

Managing EA borehole maintenance in Shropshire

The Shropshire Groundwater Scheme (SGS) has been developed to maintain the water levels in the River Severn by pumping water from surface and groundwater storage either directly into the Severn or one of its major tributaries. The contract for maintaining the pumping stations and the equipment within them has been awarded to ECS Engineering Services on a rolling 5 year contract.

The Environment Agency (EA) has a responsibility to maintain water levels within the River Severn and to balance the demands of abstractors with the ecological needs of the river. This task is accomplished by the largest groundwater regulation scheme in the UK and consists of groups of interconnected pumping stations that discharge water through a

network of buried pipelines. SGS is specifically designed for short term, intermittent pumping of between two and fifteen weeks per season, averaging two years out of every five. This operational model means that although the pumping stations are called in to action infrequently, when the call comes the station must perform reliably.

In order to achieve this constant state of readiness, the EA has employed one of its long-standing contractors, ECS Engineering Services, to carry out regular mechanical and electrical inspections and tests as well as the necessary remedial work. Working to a planned schedule, the engineers visit each site in turn and compile a maintenance report that goes to build a profile for each station.

Steve Crapper, Business Development Manager at ECS, comments: "The Shropshire Groundwater Scheme comprises 45 borehole sites which contain 75 pumps and associated control equipment that require regular maintenance checks and remedial work. We work very closely with the EA providing regular updates as well as responding to call outs for faults that may occur at the live stations."

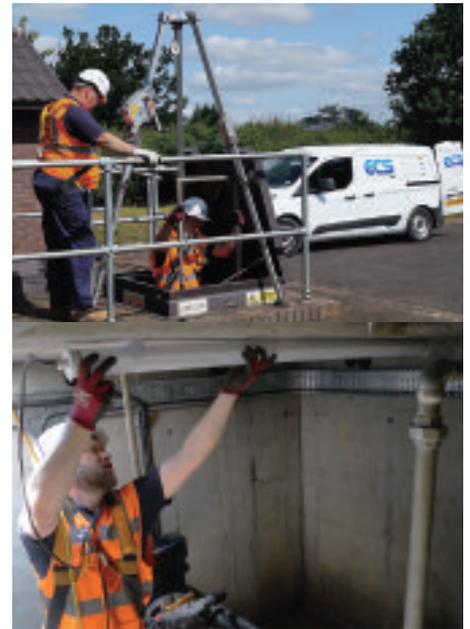
Each maintenance team comprises one electrical and one mechanical engineer, both of whom are trained for confined space entry procedures as well as being fully qualified within their own disciplines. Safety while working is always a top priority and ECS ensures that all the necessary safety equipment is available and that training is kept up to date.

The pumps are run for 20 minutes every three months to check pumping efficiency and the proper operation of the non-return valves (NRVs).

Electrical checks for insulation resistance and continuity are made every 6 months to assess the condition of the pump supply cable and motor windings. If these readings are approaching a predefined level, then the pump will be identified for lifting and any necessary remedial work.

As part of the regular inspections, the electrical engineer will also carry out a full inspection and test of the domestic circuits within the pumping station and issue a certificate which is valid for the next five years. Occasionally these tests will identify a fault that requires immediate attention and the engineers are equipped to remedy these situations. Any minor issues are recorded and scheduled for remedial action during the next visit.

Steve concludes: "Through this coordinated approach, ECS is able to deliver a comprehensive service that provides a regular maintenance programme as well as immediate operational support on



site. In this way the EA is able to maintain the necessary water to rely on the performance of the pumping stations and levels within the River Severn."

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Managing the clogging of groundwater wells in civil engineering schemes

Martin Preene of Preene Groundwater Consulting and Mike Deed of Geoquip Water Solutions presented a paper at the XVI ECSMGE Conference in September on managing the clogging of groundwater wells in civil engineering schemes. The full paper can be read on the Geoquip website. Groundwater wells are common to many civil engineering schemes, used for construction dewatering, open loop geothermal systems or alternative water supplies for buildings and facilities. Well performance must be optimised and high levels of operational efficiency and service availability achieved. Yet, the benefits of proactive planned maintenance of



A downhole view of a well clogged with Iron related bacteria

groundwater wells on civil engineering projects are not widely recognised.

A groundwater well is a complex hydrodynamic environ-

ment. As water passes through the well and the downstream pumping system, it undergoes pressure changes, temperatures changes, is exposed to the atmosphere and comes into contact with artificial surfaces in well screens and pumps. This can create ideal conditions for clogging to occur.

There are three main clogging processes: physical clogging, bacterial clogging, and chemical clogging - which occurs by chemical precipitation induced by the natural pressure release on the water as it moves from the formation into the well bore and to the pump, combined with the oxygen available in the well. The most common chemical encrustations are iron oxyhydroxides, identified by rusty coloured water and deposits in the well and pump; and calcium carbonates, identified by white or pale grey calcareous deposits.

Chemical treatments are widely used to rehabilitate wells. Research has shown that chemical rehabilitation can provide 40 to 60% of the total gain during a combined chemical and hydro- or mechanical rehabilitation. With careful investigation and planning, many wells can be returned close to their

original performance.

However, rehabilitation alone is not the optimal solution. Programmes effective in managing well performance incorporate monitoring and measurement plans alongside regular chemical treatments. The elements of well rehabilitation can be illustrated by the BoreSaver well management programme intended to return performance to as close to the original drilled capacity as possible and to help maintain a continual, problem-free water supply.

The elements of the BoreSaver programme are: 1. Pre-rehabilitation survey 2. Assessment of borehole condition and required rehabilitation 3. Rehabilitation treatment 4. Post-treatment survey and 5. Continuing monitoring and maintenance.

BoreSaver treatments are approved by the Secretary of State in the UK and now used in more than 14 countries worldwide. BoreSaver removes deposits and residues that build up and cause blockages in wells, pipes, pumps and other equipment. It is safe, easy to use and biodegradable, so particularly appropriate for environmentally responsible water management.

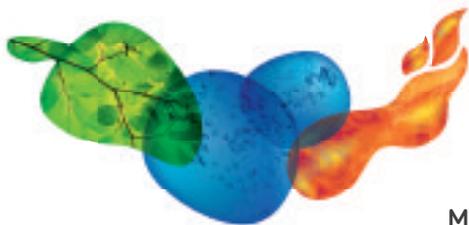
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