

Case Study 1 and 1a

Getting the water quality right from a bore hole

In March 2009 we were asked, by a family who had purchased a large, old, but lovely cottage in a village near Alresford (the home of the Watercress Line Steam Railway) in Hampshire, to upgrade and revise the plumbing supplied by a private water source. A site survey showed that the premises was provided with water from an adjacent bore hole. There was no water quality equipment fitted of any kind and the pipe work in places was archaic.



The original pump set up in the property

The incoming supply pipe entered under the kitchen floor. Water was supplied to a header tank (cistern) in the loft via a pump located in a 'lean to' on the side of the cottage. The system operated via a micro-

switch attached to the arm of the ball valve. As water was used the water level dropped in the tank switching on the pump which then proceeded to refill the tank. This header tank provided all the water in the premises including the central heating.

Many bore hole systems were set up in this way years ago. This worked well during the time that bore hole water could be relied upon to give a consistent quality of drinking water year in and year out. In recent times, however, with erratic weather conditions, varying water table levels and increased chemical (fertiliser) run off from fields into natural water courses, the quality of water from underground aquifers has become much more unstable.



The state of the original plumbing above the bore hole connection

Aqua-Nouveau would not recommend drinking water from any private supply unless it was suitably protected with a water purification system. There are different levels of protection available. In this situation the family had young children and wanted to install water treatment that provided a 'belt and braces' job, so there would be no need to have any concerns about potability.

Guidance from the Department of the Environment

The advice from the Drinking Water Inspectorate (DWI) is that all private water supplies can pose a threat to health unless they are properly protected and treated. There can be contamination from bacteria, protozoa, parasites and viruses (micro-organisms) combined with particulates etc. Although some contamination may be harmless, others can cause serious ill health and worse. It is common for problems not to become apparent as there may not be any change to smell, taste or colour.

In England the DWI is responsible for monitoring water quality of all private supplies with the exception of those serving only one household. Local councils can offer a testing service but this will only clarify the circumstances at the time of the test. Contamination levels can vary considerably during the course of the year often highlighted by the variations in weather

It is not normally possible to install water treatment in a home, unless a water system is pressurised, as would be the case in a property on mains water. The original system was totally unsuitable in this respect. We needed to fit a booster pump to maintain a reasonable ongoing pressure (approximately 3½ bar). This also involved us in replumbing other aspects of the household water system including a new header tank in the loft.

On the water treatment front it was decided to install an ultra violet steriliser, a water softener and a reverse osmosis (RO) drinking water system. Close to the incoming bore hole connection was a larder cupboard and this proved an ideal location in which to assemble most of the system.

After the pump a 20" filter housing was fitted with a 5 micron sediment filter. This protects the rest of the system from sediment and particulate contamination. It keeps the water clear so that the following ultra-violet (UV) steriliser (see Aquafacts No.18) can destroy most harmful micro-organisms. A UV system uses high intensity UV rays to constantly irradiate the water as it passes through an illuminated chamber.

Next in line is a water softener. The water is very hard in this part

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of Hampshire and softened water protects heating systems 100% from scale as well as giving many other financial benefits (see Aquafacts No.5). Softened water is also important for RO systems (see Aquafacts No.2) as hard water clogs membranes. Softened water can double RO membrane life.

The RO system was installed under the kitchen sink. Although the UV provides volume water at a very high level of disinfection it is not 'fail safe' and therefore the RO, which can produce a 95 to 98% pure water regardless of incoming contamination, was an obvious choice. However, a domestic RO produces pure water slowly sufficient for drinking and cooking purposes only.

The installation was undertaken over a two day period prior to the property being occupied. The work was undertaken by Jimmy Gibbs, the companies most experienced engineer. He commented, 'The initial concern was the mixture of galvanised and copper pipe which had been added over a number of years. Much of this was old and buried in the walls and we weren't sure what fed what'.

Now everything is working well the ongoing maintenance is going to be relatively straightforward. The softener is a non electric, KINETICO and uses block salt. Sediment filter changes will be six monthly. The UV will require a mercury lamp change annually. The RO membrane should last many years as long as the pre and post filters are changed annually.

A job of this nature is not necessarily going to be the same in every private water supply situation. We hope that this case study gives some idea of what is entailed when tackling water quality issues of this nature. We would like to thank our customer for permission to publish this case study.

A slightly different bore hole scenario is highlighted on the following page.



The completed installation. The pump is bolted to the floor. The filter is above it. The UV steriliser and electrics are mounted on the rear wall. The softener is shown on the left.



The plumbing above the bore hole (centre right) can be compared with the original set up in the photograph overleaf. The pipe work goes through the wall (left) into the larder cupboard.



It was convenient to install the reverse osmosis drinking water system under the kitchen sink. New pipe work to the rear feeds bore hole water directly to an outside tap.

Case Study 1a

Another variation of a bore hole water treatment system

Aqua-Nouveau gets involved with a number of projects annually improving bore hole and spring water purity. In some cases these require filtration and UV equipment. With others involvement has included pumps, pressure switches, RO and some fairly complex plumbing.

A neighbour of the previous case study contacted us as they were wanting a water softener. There were concerns about installation as household water was again supplied by a bore hole, sited on the property, as many are throughout the village.

The bore hole was sunk only a few years before to replace an existing one (see top photograph). It was fitted with a submersible pump activated by a float switch operating with three loft tanks. All water, including drinking water, was supplied from these tanks. There was no water treatment protection and the condition of the tanks was far from hygienic.

Besides installing a water softener, our recommendation, to kill off any ongoing organic contamination, was to fit a UV system with pre-filter. As with the previous case study we needed to provide constant water pressure, within the cottage, so that the water softener could operate. This involved disconnecting the float switch and replumbing the main loft tank with an ordinary input valve. An electric water pressure sensing switch was then connected to the pipe coming from the bore hole where the water supply entered the property. A secondary pump was unnecessary as the submersible pump was giving excellent above ground pressure of around 4 bar.

All the equipment we installed was located in a 'lean-to' on the side of the cottage where the supply pipe from the bore hole entered the property. As can be seen from the photograph (right) the pressure switch precedes the filter, softener and UV system (fitted in that order). A certain amount of new electric cable work was necessary to power the UV and pressure switch.

The loft tanks were thoroughly cleaned and sanitised before all the equipment was commissioned. The job took two days, with two engineers, to complete. The results have been much appreciated by the property owner; particularly the improved outside tap water pressure which operates just as if it were on a mains water supply.



The bore hole (shown above) was sunk to a depth of 25 metres in 2004. It is sited about six metres from the main cottage wall. The 'Godwin' pump was found to be producing an excellent pressure of around 4 bar which was more than enough to provide a good continuous household pressure. As can be seen below the water supply is controlled, within the property, by a pressure sensing switch (coloured orange). The water then goes through a 5 micron sediment cartridge (blue), a 55 watt stainless steel UV system (mounted up the back wall) and then through an Aqua-twin water softener (sitting on the floor).

