



John Lawson
Group Against Reservoir Development

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Dear John

I forwarded your email of 10 October on to the Water UK Project Team responsible for the Water Resources Long Term Planning Framework study. I understand from the team that you attended the project dissemination workshop on 6 July and are therefore familiar with the objectives of the study, the team who delivered the project and the peer review team of experts appointed to independently scrutinise and challenge the findings of the study. As you will appreciate both from the workshop and online reports, the objective of the study was to evaluate the performance of different future supply strategies relating to raw water transfer, as opposed to the performance of individual schemes. A simulation model of the United Utilities, Severn Trent and Thames Water systems was specifically developed to undertake this analysis using Wathnet software. The Water UK project team has advised that the specific information you have requested from the study is not available and the associated analysis you are looking to undertake would not derive robust results without being set in the context of a future supply strategy in Severn Trent's area. I have set out their detailed explanation for this below.

- 1) The Wathnet model was run using a system simulator that included resilience testing of 12 portfolios, all set at the 2040 time horizon. Portfolios without supporting storage relied on demand management to reduce supply side investment by Severn Trent in order to facilitate a fairly large water transfer from the River Severn to the Thames. There were four scenarios where no specific storage support was assigned to the transfer, but where resource development and/or demand management was applied in the Severn Trent area to leave water available in the river for transfer. The level of transfer that was planned was fairly wide ranging across the 4 portfolios, ranging from 66MI/d (scenario 4) to 250 MI/d (scenario 12).
- 2) Sufficient alternative resources were therefore developed for Severn Trent such that theoretically this should have allowed them not to take this amount of water from the River Severn so that it was available for transfer.
- 3) As shown on page 139 of the report, even Scenario 1 (worst historic type drought resilience, mid range climate change, no specific support for the transfer), significantly under-performed in comparison to the options that did contain dedicated storage, when resilience testing was carried out using the Wathnet model.
- 4) As described on Pages 140-141 of the report, the storage performance results for Severn Trent indicate that the underlying problem is that climate change and growth starts to change the nature of the Severn Trent supply system, so that it no longer has spare resources available on the eastern side under resilience scenarios (the system is normally constrained by hosepipe ban frequency, and there is spare water left in the eastern side of the system under severe droughts, as the stress is primarily on the western side of the system). This meant that attempting to 'leave' water in the River Severn does not work very well, as abstraction generally increases to maintain Severn Trent's reservoir storage levels.
- 5) Finally, it should be noted that the resilience testing was carried out assuming no inherent benefit from the unsupported transfer i.e. there was no additional DO assumed by building the transfer, the only DO for the transfer was based on the amount that Severn Trent were 'leaving' in their supply/demand balance. This further supported the conclusion that an unsupported transfer was providing little benefit and as such was not a resilient solution.

The Water UK project tested strategies, not individual schemes, on a comparative basis only. For the Central-West and London combined region, the comparison was between strategies that contained

dedicated supporting storage (Vyrnwy, and for a number of portfolios, the Draycote support scheme/Abingdon), versus others that were unsupported. As shown on pages 138 to 140, the 'dedicated storage' portfolios behaved as expected, but the strategies without dedicated storage significantly under-performed.

The underlying reasons why the 'unsupported' strategies performed poorly revolved around two factors:

(1) changes in the storage behaviour of the eastern side of the Severn Trent system due to changing climates and demand. This is fully demonstrated in the figures on pages 140-141.

(2) possible impacts from climate change on underlying yields for some droughts that were larger than anticipated when the portfolios were being developed (the portfolios were developed based on estimated supply/demand balances, and were then tested against a range of different futures and droughts in Wathnet).

The second factor is a fundamental aspect of the scenario/simulation and robust decision making approaches which have been prescribed for WRMP19 decision support tools¹, and is why all the key conclusions of the Water UK project are drawn on a comparative analysis between strategies i.e. in this case the project examined which portfolios performed as expected and which didn't, and concluded that the ones with dedicated storage clearly outperformed the ones without storage on a relative basis. It should also be noted that when the portfolios were developed no 'underlying' benefit was assumed from the unsupported Severn Thames Transfer. This meant that unsupported portfolios should, theoretically, have outperformed expectations during resilience testing (i.e. when the system simulation was carried out the natural flows in the river should have added an additional benefit beyond that which was 'expected'). The fact that they didn't further raised concerns about the resilience of such a strategy. The clear conclusion which can be drawn from the figures shown in the report, was therefore that any strategy for the two regions that relied on transfers, but that did not provide the River Thames with a 'guaranteed' storage to support that transfer, was considerably more vulnerable to changing patterns of demand and climate change.

The conclusion from the Water UK analysis is that there is a strong risk, associated with the changing nature of storage in Severn Trent's systems under climate change and future demands, that future abstraction patterns within the River Severn will be different. Hence, any analysis based only on the historical record of flows and abstractions in the River Severn will not be robust. Because storage is drawn down earlier and further in the eastern Severn Trent reservoirs (see pages 140 - 141 of the report), it is very likely that the River Severn abstraction pattern will include higher abstraction in the spring and autumn 'shoulder' seasons. Analysis shows that an unsupported Severn Thames Transfer relies on the availability of water in the 'shoulder' spring and autumn seasons to offset demand on the London reservoirs, and the existing abstraction from the River Severn in those periods is clearly lower than both the licence and, crucially, the abstraction that occurs once the Severn Trent reservoirs start to hit their control curves in the late spring/summer.

The Steering Group for the Water UK project included Severn Trent, who were comfortable with the understanding of why resilience storage risks changed.

On the basis of the above information the Water UK project team consider that the data you have requested would inevitably have a number of caveats attached and it is likely to mean that any associated analysis using it would not be robust. I have set out the caveats below.

¹ UKWIR 2016 WRMP 2019 Methods – Decision Making Process: Guidance Report Ref. No. 16/WR/02/10

- 1) The time series of river flows would either be naturalised, which doesn't reflect abstraction patterns, or denaturalised within a system/strategy that includes development intended to reduce abstraction by Severn Trent to allow additional transfer. Providing a denaturalised sequence that held Severn Trent demand static so that the net benefit of the 'natural' water in the Severn could be separately identified would require careful consideration and agreement of exactly what future strategy is envisaged as even under a 'static' demand scenario Severn Trent's abstraction from its eastern reservoirs (Derwent Valley, Ogston, Carsington, Melbourne, Draycote) will change due to the forecast impacts of climate change.
- 2) Water transfer volumes are available for each strategy/portfolio for Wathnet, but the availability of water depends on actions within the Severn Trent system, so does not represent the 'inherent' benefit of an unsupported Severn Thames Transfer without other system changes.
- 3) Abingdon was only modelled in conjunction with at least a Vyrnwy supported transfer option, so the data are not available.

Undertaking a detailed analysis that goes beyond the strategic level conclusions in the Water UK report and specifically examines the 'inherent' benefit of the natural flows in the Severn, within a framework of future abstraction risks and pressures, will require the full agreement of Severn Trent recognising the commercially confidential nature of their information. The Water UK project can provide naturalised flows but you will need to liaise directly with Severn Trent to derive a model that incorporates the Severn Trent supply system in order to use the flows to examine future risks in a meaningful way.

In terms of calibration and reliability of the Wathnet model, this information was fully shared with the Water UK Steering Group through the examination of storage/drawdown plots obtained by running the historic flow records through Wathnet and comparing them against the Severn Trent and Thames Aquator outputs. These plots haven't been published in the final report, but I'm sure the Water UK team would be happy to make these available to you on request.

I trust you find the above information helpful and recognise that the Water UK project team are fully committed to being open and transparent about the work that has been done. The team is happy to meet with you to discuss the above information in more detail.

Yours sincerely

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