

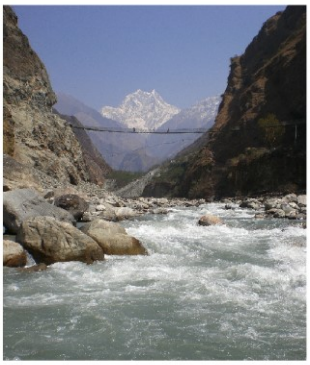





HIGH PEAK

WELL DECOMMISSIONING STRATEGY & SPECIFICATION

MARCH 2018

PROJECT NO. 17180348

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WELL DECOMMISSIONING STRATEGY & SPECIFICATION

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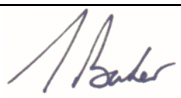
Reviewed by:	**Tim Baker** **Principal Hydrogeologist**		*14/03/2018*

Report researched and produced by B. A. Hydro Solutions Limited (BAHS Ltd.) on behalf of Laurel Developments.

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0.0	23/02/2018	Order Date
1.0	05/03/2018	Site Survey
2.0	13/03/2018	Site Survey
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3.1	15/03/2018	Final Report Issue

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1 Introduction

B. A. Hydro Solutions Ltd. (BAHS Ltd.) has been commissioned to generate a decommissioning strategy and specification for an existing well at High Peak, site details as listed below.

Site Address:	High Peak	
	London Road	
	Barkway	
	Herts	
Postcode:	SG8 8EQ	
NGR borehole position:	TL 38408 34797	
Site elevation at NGR:	126.5	maOD

Table 1: Site details

2 Background

High Peak consists of a detached property sitting within a large garden plot. The current owner/developer has secured permission to build two new detached properties within the garden of the property. An existing well shall be decommissioned as its position will be between the two properties, possibly slightly under one of the new dwellings.

B. A. Hydro Solutions Ltd has been engaged to survey the well, assess its condition and provide a strategy for the decommissioning of the structure. This document also provides an outline specification for the Main Contractor or their Sub-Contractor to adopt when decommissioning the well. B. A. Hydro Solutions Ltd refers to the Environment Agency's 'Good practice for decommissioning redundant boreholes and wells'.

3 Hydro-Geological Setting

3.1 Geology

The geology mapped at ground level beneath the site consists of a thin layer of topsoil followed by made ground and glacial clays with gravel. At depth the Upper, Middle and Lower Chalk are present. There are no reported boreholes in the immediate vicinity of the property that penetrate the full thickness of the glacial materials, thus their thickness beneath the site cannot be accurately confirmed. Boreholes further away do pass through the glacial material but do not record their thickness. Holes completed on site as part of a site investigation did not reach the Chalk at a maximum depth of 5 metres.

3.2 Structure

The glacial material beneath the property sits on a weathered layer of Chalk, the top of which is very irregular and undulating. The Chalk occurs just below ground level in some places and at others may be 20 metres below ground level. The Chalk has a gentle dip towards the south and while it influences the regional flow of groundwater, local topography has a greater influence on local groundwater presence and flow.

3.3 Hydrogeology

Rainfall across the site will either become runoff or enter the ground. The glacial layer beneath the site is variable in its permeability with areas of very low infiltration and other areas where water can penetrate the ground quickly. Permeable, sandy and gravel rich layers within the glacial material will contain and transmit small volumes of groundwater.

The underlying Chalk is a major, principal aquifer which contains large volumes of groundwater within joints and fractures which cut through the upper 30 to 50 metres of the Chalk below ground level. Many large public water supply sources draw water from the Chalk.

The site is within a ‘Zone 3’ of a total catchment area for at least one public water supply abstraction borehole or well. This means that anything entering the ground at this site would theoretically end up at a pumping station where it could enter the water supply. It is for this reason that the former well must be carefully and correctly decommissioned.

There is unlikely to be one, consistent groundwater level within the permeable layers of the glacial material due to its varied nature. Groundwater levels in the Chalk are likely to rise and fall from summer to winter. During later winter and spring, Chalk groundwater levels will be at their highest and could be at or above the base of the glacial material.

Based on groundwater levels, the water level measured in the well and geological data, it is not possible to determine whether the well is intercepting groundwater within the Chalk or the glacial material. While more likely to be Glacial material, Chalk groundwater could not be ruled out without more long-term monitoring of water levels in the well and neighbouring Chalk abstraction boreholes.

This cannot be completed with the time and available resources; thus it must be assumed that there could be at least an indirect hydraulic link between water within the well and Chalk groundwater.

4 Surveys

4.1 Ground Investigations

As part of the process towards developing the site, a Geotechnical Investigation Report and a Phase II Ground Investigation & Generic Risk Assessment Report have been prepared. As part of the work undertaken to complete this work trial holes were opened on site to confirm the geology, measure the geotechnical properties of the ground and assess whether the site has been contaminated by historical activities.

Unfortunately, the invasive work completed did not reach or confirm the presence of Chalk beneath the site. The site work did identify some contamination in discrete areas of the site. A water sample from the well was analysed and found to have low levels of hydrocarbons present.

4.2 BAHS Visual Survey

B. A. Hydro Solutions Ltd completed a visual inspection of the well using a small hand held inspection camera which was lowered down the well. The well was found to be constructed of modern bricks to a depth of around 4 metres followed by much older, softer and more rounded/weathered bricks continuing to the base of the well. The top 4 metres of the well appear to have been repaired within the last 40 to 60 years.

A riser pipe associated with the hand pump remains within the well. This extends to the base of the well via a beam at around 6 metres below ground level. The total well depth was found to be 7.23 metres below ground level. On the 13th March 2018 the rest water level in the well was 6.79 metres below ground level. The well is circa 1.2 metres in diameter, the actual diameter could not be directly measured due to the limited access to the top of the well.

There was seepage of water into the well observed between 4 and 6 metres below ground level on the north side of the structure. The water surface is constantly moving and the water was found to be very clear with flints and a Chalky base to the well. This indicates that there is a flow of water into and out of the well.

A test of a water sample from the well, completed by BAHS Laboratory found the water has many Chalk groundwater characteristics including hardness, calcium content, high electrical conductivity, total dissolved solids and it was slightly alkaline. The analysis cannot be used to conclude the water is

perched drift or Chalk. B. A. Hydro Solutions Ltd therefore recommend it is treated as a Chalk groundwater source.

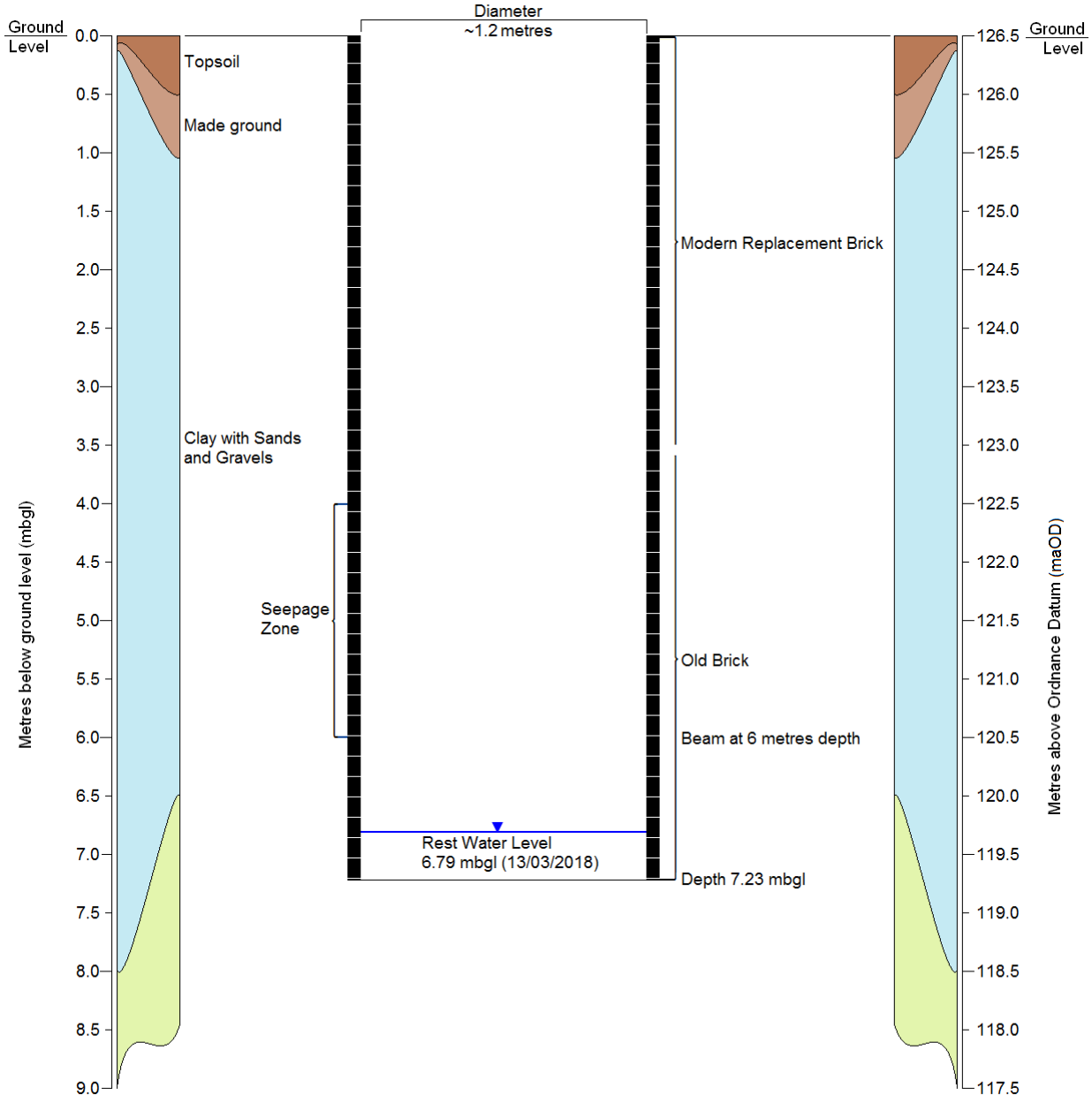

Figure 1: Well Cross Section

The above diagram illustrates the inferred structure of the well at High Peak and the anticipated geology at the site. The following decommissioning strategy and specification are based on the cross section.

5 Decommissioning Strategy

It is important that boreholes and wells are decommissioned correctly in order to protect the environment and to maintain the same hydraulic potential of the ground. If a borehole or well is not decommissioned or not done correctly the former structure can easily become a potential pathway for inferior quality water or contamination to enter the ground and contaminate groundwater. It is a criminal offence to wilfully or through neglect to allow such contamination. Equally if a borehole or well is not decommissioned correctly it can have the effect of forming a barrier to groundwater flow which may adversely affect other abstractors and the environment.

The Environment Agency has published a 'Good practice for decommissioning redundant boreholes and wells'. This sets out the principles adopted by the following strategy:

- The decommissioned well must not form a pathway for any surface water, shallower groundwater or contamination to enter the ground or to reach the water table (whether perched or the Chalk)
- The well must be decommissioned in such a way to allow the movement of groundwater across the lower, more permeable horizons, as indicated by water seepage into the well.
- When decommissioning the permeable horizons of ground passed through by the well, clean and inert material from which no harmful leachate will arise should be used
- The well should be sealed with a least a 1 and ideally 2 metre concrete cap
- The top of the well should be lowered to below ground level and a reinforced concrete cap cast to at least 0.5 metres beyond the original edge of the well.
- Above the concrete cap, and to ground level, the finish will depend on future land use. If any structures are to be constructed over or in the vicinity of the well a structural engineer should be consulted.

6 Outline Specification

The following form an outline specification based on the Environment Agency guidance, the following figure illustrates the details below:

- The rising main from the original hand pump must be removed from the well
- The current concrete cap must be removed from the well
- The beam towards the base of the well should ideally be removed, but only if it can be raised without someone having to enter the well
- The lower 3.0 to 3.5 metres of the well should be backfilled with clean and washed gravel, roughly 4 m^3 in volume
- A blinding layer should be placed above the washed gravel raising levels to ~3.5 metres below ground level, roughly 0.6 m^3 in volume
- A 2 metre layer of concrete, roughly 2.25 m^3 in volume, should then be placed on top of the blinding layer raising levels to 1.5 metres below ground level
- Once the concrete layer has cured the top of the well should be excavated, the bricks removed from site and an area excavated extending at least 0.5 metres beyond the original edge of the well
- Steel reinforcing cage should be assembled over the old well extending out beyond the original edge of the well
- Concrete should be cast around the reinforcing cage with a finish level ~0.5 metres below ground level so that the reinforced concrete cap is ~1 metre in thickness and at least 2.2 metres in diameter
- The makeup of ground from 0.5 metre to ground level will depend on final land use above.

- If any building or structure is planned above the old well a structural engineer should be consulted as the concrete cap and layers above may need to be engineered differently

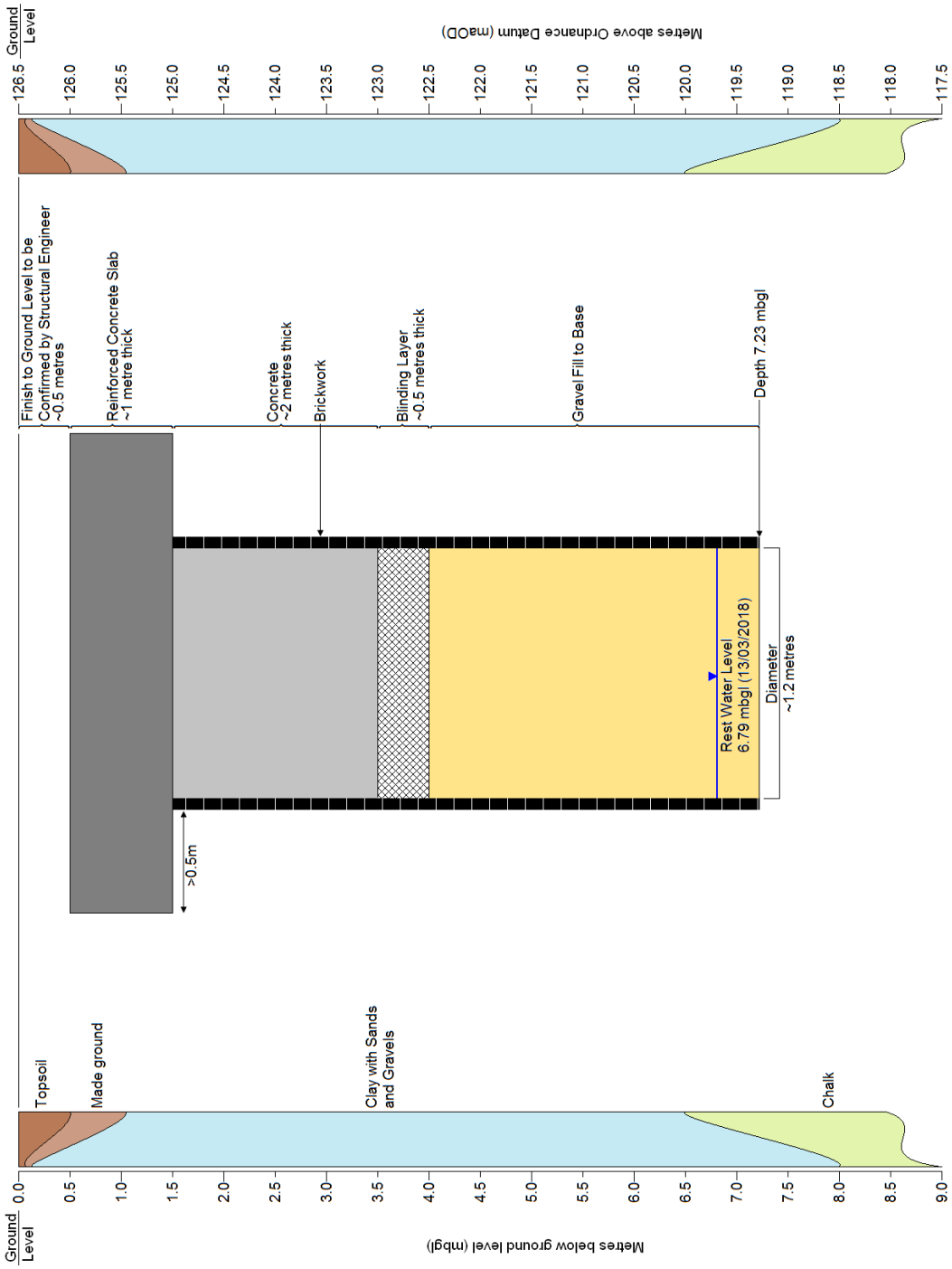

Figure 2: Decommissioning Diagram

Disclaimer – High Peak, London Road, Barkway, Herts, SG8 8EY

Information within this Well Decommissioning Strategy & Specification has been gathered from all sources available to B. A. Hydro Solutions Ltd. Discussion and interpretation is the professional opinion of B. A. Hydro Solutions Ltd. based on information and data provided by the client plus the best available information collected specifically for this study.

B. A. Hydro Solutions Ltd. cannot guarantee the ground conditions discussed/used (as drawn from research undertaken).

March 2018