



**Project:** Severn Thames Transfer Water Quality and Ecology Investigation  
**Meeting:** Phase 2 study, Second Stakeholder Meeting  
**Location:** Thames Water Offices, Clearwater Court, Vastern Road, Reading  
**Date:** 1000 – 1530, Wednesday 6th May 2015

**Attendees:**

Chris Lambert	TWUL	Graham Welland	TWUL
Steve Tuck	TWUL	Richard Smith	TWUL
Kieran Conlan	Cascade	Andy Brown	HR Wallingford
Trevor Wade	Cascade	Valerie Houlden	HR Wallingford
Rob Hinks	Cascade	Elfed Jones	HR Wallingford
Martin Berry	Bristol Water	Grace Martin	United Utilities
Andy Banham	Severn Trent Water	Karen Gibbs	CC Water
Phil Chatfield	Welsh Government	Tora Hallatt	EA
Graham Scholey	EA	Lucy Morris	EA
Jon Ashley	Ofwat	Helen Tidridge	NRW
Sarah Jones	Canal & Rivers Trust	Ken Burgin	Cotswolds Canals Trust
John Lawson	GARD	Colin Fenn	Independent

**MINUTES OF MEETING**

		<b>Action</b>
1	<p><b>Session 1: Introduction</b></p> <p>Chris Lambert (CL) welcomed everyone to the meeting. Kieran Conlan (KC) provided an overview of STT Phase 1 findings, transfer variants, scope of Phase 2, work completed to date and approach to the assessment.</p> <p>John Lawson (JL) queried whether recirculation from Longdon Marsh back to Ukinghall had been considered. Trevor Wade (TIW) confirmed that it had but that Longdon Marsh was now not being taken forward as a supported option which is why the Ukinghall option was crossed out in the options table on slide 6. Instead Lake Vyrnwy (UU) and Minworth reuse (Severn-Trent) were being considered as the supporting options, as per the Water Resources Stakeholder Meeting of 26/3/15.</p> <p>Ken Burgin (KB) commented that the 100Ml/d transfer limit was too low for canal transfer. TIW confirmed that higher rates up to 240Ml/d were being assessed for the canal transfer options.</p>	

	<p>JL queried why 200Ml/d was being assessed for pipeline transfer and not 300Ml/d. TIW stated variants were those from WRMP14 and noted that the approach was intended to be flexible to assessing other variants. With 200Ml/d and 600Ml/d being assessed for pipeline transfer, a 300Ml/d scheme was covered within that range, and that depending on the outcomes of initial results the assessment would be fine tuned.</p> <p>JL queried whether the HR Wallingford model was a hydrology model. Valerie Houlden (VH) explained that the model was a hydraulic and water quality model, which uses river flows (derived from gauged data at boundary locations) to drive the water quality simulations. VH also clarified that the Jubilee model was the model covering the Jubilee River Channel.</p> <p>JL queried whether other bulk transfer schemes (specifically Ely Ouse scheme operated by Essex and Suffolk) were being considered in the assessment. TIW confirmed that the project team were aware of the Essex bulk transfer scheme and it was being considered in the assessment. Phil Chatfield asked whether previous Severn Thames transfer studies were included in the study. RH confirmed that they had been reviewed in Phase 1 with findings taken through to Phase 2. JL asked whether a review of other bulk transfer schemes would be provided as an appendix to the Phase 2 report. KC confirmed that this was not within scope, but that findings of previous Severn Thames studies and experience of other bulk transfer scheme were included in the assessment.</p> <p>JL commented that on the mitigation and costs box presented on the schematic on slide 9 there needed to be feed back loops into the assessment. KC confirmed that they were, which was why the scenario testing and assessment boxes were encompassed within the Mitigation and Costs box.</p>	
2	<p><b>Session 2: Hydrology</b></p> <p>TIW provided an overview of the requirements of the hydrology work in the water quality and ecology assessment, the two operating conventions being applied, work completed to date and next steps.</p> <p>JL stated that though Longdon Marsh was being dropped as a supported option, the alternative (GARD) operating convention was still relevant for Lake Vyrnwy and Minworth STW supported options. TIW agreed but requested discussions with JL on suitable alternative triggers for both replacement supported options.</p> <p>JL confirmed that Alternative (GARD) trigger presented had since been updated following revised WARMS2 outputs, which should be used by the study. TIW agreed.</p> <p>Steve Tuck (ST) confirmed that initial updates to the Severn flow record had been provided to TWUL by HR Wallingford. TWUL review currently underway, prior to feeding back to HR</p>	<p>JL to provide an updated alternative trigger for supported transfer options.</p> <p>JL to provide updated alternative operating convention for unsupported transfers based on recent updates in line with WARMS2.</p>

	<p>Wallingford. EA and Severn Trent Water would then also need to review. It was confirmed by CL that JL would receive the agreed updated Severn flow record when it was available to update his alternative operating convention.</p> <p>Graham Scholey (GS) queried whether climate change was factored into the assessment. TIW confirmed that sensitivity testing would be undertaken using climate change amended flow series of both Severn and Thames as modelled through WARMS2. GS asked whether ecological consequence of climate change was being considered. TIW stated that climate changed flows will be modelled in WARMS2 using future climate scenarios and linked with water quality modelling outputs used to test ecological sensitivity to climate change under various scheme variants.</p> <p>JL asked whether there was enough detail available on the replacement supported options of Lake Vyrnwy and Minworth STW. CL confirmed that UU had provided detail on the Lake Vyrnwy option, but that input from Severn Trent Water was still awaited. Andy Banham (ABa) confirmed that details of Minworth STW option were still being worked on but that he would follow up. TIW confirmed that the hydrology and water quality assessment could and would be progressed to a point prior to full Lake Vyrnwy details being available. Martin Berry (MB) asked whether the status quo at Deerhurst would be maintained for alternative supported options. TIW confirmed that it would, with terms of consent absolute HOF of 1,800Ml/d (and second tier HoF) retained at Deerhurst for these supported options as provided by the EA in line with the Habitats Directive Review of Consents of the Severn Estuary SAC/SPA/Ramsar site.</p>	<p>AB to follow up with colleagues on input for the Minworth supported option.</p>
3	<p><b>Session 3: Water Quality</b></p> <p>TIW provided overview of the environmental and operational water quality assessments, the determinands being included in each assessment, data sources, site selection criteria, approach to baseline characterisation, approach to assessing variability, and presented baseline water quality results for selected determinands.</p> <p><b>Environmental Water Quality</b></p> <p>KC asked if stakeholders thought that any determinands were missing from the scope presented. No additional determinands were raised by the stakeholders.</p> <p>It was raised that the release point B (Lechlade) was shown in the wrong position on all maps. <i>POST MEETING NOTE: this has been investigated and it has been confirmed that it is only the illustrative maps that have the 'B' in the wrong location. The location of 'B' in all site selection statistical exercises have used the correct location. 'B' has been corrected on all map outputs.</i></p>	

<p>ABa queried whether Avon sites would now need to be added to the WQ assessment with the inclusion of the Minworth supported option, TIW agreed and added that further sites in the upper Severn would also be added. ABa asked whether the estuary had been included. TIW and ST confirmed that both Severn and Thames estuaries had been scoped out at this stage due to the small volume of the transfer relevant to volumes in play in the estuaries. ST mentioned that migratory fish might be an issue, but TIW confirmed that migration in the Severn was protected by the HOF arrangements as per the appropriate assessment.</p> <p>Colin Fenn (CF) asked what frequency of data was being used, TIW confirmed that it was monthly EA data, and the number of data points used for each statistical representation would be stated in reporting.</p> <p>ABa commented that the River Avon joins the Severn between the d/s Ukinghall site and the u/s Deerhurst site, thus it seemed strange that the two sites could be combined into a single dataset. TIW explained that the two datasets had been tested for statistical significance, but would recheck.</p> <p>KB commented that it was a shame that there were no suspended solids data available for the Gloucester and Sharpness (G&amp;S) canal, but that the canal was regarded as having low suspended solids, especially with the Frome's input being very low in suspended solids.</p> <p>GS commented that there are turbidity data available for the upper Thames and lower Severn from AQMS data.</p> <p>JL asked whether WFD was the driver of the assessment or algal growth. TIW confirmed that WFD status of the main nutrient (phosphorus) was being investigated, assessing how far away from Good Ecological Status (GES) waterbodies were, and whether it was likely that GES would be achieved by the time of scheme operation in 2027. TIW explained that due to the differing standards required for different waterbodies, what would be classified as GES in the upper Severn intake locations would not necessarily be classified as GES at Thames release locations.</p> <p>Sarah Jones (SJ) commented that the G&amp;S canal had been known to suffer from blue green algae blooms but there wasn't any data to support this.</p> <p>Low flow issues were raised, but it was explained by KC and JL that due to the HOF within the operating conventions the transfer would cease operation under such conditions, which provides a key mitigation measure should the assessment identify such issues.</p> <p><b>Drinking (operational) Water Quality Assessment</b></p> <p>With respect to the high metaldehyde concentrations reported</p>	<p>TIW to recheck validity of combining d/s Ukinghall and u/s Deerhurst sites.</p> <p>RH to investigate.</p>
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	<p>for the G&amp;S Canal, Lucy Morris commented that the Frome provides a source of metaldehyde into the G&amp;S Canal, which is thought to come from maize production further up the catchment. MB explained that the Purton WTW is able to reduce metaldehyde levels by 50% during periods of peak levels, but that the WTW could only maintain this level of reduction for short periods, and cannot maintain it during extended peaks. He also explained that GAC regeneration was required on a more frequent basis leading to a significant increase in costs.</p>	
4	<p><b>Session 4: Modelling</b>  Andy Brown (ABr) and VH introduced the modelling work, presenting the Severn and Thames model calibration and verification, then the first scenario runs.</p> <p>JL asked why 2011 had been used. TIW/VH explained that a recent year had been sought (within last 10yrs) so as to be representative of current WQ and that 2011 was the best available representative and most recent year in both catchments in which hydrological conditions could potentially have led to (unsupported) transfer within that period being neither 'wet' nor 'too dry'.</p> <p>JL asked whether the model picked up rainfall and diffuse contributions from the catchment. VH and Elfed Jones (EJ) explained that the modelled used gauged river flow at the start and end of each reach and at the final monitoring point on each tributary to provide the model with boundary conditions with which to model flow in between these data points.</p> <p>KB asked why there was no flow calibration above Farmoor, EJ and RH confirmed that there were not any gauged monitoring points locally above Farmoor until much further upstream near to Lechlade.</p> <p>JL commented that the 2011 modelled against measured data flow plots did not provide a very good fit at Kingston (Teddington). CF explained that 2011 was the verification year and as such could not be "fitted", plus the Nash Sutcliffe efficiency of 0.98 at Deerhurst was very high, inferring a very good fit. EJ explained that Nash Sutcliffe efficiency only calculated where there is observed data available, pointing out that there are data gaps in the Deerhurst record. ABr commented that HRW needed to check the Nash Sutcliffe efficiency for 2011 as it did seem high in comparison to the plots. CF commented that the 2011 fit was very good, but that 2010 was not as good and wondered why when the 2010 year could be manipulated to improve the fit.</p> <p>JL asked why the modelled 2010 suspended solids at Hawbridge showed peaks in autumn when the observed data didn't. EJ/VH thought it was peak flow events, but were looking into the issue to determine the cause.</p> <p>KB queried the sharp drops in dissolved oxygen in the 2007 Masiemore plot. EJ explained that the dissolved oxygen simulations were driven by a range of modelled processes so the</p>	<p>HR to check Nash Sutcliffe efficiency.</p> <p>HR to look into model fit.</p> <p>HR to look into 2010 suspended solids modelled peaks.</p>

	<p>modelling team would need to look into the issue to explain the reasons behind the output.</p> <p>JL commented that the 2011 and 2004 Teddington flow plots were very low flows compared to observed data. PC agreed and asked whether the model was fit for purpose, JL felt that particularly for 2011, it was not. AB agreed that further checks were required. ST suggested checking the model outputs at Walton due to there being little change in terms of flow input between Walton and Teddington. KC welcomed the feedback on model and would encourage post meeting feedback also.</p> <p>JL asked why the model scenarios were run for everyday. TIW explained that for the WQ to drive the ecological assessments a full understanding of the water quality risk envelope was required, allowing full understanding of which issues were of concern. These outputs will then be used together with the hydrology analysis output of when transfer is likely to occur for each variant in order to determine the level of water quality risk for each variant.</p> <p>KB recommended that the flow transfer rates specified for the canal transfer (7 days) needed to be reviewed to reflect reality of transfer times. EJ agreed.</p>	<p>HR to review Lower Thames flow modelling outputs.</p> <p>EJ to review canal transfer rate.</p>
5	<p><b>Session 5: Ecology</b></p> <p>RH outlined the scope methodology and early baseline findings of the ecological assessment workpackages covering WFD, specific fisheries issues, invasive species and protected species.</p> <p>PC commented that shad populations in the Wye, Usk and Severn were genetically unique, very rare and very sensitive to abstraction. RH confirmed that the fisheries workpackage included assessment of shad and that these issues had been flagged in the initial baseline findings.</p> <p>GS commented that the transfer may remove occurrence of the bottom of the hydrograph (i.e. lowest flows) in the Thames, which has the potential to influence important dead zones and fish species that favour such low flow conditions. KC agreed that it was an important issue, and thought that research had been undertaken into the issue as part of the Upper Thames Reservoir project. TIW confirmed that backwaters were included as an important part of the ecological assessment (<i>cf</i> Slide 12 in the hydrology presentation).</p> <p><b>Reporting</b></p> <p>KC outlined the proposed reporting structure, consisting of a concise high level overview report supported by detailed technical appendices.</p> <p>JL asked what the timeframes for reporting were. CL confirmed September, but stated that before the updated Severn flow record could be incorporated it still needed the TWUL review to be completed, HR Wallingford to take account of comments and then review by Severn Trent Water and EA. JL thought that it</p>	<p>TWUL/Cascade to consider using existing Severn flow record.</p>

	would be better to progress with the assessment using the current (derived) flow series rather than experience delays.	
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