

# WRMP19 - WARMS2 Independent Review

## Summary

Thames Water has an on-going programme of work to improve the assessment of Deployable Outputs (DO), which includes reassessing the yields of drought schemes and enhancing the WARMS system. HR Wallingford Limited previously reviewed WARMS system in July 2014 (HR Wallingford, 2014).

Thames Water requested HR Wallingford Limited to undertake an updated review to focus on recent updates to WARMS (now known as WARMS2), primarily verifying the performance of WARMS2 for selected design runs, the assessment of supply-side options and estimating system DO using stochastically generated weather sequences and climate change scenarios.

This updated review has demonstrated that the overall mass balance across the system is maintained throughout a range of historical, stochastic and climate change simulations. WARMS2 implements the triggering of strategic schemes and demand savings in accordance with the document rules and the updated Lower Thames Operating Agreement Control Diagram (LTCD). This includes ensuring minimum flow requirements are complied with on both the River Thames and River Lee. This performance is also maintained under a selected climate change scenario and a stochastically generated drought library. The climate change impacts on flows (in terms of monthly changes in flows across four WARMS2 locations) for the selected scenario were consistent with the climate change impacts assessment undertaken for WRMP 2019 and the monthly changes in flows projected for Teddington (HR Wallingford, 2017).

The review has also included an assessment of WARMS2 performance when considering selected Upper Thames Reservoir and Unsupported Severn Thames Transfer option variants. For both option variants the LTCD control curves for the current system (AR16 Design Simulation) are used and these schemes are implemented within WARMS2 in accordance with the published rules and assumptions associated with each option. With regards to the unsupported Severn Thames Transfer, this review confirms that the WARMS2 simulations comply with the Hands-Off Flow conditions and other operational constraints (e.g. dealing with spate flows) applicable to the River Severn at Deerhurst. For the Upper Thames Reservoir, the triggering of releases and reservoir refill is as set-out in the published reporting associated with this option.

It should be noted that this updated review has not considered hydrological model calibration / validation, derivation of effluent returns, estimation of groundwater DOs or the assumptions regarding operational practices of other water users on the River Thames, River Lee and River Severn.