incrustation.
- 7 Incrustation reduces the efficiency of the well. In response, the pumping water level falls further which introduces more oxygen, resulting in further incrustation and further reduction in the efficiency of the well.