

APPENDIX G. Groundwater Resource Tracking to Aid Drought Management

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G1. Introduction

The Slough, Wycombe and Aylesbury (SWA) and Henley WRZs are solely fed from groundwater sources. A catchment-based groundwater resource tracking approach has been developed to form a structured protocol to aid drought management in these zones. This approach is based on tracking of groundwater catchment resource status using groundwater level data. This methodology has focused on the SWA and Henley WRZs as groundwater is the sole supply source, with other WRZs having drought management protocols based on surface water supply sources.

G2. Groundwater Resource Tracking & Protocol Development

For the SWA and Henley WRZs located in the south western Chiltern Hills, public water supply is totally dependent on groundwater abstraction sources. As the Chilterns are underlain mainly by the unconfined Chalk aquifer, the majority of groundwater is abstracted from this aquifer, with some abstractions from the confined Chalk and Superficial Gravel aquifers. Although the south western Chilterns Chalk aquifer is extensive, its groundwater storage is reasonably well characterised by the groundwater levels measured at the Stonor Park observation borehole (OBH). As a result this has been chosen for tracking catchment groundwater levels and forms the basis for defining the drought management protocol for both the SWA and Henley WRZs. The rationale adopted for this protocol is as follows:

- Groundwater levels in the Chalk at Stonor Park broadly reflect groundwater behaviour across the Chilterns in both the SWA and Henley WRZs;
- When groundwater recession continues below levels normally expected, enhanced tracking of groundwater levels and abstraction source performance will commence;
- At groundwater levels down to the minimum in the catchment, both recorded levels and those hindcast to the middle of the 20th century, the groundwater sources are robust and able to produce their drought deployable output.
- If groundwater recession continues further, reaching low levels at times of high demand, then a Temporary Use Ban may be triggered;
- Demand management actions in SWA and Henley would be driven initially by supply demand conditions in London and not triggered specifically by drought conditions in the SWA or Henley zones;.
- Below the minimum recorded groundwater levels, Drought Permits may be required to supplement normal supply capability;
- Any drought management actions in SWA and Henley would be triggered assuming Company-wide actions were not already in place triggered by the management protocol for the London WRZ.

These are pragmatic principles, but in practice the timing of implementation of drought management measures can be difficult to define with confidence. As a result, there is significant uncertainty in assigning drought management measures to specific hydrogeological conditions and control levels. At this stage, the drought protocol for SWA and Henley remains provisional and has not yet been used in practice leading up to or during a drought in the absence of drought management measures triggered by the London WRZ protocol. Consequently, the protocol will continue to be subject to review:

- During and following future droughts,
- Following any significant change in the supply demand balance, including the revision of abstraction licences and deployable outputs.

Bearing in mind these practical constraints Figure G1 illustrates the proposed drought management control curves and tracking approach for the SWA and Henley WRZs based on tracking the Stonor Park groundwater hydrograph for 1976.

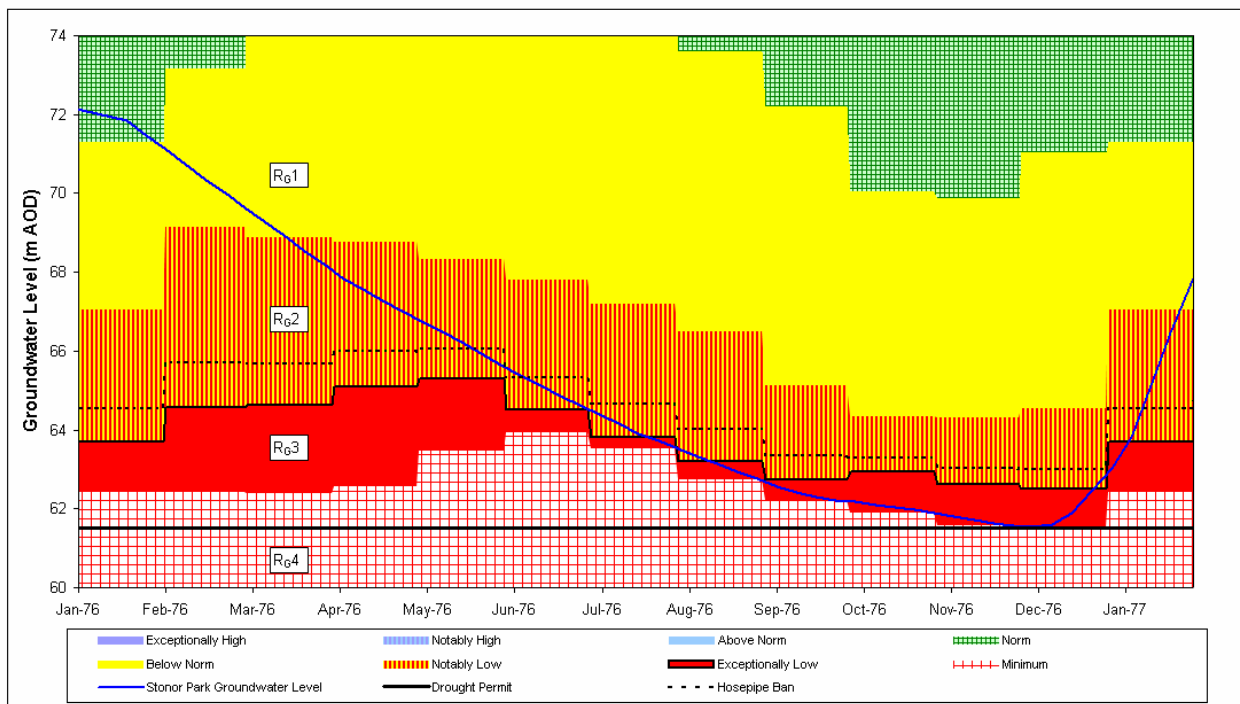


Figure G1 Tracking approach applied to Stonor Park groundwater hydrograph

The proposed tracking will be done by comparing actual groundwater levels with the historical groundwater hydrograph record, as defined by a series of curves based on monthly statistics developed by the Environment Agency, e.g. “Notably Low”, “Exceptionally Low”. Groundwater level forecasts can also be compared with the control curves to assist in decision making specific to the SWA and Henley WRZs. These forecasts can be produced using the Environment Agency’s Catchmod model, which is calibrated to the Stonor Park OBH

hydrograph record and used regularly by Thames Water in “business as usual” water situation reporting.

A more detailed explanation of the features, use and testing of these control curves is provided in the main report in Section 4.7 and Section 8.3.3.

To provide an operational abstraction context in the SWA and Henley WRZs, tracking of the Stonor Park groundwater level will be carried out in conjunction with monitoring of groundwater abstraction output to assess any decline towards and below their current deployable outputs. This will enable drought measures triggered by the proposed protocol to be made into pragmatic management decisions. In addition, it will potentially aid development of a clearer link between groundwater abstraction rates, pumping water levels and catchment groundwater levels. This could result in the future enhancement of the protocol.