# Private Water Supplies

A Guide to ensure the safety of your private water supply

Durham County Council

## Background

A Private Water Supply is a supply of drinking water which is not provided by a water company such as Northumbrian Water Limited.

The Private Water Supplies Regulations 2016 (as amended 2018) require Local Authorities to inspect, risk assess and sample all private water supplies, with the exception of those that supply one domestic dwelling. In accordance with the Regulations the Local Authority will recharge you for this work.

As the operator of a Private Water Supply you have a duty to ensure that the water you supply is safe to drink.

This document will help you to:

- Protect the health of the people who consume the water from your supply,
- Improve your water supply,
- Avoid water quality failures which can lead to costly investigations and remedial works,
- Develop and document your own water safety plans and procedures.

## Health, and Safety at work act 1974

If you provide facilities to a third party for example holiday accommodation, tenanted houses, caravan parks etc, under the Health and Safety at Work Act 1974 you have a duty of care to provide safe facilities and manage risks from potential hazards. You also have a legal obligation to follow relevant regulations, this includes 'The Private Water Supply Regulations' and the provision of wholesome water. We would also draw your attention to the terms and conditions of Public Liability Insurance. If you have any further queries, we suggest you contact the appropriate Health and Safety Regulators and your insurance company.

## Enforcement Policy

Under the Water Industries Act 1991 and The Private Water Supply Regulations 2016 (as amended 2018), Durham County Council, as a local authority, has a duty as regulators to ensure that all Private Water Supplies, supply wholesome water to all users. Where we are unable to carry out our duties or it is evident that supply is unwholesome we have the powers to take enforcement or formal action. All breaches of law will be responded to in a fair and proportionate manner in line with Durham County Council's Corporate Enforcement Policy. Please contact us if you would like a copy of the policy.

## Categories of Private water supplies

Private Water Supplies are split into 3 categories:

**Single Domestic Supplies** - Supplies relating to single domestic dwellings only. These supplies are monitored but not routinely risk assessed or sampled unless requested to by the owner or occupier.

**Multiple Domestic Supplies or Commercial Supplies** - Supplies that relate to more than one premises or supply a commercial or public activity.

> ***Regulation 9 supplies*** - These supplies generally include any rented or commercial activity and are required to be sampled annually.
>
> ***Regulation 10 Supplies*** - These supplies relate to any owner-occupied properties on a multiple supply i.e. 2 or more properties on a supply. These are required to be sampled every 5 years.

**Large Domestic and Commercial Supplies** - Supplies that use an average daily volume of water of 10m³ or more - this equates to approximately 50 people. These supplies are required to be sampled twice a year or more depending on the volume of water used.

## Water Sources

Springs, boreholes, and wells are the most common sources of water for private water supplies.

When we undertake a risk assessment, we consider the following criteria:

**Springs**

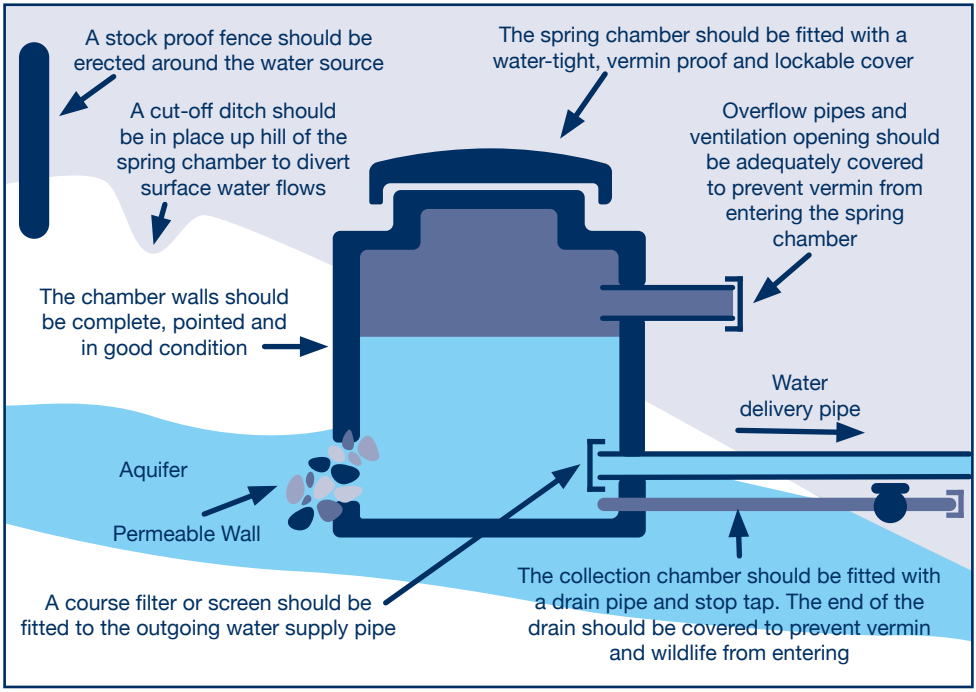
Springs are formed where the water table meets the land surface. The quality of water from springs can vary and is likely to be influenced by the activities and land use in the area around the water source. Particular attention should be paid to ensuring that activities which could cause contamination of the water supply are avoided in the area of the water source.

The following safety points are good practice to follow with spring supplies:

- The spring collection chamber cover should be
  - lockable,
  - vermin proof,
  - watertight,
  - allow easy access and
  - made of a suitable non degradable material.

This prevents people, animals and surface water introducing potentially dangerous bacteria or other substances to the water supply.

- The chamber should extend at least 150mm above the level of the floor and have an apron sloping away from the cover. This ensures that spillages are directed away from the cover and prevents contaminated surface water entering the chamber.
- The walls of the chamber must be in good repair. This prevents potentially contaminated water entering the chamber through the topsoil.
- A stockproof fence should be erected around the chamber. This prevents livestock entering and damaging the chamber lid.
- Have a documented management plan which includes:
  - A plan of the supply - location of the source, chambers, tanks, treatment and the distribution system including valves, pipework, consumer premises and outlets.
  - Put in place procedures for the effective management of the collection, treatment and distribution system - regular maintenance of treatment systems, disinfect and/or flush collection chambers, tanks and supply at appropriate intervals.



- Implement a system of logging all service and maintenance of equipment and structures and all site inspections.

The figure above illustrates a number of the features we would expect to see in a good quality protected spring supply.

**Boreholes**

Many drinking water supplies are derived from boreholes. Shallow boreholes may be more at risk from contamination than deep boreholes. If built and sited correctly, boreholes can provide good quality water.

The following safety points are good practice to follow where you have a borehole:

- The borehole chamber cover should be
  - lockable,
  - vermin proof,
  - watertight,
  - allow easy access and
  - made of a suitable non degradable material.

This prevents people, vermin and surface water from contaminating the water supply.

- The chamber walls should be
  - Fully grouted (lined) and watertight,
  - Of substantial construction, impermeable and in good repair,
  - Points of cable or wiring should have watertight seals,
  - Concrete base of the chamber should be suitably robust,
  - Ventilation (if present) should be vermin proof.

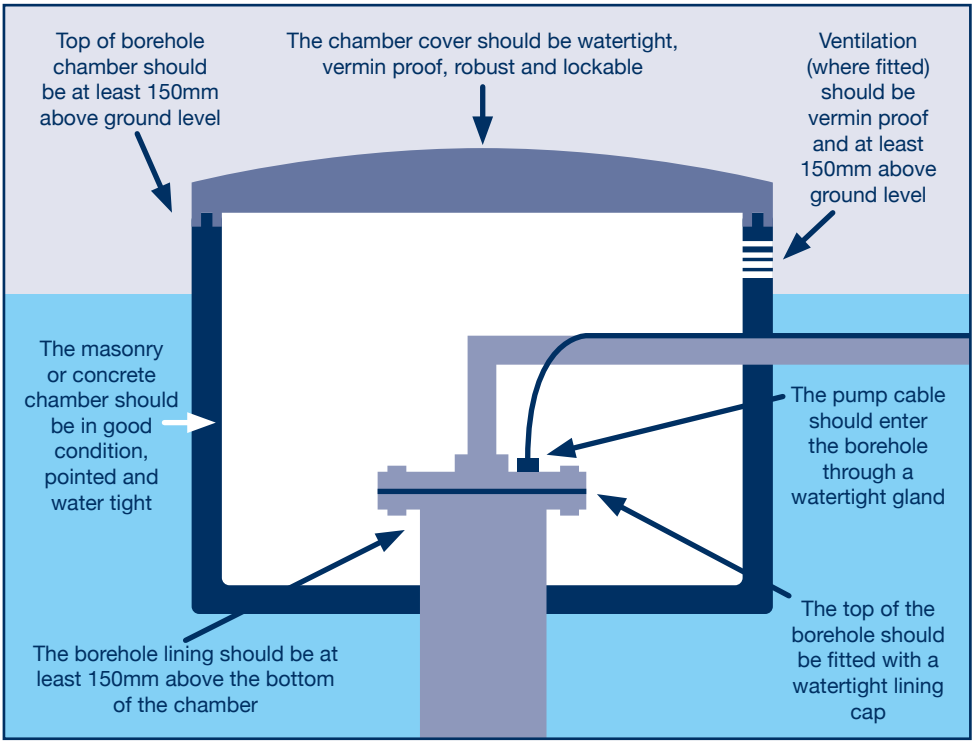
This protects the integrity of the source from contamination by surface water or spillages.

- The Borehole lining (also known as casing) should:
  - Extend at least 150mm above the chamber floor,
  - Have a watertight cap. Holes for the water delivery pipe and pump cable should be sealed with an appropriate gland or sealant approved for use with drinking water supplies.
  - Where ventilation is fitted to the watertight lining car it should be vermin proof.

This prevents surface water, vermin or wildlife from contaminating the borehole and protects the integrity of the source.

- Have a documented management plan which includes:
  - A plan of the supply - location of the source, chambers, tanks, treatment and the distribution system including valves, pipework, consumer premises and outlets.
  - Put in place procedures for the effective management of the collection, treatment and distribution system - regular maintenance of treatment systems, disinfect and/or flush collection chambers, tanks and supply at appropriate intervals.
  - Implement a system of logging all service and maintenance of equipment and structures and all site inspections.

The figure below illustrates a number of the features which would be seen in a good quality, well protected borehole supply. Please note that although the diagram illustrates a borehole with headworks below ground, it is recommended that borehole headworks are kept above ground level to reduce the likelihood of contamination.



**Water Storage and Distribution**
Water is commonly stored in reservoirs, storage tanks and cisterns. They can be above or below ground but are usually header tanks in roof spaces or lofts.

The following are best practice for water storage:

- Storage tanks, reservoirs and inspection chambers should be adequately protected by appropriate and robust fencing to prevent access by livestock and wildlife. It is recommended that fencing should be 4m away from the tank.
- Where the lip of storage tanks, reservoirs or inspection chambers are near ground level, a suitable barrier of a 450mm depth drainage ditch should be present to prevent the ingress of surface flows.
- The end of the overflow pipes to the reservoir should be fitted with an appropriate vermin proof cover such as wire sleeve.
- Reservoirs and storage tanks should be fitted with a watertight, lockable and vermin proof inspection cover.
- The volume of the tank should be sufficient to hold enough water for peak demand and frequent turnover.
- The tank should be constructed from materials which are not liable to fracture or deterioration.
- Pipes should be made of a durable material to prevent deterioration or fracture. Lead pipes and some iron pipes lined with coal tar can contaminate water.

**What information should you know about the supply?**
- Name of the Private Water Supply
- Private Water Supply Owner - including name and postal address.
- Who is the person responsible for the day to day management of the water supply?
- How many properties are served by the water supply?
- Is the water supply subject to any treatment? This can be for the whole supply or at individual properties.
- What is the estimated daily water usage? (For supplies that serve residential properties only, the daily water usage can be estimated by assuming 200 litres is used per person per day).

**Supply Plan**
You should be aware of your water supply and water distribution network. Details should be recorded of how water flows from the source to the water outlets and should include any or all of the following: water source, pump house, collection chambers, storage tanks, animal troughs, stop taps and each property supplied by the water.

**Management and Control**
It is important that everyone with responsibility for the management, control or supervision of the water supply and distribution system are properly trained, understand the system and what to do if something goes wrong.

The following safety points are good practice when carrying out maintenance or repairs of water supplies:

- The Drinking Water Inspectorate recommends that your water supply should be inspected and checked at least weekly. Without these checks serious damage to the water supply system or sources of contamination could go undetected and could pose a serious risk to human health. A written record of this should be kept.
- Maintenance or repair of a water supply system should be carried out by a qualified and suitably experienced water engineer. In some circumstances you may be able to carry out some of your own maintenance or repairs. Written records of any maintenance, repairs or other incidents should be kept.
- It is important that you have copies of the manufacturer's instructions for the operation of the water supply and treatment equipment.
- Water storage tanks and reservoirs should be periodically cleaned. The DWI recommends that header tanks are cleaned annually.
- It is important that you have a plan and procedure in place to help you manage in an emergency. This could be in the event that the water supply fails, is stopped, becomes insufficient or unsafe.

# Water Sampling

**What you should do prior to water sampling**

Water sampling is costly, and it is in everyone's interest to ensure the supply/ sample passes.

- Ensure the chamber is sealed as far a practically possible to prevent the ingress of excessive debris/matter.
- Ensure the filters are renewed, check all seals to ensure they are not perished or corroded. Replace as and when necessary.
- UV Sanitation - replace the UV blub as in accordance with the manufacturer's instructions. Thoroughly clean the quartz/outer sleeve, which houses the UV blub. Check all seals to check that they are not perished or corroded and replace as and when necessary. Ensure that the UV is turned off prior to any maintenance being carried out.
- Ensure there are no leaks.
- If possible and if practical flush out pipe work with a chlorine solution after all work has been completed

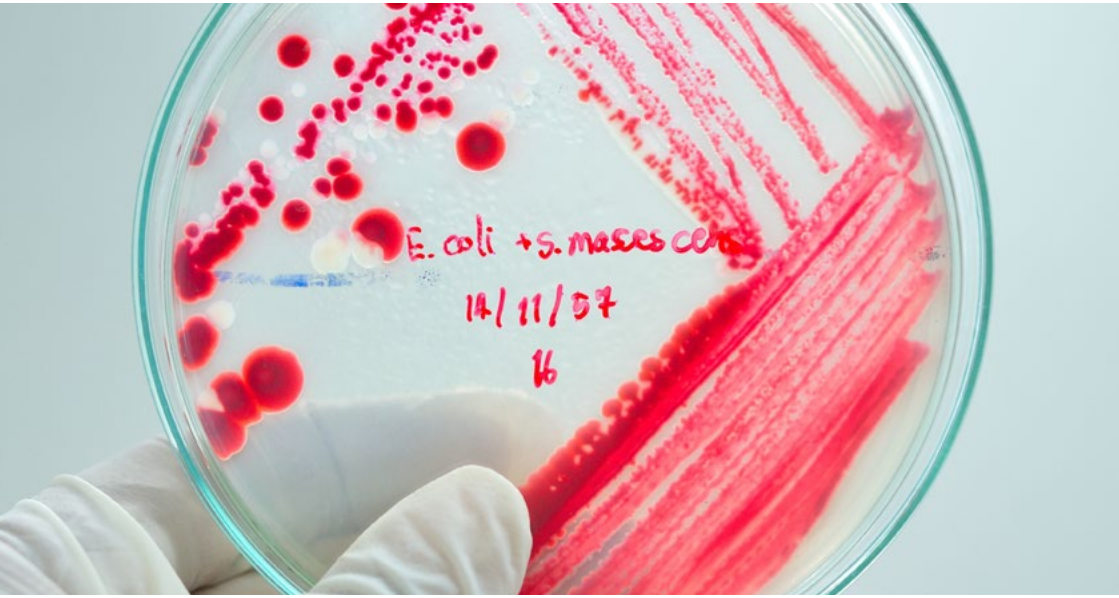
**Water Quality**

It is not practical to analyse water samples for every microorganism. We therefore sample for 'indicator organisms'. The presence of indicator organisms, in addition to harmful bacterial organisms including E.coli and Enterococci demonstrates that the water supply has become contaminated and provides an indication that other, potentially harmful organisms may be present in the water.

We also test for a range of non biological parameters which may have a direct affect on health, cause aesthetic problems or indicate a problem with the supply. If your water contains levels of these substances above the prescribed limit, an investigation will be required and water treatment may need to be installed.

## Microbiological Contaminants

| Contaminant | Problems it can cause | Limit shown in Legislation |
|---|---|---|
| **E.coli and Enterococci** | These bacteria indicate that there has been faecal contamination of the water supply and that other microorganisms may be present. Enterococci can survive for longer in the environment than E.coli.<br><br>If a sample contains these bacteria we will serve a legal notice requiring everyone consuming the water to boil it before drinking. | 0 |
| **Coliforms** | Presence of this group of bacteria indicates that contamination from the environment has taken place. These could indicate that other microorganisms may also be present. | 0 |
| **Colony Counts** | Colony Counts do not indicate a health risk but indicate the presence of non harmful bacteria. Significant changes in colony counts indicates a change in water quality and could indicate a problem with the water supply system. | No abnormal change. |



## Chemical Contaminants

| Contaminant | Problems it can cause | Limit shown in Legislation |
|---|---|---|
| **Ammonium** | Increased levels of ammonium can mean that the water has recently been contaminated. This could be from soakaways, sewers or farms. High levels can affect the efficiency of any chlorine treatment on your supply. | 0.50mg/l |
| **Colour** | Water may become coloured because of the ground that it has filtered through or from contamination. The colour of your water can make it unpleasant to drink and can affect the efficiency of treatment systems. | 20mg/l Pt-Co |
| **pH** | This is used to measure whether your water is slightly acidic (soft water) or alkaline (hard water). Acidic water can affect pipework and dissolve lead in pipes. Alkaline water can cause problems by furring up of appliances. | Between 6.5 and 9.5 |
| **Iron** | High levels of iron in your water supply may be due to the ground that the water has filtered through or due to water pipes in the system. Its presence can affect the efficiency of treatment. | 200µg/l |
| **Odour** | Odour may come from a range of sources including decaying vegetation, algae, mould or chlorine. | Acceptable to customer and no abnormal change |
| **Conductivity** | This tells us the level of certain substances dissolved in the water. | 2500µS/cm |
| **Turbidity** | Water may become more turbid because of the ground it has filtered through or from contamination. High turbidity can make water unpleasant to drink and can affect the efficiency of treatment systems. | 4 NTU |
| **Aluminium** | Aluminium can be found in some surface waters and is sometimes used in water treatment. Very high levels can be toxic to humans. | 200µg/l |

| Contaminant | Problems it can cause | Limit shown in Legislation |
|---|---|---|
| **Lead** | Lead can be found in groundwater or from pipes on the supply. Lead is toxic to the human nervous system. | 10µg/l |
| **Pesticides** | A wide range of pesticides may be sprayed on agricultural land. There are different limits for specific pesticides. | Total pesticide limit is 50µg/l |
| **Poly Aromatic Hydrocarbons (PAH)** | These can come from coal-tar lined drinking water pipes. Some PAH are toxic and potentially carcinogenic. | 0.10µg/l |
| **Manganese** | Manganese can be found in high levels in ground or surface water. It is not a health concern but may affect taste and appearance. | 50µg/l |
| **Fluoride** | Very high levels of fluoride in drinking can have adverse effects on teeth and bones. | 1.5mg/l |
| **Nitrate and Nitrite** | High levels of these substances can be caused by animal waste and fertilisers from farmland. High levels of nitrate could be harmful to bottle fed infants under 6 months. | Nitrate – 50mg/l<br>Nitrite – 0.5mg/l |
| **Trihalomethanes (THM)** | If your supply is chlorinated we will test it for THM on at least one occasion. They are chlorine by-products and can be formed if the untreated water has lots of organic matter in it before chlorination. THM have been linked to long term illness including cancer. | 100µg/l |
| **Radioactive Substances** | Radon is a noble gas that emanates from decaying uranium rocks in the earth. It is considered a health hazard due to its radioactivity. Radon is soluble in water. | 100Bq/l |
| **Tritium** | This is a radioactive isotope of hydrogen that is rare in the natural environment. | 100Bq/l |

# Water Treatment

Mains water is subject to a range of treatment to make the water safe and pleasant to drink. The most common forms of treatment for Private Water Supplies are detailed below:

**Particulate and Absorption Filters**

Particulate filters may be made of pleated paper, woven cartridges, resin bonded cartridges or ceramic candles. They are often installed prior to UV or reverse osmosis systems to improve the quality of water before it is treated. They can reduce the level of turbidity, microorganisms, iron, aluminium or manganese.

Absorption filters may contain substances such as granular activated carbon or powdered activated carbon. These can remove some suspended solids, chlorine, colour, taste, odour and pesticides.

**Ultraviolet Treatment (UV)**
This is the most common method of disinfection for small private water supplies. UV can be used to treat the whole supply, or it may be more appropriate to install at point of use. A pre-filter is nearly always needed to remove colour or turbidity which can decrease the effectiveness of the UV.

During this process, water passes through the metal tube and is exposed to Ultraviolet light which renders most harmful micro-organisms harmless. It is chemical free so does not alter the taste of the water.

UV is relatively low maintenance but must be installed by a competent person. The installer should provide you with documentation to show the system that has been installed, will achieve the stated level of disinfection under normal operating conditions. The system must be large enough to cope with the peak water flow rate.

The treatment system should be maintained in line with manufacturers instructions including the pre-filter. This will include servicing the system, cleaning and replacing the bulbs to ensure it is working effectively.

Frequent checks should be made to ensure the UV is switched on and working as designed. It is recommended that an alarm is fitted which will sound should the UV not be working.

**Chlorination**
Some larger private water supply owners may decide chlorination is an effective way of maintaining a safe water supply. The most common method of chlorinating supplies is by marginal chlorination. This is when water is dosed with a chlorine solution so that a residual level of 'free chlorine' is left in the water. Free chlorine is the chlorine that is left available in the water to kill microorganisms. It is important to note that not all harmful microorganisms are killed by chlorine and is therefore important to ensure the water is not contaminated at source.

The addition of chlorine can change the taste and odour of the water and if added to water containing organic matter, may form Trihalomethanes.

You must ensure that the correct concentration of chlorine is used and that the correct contact time is achieved. There should also be a system in place to notify you if there is a problem with the dosing.

**Ion Exchange**
Ion exchange units may at the point of use or used to treat the whole supply. They are frequently used to remove nitrates, magnesium and calcium.

The system passes the water through a nitrate specific resin and the nitrate

is exchanged for chloride. When the capacity of the resin to exchange ions is exhausted it is backwashed with a solution of sodium chloride to recharge. This solution is made up from a vessel containing salt or a salt solution. You must ensure that this vessel is maintained and topped up in accordance with the manufacturers instructions.

**Reverse Osmosis**

Reverse osmosis units can remove a range of substances from water including some microorganisms, sodium, calcium, nitrate, fluoride and pesticides.

Water is passed through a semi-permeable membrane which blocks the passage of certain substances. These systems usually operate relatively slowly and at low pressures so water is usually collected in a storage tank after treatment. Water treated by reverse osmosis will be very soft and will lack dissolved minerals. It will not contain sufficient fluoride to protect against dental cavities.

Softened water can have poor taste and can affect some water fittings and pipes. Some units can have a re-hardening system included.

Reverse osmosis treatment systems are normally expensive and only considered where there is no alternative treatment to make the water safe to drink.