Developments in understanding the flow mechanisms in the Chalk and the groundwater – surface water interactions

The Cretaceous Chalk is a major aquifer and is considered the most important in the UK. Abstraction from the chalk aquifer provides more than 50% of the groundwater used in Great Britain and in Affinity Water's area it provides up to 60% of the public water supply. Whilst meeting the demand of a rising population is the primary aim of every water supplier, there is a growing need to enhance our understanding of the flow processes within the Chalk aquifer and the groundwater-surface water interactions, with the aim to enhance the ecological conditions of the chalk streams and meet the Water Framework Directive objectives by 2027.

This presentation will aim to bring together the updated geological and hydrogeological conceptualisation of the chalk aquifer in the Chilterns. The importance of detailed geological mapping and its influence on hydrogeological interpretation is of paramount importance given the complexities of the chalk aquifer. Understanding the relationship between river flows and groundwater abstraction at both a local and regional scale is key, whilst taking into account other pressures such as water quality deterioration, changes in land use and climate change. The presenter proposes an enhanced understanding for the chalk aquifer that will help with effective decision making with regard to current and future environmental sustainability and water resources management.

Other key issues included in the presentation are artesian boreholes, demonstrating the criticality of Marls in the chalk sequence and the location of some springs. The superficial deposits, including Boulder Clay and the significance of storage in secondary aquifers, such as the glacial and fluvial gravels influencing the availability of water and providing a proportion of baseflow to rivers. How swallow holes and by-pass recharge are impacted by land use changes and the impact of other water quality issues on the availability of water. Lastly the impact of climate change on recharge patterns and the effects on the chalk aquifer storage relative to abstraction impacts.