Log of individual stakeholder comments

Comment Ref	Stakeholder	Date	Report	Topic	Consultee representation	Thames Water Response
1	CCT		Raw Water Transfers Feasibility	Transparency of costs	Ken Burgin request for costs	Consideration is being given to this. Thames Water are waiting for a position statement from OFWAT as discussed at the Technical Stakeholder Meeting on 8th November
2	EA	03/11/2016	Fine Screening Report	General	***EA1 General comment:*** *We have concerns with the amount of material that has been provided to stakeholders and the length of time to review and provide comments. Although we have been advised of when these documents were due, it has still proven difficult to ensure all documents have been reviewed in sufficient detail. A staggered approach for providing detailed comments would have been preferred. We would like to work with you to discuss how this engagement, particularly from our Area colleagues, can be improved in the future. As such, our review is limited given the amount of information shared in the timeframe.*	We are undertaking an extensive programme of work to examine feasible demand management and resource options to inform our next WRMP. We commenced this work in 2015 and have engaged with stakeholders at regular intervals to ensure they are aware of progress with the programme, and have an opportunity to comment and input to the work. Over the past 18 months we have published a suite of technical reports and have requested comments on these from interested organisations. We have set deadlines for comments to ensure we are able to complete the work in sufficient time to inform the development of the WRMP. Where stakeholders have not been able to meet the proposed deadlines for comments, we have accommodated this. We will continue to work with the EA, and other stakeholders, to ensure we understand issues and concerns and take these into account in the work. We have regular meetings with the EA and are willing to review the process to ensure we understand, and are able to address, EA comments and concerns.
3	EA	03/11/2016	Fine Screening Report	Approach to cost criterion	***EA2 Executive Summary – Table S.1 (page ii):*** *What constitutes as "excessively costly"? Is it appropriate to screen out on cost at this stage? How confident are you in the costs being assigned? Have you assigned confidence grades to the costs applied? Can you provide justification for cost being used to screen out at this stage?*	Costs for options are included in a chart in Section 3 of the report which visualises uncertainty around cost and utilisation. Cost is one dimension used alongside others when making screening decisions.
4	EA	03/11/2016	Fine Screening Report	Approach to cost criterion	***EA3 Executive Summary - Table S.1 (page ii):*** *Has there been any assessment of how options of similar sizes compare, and screening based on this? Would size-based screening affect the results? E.g. screened out 25Ml/d reuse at Crossness on cost, but could this be cheaper than a reservoir for the same volume? We do have concerns about ensuring that there is manageable number of options to consider, but ensuring that there is a good enough mix of options.*	The cost comparisons set out in Section 3 of the report are split into size bands and higher cost thresholds have been selected for the smaller size bands to reflect that smaller options can be used to more closely match supply/demand deficit profiles and defer expenditure.
5	EA	03/11/2016	Fine Screening Report	General	***EA4 Executive Summary – Fine screening summary (page ii):*** *We'd recommend including definition of "Thames Valley water resource zones" for clarity.*	Text modified to be clearer.
6	EA	03/11/2016	Fine Screening Report	Sufficient number of options on Constrained List	***EA5 Executive Summary – Next steps (page iv):*** *In reference to the next steps for options on the constrained list (e.g. conceptual design, SEA), how have you ensured that you have enough sub-options within an option type to allow for others to be reconsidered should the options progressing from Phase 2 be ruled out at the next stage? Would it be too late to then go back and look at alternatives as they have already been screened out? For example if there is only one reservoir site left in the constrained list?*	The process has been designed to identify risks that could potentially prevent an option from proceeding and to consider them as part of the fine screening process. Notwithstanding this, there is a risk that an issue may arise late in the process that prevents a specific option from proceeding. Depending upon when this occurs in the process, it may still be possible to bring forward an alternative option. However, a check has been done (in the form of a "What if" analysis) to ensure that there are sufficient options to provide an 800Ml/d programme even if two large options are found to be unfeasible at a late stage in the process. In relation to the specific example given of the Abingdon reservoir, the current analysis indicates that if the Abingdon option were prevented from proceeding then alternative desalination and reuse options would be available that would be better value than the alternative reservoir sites.
7	EA	03/11/2016	Fine Screening Report	General	***EA6 Executive Summary – Next steps (page iv):*** *Please provide further explanation of what "bottom-up assessment of risk" means? What does it entail?*	At feasibility and fine screening stage an allowance has been made for risk in the costings based upon Optimism Bias. For options on the Constrained List conceptual designs are being prepared, as part of which a risk register is being compiled. The risks on the risk register will then be assigned a likelihood and monetised consequence which will be combined in a monte carlo analysis to provide a distribution for specific risks identified. The allowance for "optimism bias" will then be scaled back to reflect the improved understanding of the option and the specific risks that have been captured.
8	EA	03/11/2016	Fine Screening Report	Programme appraisal approach	***EA7 Executive Summary – Next steps (page iv):*** *We would like to understand how the metrics that feed into programme appraisal impact your decision making. We have recently discussed this at a meeting with regarding the environmental assessment / metric and would like to arrange a meeting to understand how this will work.*	This was discussed at the November Technical Stakeholder Meeting and communication is on-going.
9	EA	03/11/2016	Fine Screening Report		***EA8 Executive Summary – Next steps (page iv):*** *With regards to the specific options next steps, what is your expectation on the level of detail in these investigations? Is this a critical step for you to have a feasible list of options to appraise? This level of detail appears to be similar pre-application work. This may be difficult to do within your timescales for the WRMP and we would not want to be subjected to unrealistic deadlines in providing pre-app advice on these issues and would not want to prejudice the public consultation of the WRMP.*	There are monthly programme updates and additional engagement to ensure that the EA are informed of Thames Water's expectations

Log of individual stakeholder comments

Comment Ref	Stakeholder	Date	Report	Topic	Consultee representation	Thames Water Response
10	EA	03/11/2016	Fine Screening Report	Scale of deficit	***EA9 Section 2.2 (page 4):*** *Text states that an 800Ml/d deficit for London resource zone has been agreed. Please provide further information on what this is based on? Is there any merit to considering a range of scenarios to meet as this would affect the mix of options in the preferred programme?*	Updated (but not finalised) information on the supply/demand balance is provided in the updated fine screening report. A what-if analysis has been conducted to ensure that even if two large options are prevented from proceeding then there will be 800Ml/d of options on the constrained list. The Constrained List currently contains over 1500Ml/d of resource options. The appropriate mix of water resource and demand management options will be considered at the programme appraisal stage.
11	EA	03/11/2016	Fine Screening Report	General	***EA10 Figure 2.2 (page 6):*** *Beckton STW is shown, but the adjacent Thames Gateway Water Treatment Works (Beckton Desalination plant) is not shown. This is a fairly significant element of TWUL infrastructure that would seem to merit inclusion as a principle feature.*	The figure has been updated to include the Gateway plant.
12	EA	03/11/2016	Fine Screening Report	Fine screening approach	***EA11 Section 3.1 (page 7):*** *States that Phase 2 investigations are to reduce uncertainty, however, is it more to reduce the number of options that are being progressed?*	The Phase 1 work developed the approach to fine screening and applied it to the WRMP14 options. It identified a number of uncertainties related to the options and further assessment of these has been included in the Phase 2 work. The Phase 2 work has also included developing feasibility reports by option type to identify whether there are any other options that should be considered. The Phase 2 work has therefore been focused on increasing confidence in the options included on the Constrained List, rather than on reducing the number per se.
13	EA	03/11/2016	Fine Screening Report	General	***EA12 Section 3.1 (page 7):*** *In relation to comment EA5, what happens in the Phase 3 programme appraisal identifies social / environmental impacts from a specific option – is it too late to look at other feasible options?*	See response to comment Ref 6.
14	EA	03/11/2016	Fine Screening Report	General	***EA13 Section 3.1 (page 7):*** *States that Phase 4 will take place in 2018/19, but isn't this too late given the plan is being submitted next year?*	The report text has been updated to clarify that Phase 4 relates to progressing through to outline design and preparation for planning those preferred options that are identified for immediate development. Most of this work will therefore be undertaken after submission of the draft WRMP.
15	EA	03/11/2016	Fine Screening Report	General	***EA14 Section 3.1 (page 7):*** *States that by the time Phase 4 is progresses all screening decisions are justified based on the state of knowledge of the options at that time not when screening decision is made. Please can you clarify? There still needs to be scope for the public consultation to shape the WRMP and preferred programme. How will new information be included, and will there be scope to switch in alternative options?*	It is intended that as new information becomes available it will be assessed to establish whether it is expected to have a material impact on decisions. Where the impact is material then, where practicable, the screening will be updated to reflect the new information.
16	EA	03/11/2016	Fine Screening Report	Fine screening approach	***EA15 Section 3.2 (page 9):*** *It isn't clear how the findings from Phase 1 have been used. It would be useful to include a brief summary of the findings from Phase 1 and how this has influenced Phase 2.*	A summary of Phase 1 findings will be included in the updated fine screening report.
17	EA	03/11/2016	Fine Screening Report	Fine screening approach	***EA16 Section 3.2 (page 9):*** *These appear to be quite fundamental changes in the approach – what evidence is there that these have been consulted on?*	Stakeholders have been kept informed of changes in approach and the reasons for them - and the iterative process that has been followed provides stakeholders with multiple opportunities to express any concerns around the approach or to request clarification. Specifically, the proposal to include feasibility reports by option type was discussed with stakeholders at a Technical Stakeholder Meeting at the start of the Phase 2 work. Similarly Thames Water has presented the work it has done on the planning horizon to stakeholders at Technical Stakeholder Meetings. The September 2016 issue of the Fine Screening report has provided an opportunity for stakeholders to comment on the approach to cost screening. Stakeholders have also been previously informed of the proposal to merge the small and large option screening.
171 a	EA	16/09/2016	Direct River Abstraction Feasibility Report	Direct River: Option Validation	In your WFD assessment you should consider abstraction and discharge in the freshwater Thames waterbody (for which the freshwater EQS standards apply), and a reduction of discharge occurring in the Thames Upper transitional waterbody, which implies the effects on Thames Middle transitional waterbody should be accounted for also. Note there are different EQS standards for transitional waters. We will need to provide advice on which standard to apply to the Upper Tideway (Upper Thames TRAC, Teddington-Battersea).	Modelling work has also been commissioned to help support the further environmental assessment of the option.
18	EA	03/11/2016	Fine Screening Report	Fine screening approach	***EA17 Section 3.2 (page 9):*** *Change in screening for cost – how does this affect the phase 1 screening results, particularly if options were screened out on cost?*	The Phase 2 report supersedes the Phase 1 report fine screening and so the cost screening from the Phase 1 report is updated in the Phase 2 report using the modified approach.
19	EA	03/11/2016	Fine Screening Report	Fine screening approach	***EA18 Section 3.3 (page 9):*** *How does the review of generic options relate to Phase 1?*	The Phase 2 report references the generic option types listed in the UKWIR Water Resources Planning Tools project to ensure consistency with the Water Resources Planning Guidelines. The generic option screening and the feasibility reports which together define the Phase 2 Feasible List supersede the Phase 1 coarse screening.
20	EA	03/11/2016	Fine Screening Report	Fine screening approach	*EA19 Section 3.4 (page 10): Please can you provide further clarification regarding the third bullet point about the estimated deployable output exceeding the deficit and therefore only the best performing options proceed? Does this limit the ability to deal with uncertainty?*	For the zones where there are significant deficits then there is more than one option type that has the potential to address the deficit. As a result the total capacity of options on the Feasible List across all option types exceeds the envisaged deficit by a substantial margin. The criteria should not therefore limit ability to deal with uncertainty.

Log of individual stakeholder comments

Comment Ref	Stakeholder	Date	Report	Topic	Consultee representation	Thames Water Response
21	EA	03/11/2016	Fine Screening Report	General	*EA20 Section 3.5.5 (page 13): Please provide further clarification for why an option would be developed to be mothballed. What would be the benefit of this, and in what situation would this occur?*	We are replacing the term "mothballed" with the term "care and maintenance". Elements that may be operated in the "care and maintenance" mode include the Severn-Thames transfer, water reuse, desalination and Teddington DRA options. In a wet year, when the London reservoirs are not drawn down these resource elements may not be required and so can be kept in a "care and maintenance" mode until a predefined trigger is passed that indicates that additional resource is required to supplement natural river flows.
22	EA	03/11/2016	Fine Screening Report	Fine screening approach	*EA21 Section 3.6 (page 14): Again, we have concerns with the screening carried out in the feasibility reports per option type – how have you ensured you have a big enough mix to allow a rich programme appraisal?*	In practice other factors have limited the options carried forward onto the Feasible List. Following fine screening over 1500Ml/d of options have been carried forward onto the Constrained List for programme appraisal.
23	EA	03/11/2016	Fine Screening Report	Fine screening approach	*EA22 Section 3.6 (page 15): Please clarify what the generic screening criteria is.*	See response to comment Ref 64.
24	EA	03/11/2016	Fine Screening Report	Fine screening approach	*EA23 Table 3.1 (page 15): Please provide further clarification around the difference between "no benefit" and "neutral".*	We have reviewed the need for this distinction and have concluded that it is no longer required.
25	EA	03/11/2016	Fine Screening Report		*EA24 Section 3.6.1 (page 15): Is the SEA and WFD dimension using WRMP14 information? There is reference to status, but is risk of deterioration taken account of?*	Risk of WFD status deterioration has been taken into account for all options in line with the WFD assessment criterion in the Feasibility Reports using information on status from the 2015 2nd Cycle WFD dataset and informed by the understanding of hydrological and/or water quality effects on the WFD water bodies. WRMP14 WFD assessment has also be used where available to inform the assessments. For SEA, up-to-date environmental constraint data have been used to assess the likely adverse and beneficial effects, informed where available by the WRMP14 SEA information.
26	EA	03/11/2016	Fine Screening Report		*EA25 Section 3.6.1.2 (page 16): The last paragraph states that a strategic hydrological assessment and WFD assessment has been used from WRMP14 full scheme dossiers. What has been used for new options?*	Risk of WFD status deterioration has been taken into account for all options in line with the WFD assessment criterion in the Feasibility Reports using information on status from the 2015 2nd Cycle WFD dataset and informed by the understanding of hydrological and/or water quality effects on the WFD water bodies. WRMP14 WFD assessment has also be used where available to inform the assessments.
27	EA	03/11/2016	Fine Screening Report	Approach to cost criterion	*EA26 Section 3.6.2 (page 19): Please can you provide further explanation for including a 0% utilisation scenario?*	Some options may not be required during a wet year (see response to comment Ref 21). For these options the minimum utilisation in any one year may be 0%.
28	EA	03/11/2016	Fine Screening Report	Approach to cost criterion	*EA27 Section 3.6.2 (page 21) : The explanation for cost benchmarking at the Technical Stakeholder Meeting on 6 October was useful to explain how this has been derived. It may be useful to review whether the explanation included in the Fine Screening report can be improved.*	The explanation on the derivation of the cost thresholds has been expanded in the report.
29	EA	03/11/2016	Fine Screening Report	Approach to cost criterion	*EA28 Section 3.6.2 (page 21) : How and when does the variation between the red and green costs (and therefore influence of variable costs) get considered in option selection?*	Text modified to be clear that the difference between the AIC at max and min utilisation feeds into the cost assessment through the way the symbols for cost are assigned.
30	EA	03/11/2016	Fine Screening Report	Approach to cost criterion	*EA29 Section 3.6.2 (page 21) : The text mentions "least cost", please provide reasoning for using this rather than best value.*	The text has been updated. Options that are screened out for reasons other than cost are excluded from the What If analysis. For those options that remain the screening process is insufficiently granular to identify the best value options and this will be done through the programme appraisal process. The What If analysis is not intended to pre-judge the programme appraisal work for which sophisticated evaluation and visualisation tools have been developed by Thames Water.
31	EA	03/11/2016	Fine Screening Report	Fine screening approach	*EA30 Section 3.6.2 (page 21) : Does the allowance deficit for supplying other companies included in the 800Ml/d include any uncertainty?*	The 800Ml/d is based upon an initial assessment of potential resource requirements over 80 years. The total potential deployable output of options identified on the constrained list is over 1,500 Ml/d. This provides flexibility should actual resource requirements be above 800Ml/d.
32	EA	03/11/2016	Fine Screening Report	Approach to cost criterion	*EA31 Figure 3.6 (page 23): The costs for the Severn Thames Transfer option appear to be significantly varied compared to other options. Please can you provide further justification for this? Also, should this option appear in 125-175Ml/d and 175-225Ml/d bands?*	The high proportion of variable cost associated with the Severn Thames Transfer relates to payments to third party suppliers of support flows (Severn Trent, UU) and also the high pumping cost due to the static head required for the STT. Severn Thames Transfer has been significantly reviewed and revised since the September 2016 issue of the report
33	EA	03/11/2016	Fine Screening Report	Fine screening approach	*EA32 Section 3.6.3.2 (page 25): In the section regarding local acceptability, the text mentions "regulatory support for a reservoir". Please can you provide further explanation regarding this statement? As environmental regulator we advise Defra on whether a WRMP meets the directions, provide secure supply of water and protects the environment. We do not provide 'backing' for any specific option, but refer to the evidence provided by a company to ensure its plan is robust.*	The sentence has been deleted.
34	EA	03/11/2016	Fine Screening Report	Fine screening approach	*EA33 Section 3.6.4.1 (page 27): The lead times and the assessment associated with each appears to be static. Should this be proportionate to the deficit being addressed? Is a longer lead time a disbenefit is the deficit is not immediate? Does this bias short lead time options?*	Options with short lead times offer benefits in terms of ability to respond to immediate deficits and allow resource options to more closely match future deficits particularly where there is significant uncertainty around the future scale of deficits.
35	EA	03/11/2016	Fine Screening Report	Fine screening approach	*EA34 Section 3.6.5.2 (page 30): The section regarding data confidence mentions deployable output assessment, however this is also covered in the resilience dimension. Is this double counting?*	The data confidence sub-dimension considers uncertainty around deployable output assessment associated with historical records, whereas the resilience dimension considers vulnerability to severe droughts that are worse than those on historical records
36	EA	03/11/2016	Fine Screening Report	Fine screening approach	*EA35 Section 3.6.6.1 (page 30): The resilience dimension covers a lot of different elements of 'resilience'. Will it be clear which element is driving a decision?*	The qualitative assessment has been conducted at the sub-dimension level and so the performance of each option against each sub-dimension can be seen

Log of individual stakeholder comments

Comment Ref	Stakeholder	Date	Report	Topic	Consultee representation	Thames Water Response
37	EA	03/11/2016	Fine Screening Report	Fine screening approach	*EA36 Section 3.6.6.2 (page 33): The last paragraph on page 33 states that the Upper Thames reservoir as the option resilient to most failure modes. What evidence has been provided to support this statement? Have issues with metaldehyde and algal blooms been included in the pollution incidents category?*	A qualitative assessment of resilience of option types to key failure modes has been conducted and this has been used to inform the assessment. The reservoir options have been designed with mitigations specifically to address concerns around the water quality impacts of Algae blooms. These mitigations include increasing reservoir depth, including multiple draw off towers and including aeration to provide mixing.
38	EA	03/11/2016	Fine Screening Report	Fine screening approach	*EA37 Section 3.6.7 (page 34): These need to be clear, transparent and justified. Does the screening decision based on the 6 dimensions result in the constrained list of options? Worthwhile to note this.*	The text has been updated to clarify that the screening based on the 6 dimensions results in the Constrained List.
39	EA	03/11/2016	Fine Screening Report	Fine screening approach	*EA38 Section 4 (page 35) : It's unclear at what stage in the process this has occurred. Are these the results of Phase 1? Would it be better to include this at the beginning of the document rather than after the Phase 2 screening dimensions have been discussed?*	Section 3 relates to the approach to screening whereas section 4 relates to application of approach to generic screening and sections 5-10 summaries the results of the feasibility assessment and fine screening
40	EA	03/11/2016	Fine Screening Report	Fine screening approach	*EA39 Table 4.1 (page 36): "Thames Barrage" should read "Thames Barrier".*	The wording has been corrected.
41	EA	03/11/2016	Fine Screening Report		*EA40 Table 4.1 (page 36): Redevelopment of existing resources – when will the screening decision be confirmed?*	The screening decision will be confirmed by March 31st.
42	EA	03/11/2016	Fine Screening Report	Fine screening approach	*EA41 Section 5 (page 37): Would it be useful to include a summary of the feasibility report stages and what was considered in each?*	Section 3.4 summaries the feasibility approach and the results of the stage 1 to 3 assessments are summarised in chapters 5-9. Cross-reference to feasibility methodology to be added in Section 3.4
43	EA	03/11/2016	Fine Screening Report	Fine screening approach	*EA42 Table 5.1 (page 38): Abbey Mills has been screened out in preference to Luxborough Lane but Luxborough Lane has also been screened out. This has also occurred with Greenwich Lower Hall and Greenwich Hogsmillll which were screened out in preference to Millbrook and Wandle which have also been screened out. Is this reasonable justification?*	All the options mentioned that are screened out in preference to others, are because they are mutually exclusive options and of similar capacity. The detailed justification for screening out one option in preference to others is given in the feasibility study report.
44	EA	03/11/2016	Fine Screening Report	Fine screening: Abingdon	*EA43 Section 5.2.2 (page 44): The third paragraph on this page states that Abingdon was the only available site for the larger reservoir capacities. Please provide further explanation to ensure this is not the only criteria for the option to be screened through.*	Fine Screening report provides a summary of feasibility report, further information can be found in the reservoirs feasibility report published on Thames Water's website. Other Band C sites passed stage 3 of the feasibility report and are included in fine screening but Abingdon is the only site capable of providing the 125Mm3 and 150Mm3 reservoirs
45	EA	03/11/2016	Fine Screening Report	Supported STT	*EA44 Section 5.2.3 (page 48): Please provide further justification for the decision to discharge at Radcot. Is this purely based on cost?*	An update paper on the Raw Water Transfers Feasibility Report has been produced which sets out the assessment of discharge locations and volumes. It is proposed that this work will be reflected in the updated Raw Water Transfers Feasibility Report and subsequent updates to the Fine Screening Report.
46	EA	03/11/2016	Fine Screening Report	Fine screening: desalination	*EA45 Section 5.2.4 (page 49): Options to build new plants at Crossness and Thamesmead: Both sites will be on land which currently hold good nature conservation value and supports an important population of water voles, which hasn't been mentioned in the report or feasibility report. This needs to be taken into account, including the need for full mitigation.*	Further investigation on the Thamesmead site indicates that the planning constraints deem the site non viable, therefore it is to be amended for a business development site south of Crossness Erith Marshes. This will be reflected in the feasibility study and fine screening reports. Regarding the Crossness site, the feasibility study report references that the site holds good nature conservation value and the need for mitigation, note to be included regarding water voles. The Crossness site is rejected in the feasibility study report, partly on the grounds of the nature conservation value.
47	EA	03/11/2016	Fine Screening Report	Fine screening: DRA	*EA46 Table 5.7 (page 50): Although this option is screened out, any new intake at Three Mills Lock will need to be considered in terms of adequate screening to protect aquatic life and comply with the Eel Regulations 2009. Additionally, the intake must not be located in such a manner that the flow to the intake and screening arrangements prevent the utilisation of the existing fish pass at the lock.*	If this option is on the final Constrained List these considerations will be addressed in the conceptual design report
48	EA	03/11/2016	Fine Screening Report	Fine screening: DRA	*EA47 Table 5.7 (page 50): Following the Stakeholder Forum held on 27 October, it may be useful to provide further description to the Teddington options that involve effluent reuse to explain why these are in the Direct River Abstraction category.*	Text added to explain.
49	EA	03/11/2016	Fine Screening Report	Fine screening: DRA	*EA48 Table 5.7 (page 50): There are potentially significant implications for tidal ecology and habitat from this proposal from option 3a. There will need to be further discussions over the scope and extent of the SEA for this proposal. Mitigation and compensation measures are likely to be required. There also needs to be discussion of failure modes/resilience measures, flow rates, seasonality, interactions with the Teddington Hydropower scheme and potential impacts upon stakeholder groups e.g. Thames Angling Conservancy, Francis Francis AC, river users etc.*	Modelling work has also been commissioned to help support the further environmental assessment of this option.
50	EA	03/11/2016	Fine Screening Report	Fine screening: DRA	*EA49 Table 5.7 (page 50): With reference to the Teddington DRA supported by Mogden STW effluent, the Upper Tideway supports some rare species (Depressed river mussel and German hairy snail). These are vulnerable populations and the extent of the impacts that the scheme would have on them needs to be assessed. Depressed river mussel is intolerant of increased salinity and there is a risk that salinity could change as a result of this. The physical characters of the river as it is means that although the duration of the impacts could be short, these could be irreversible if they put so much strain on the populations that they are unable to recover. We would expect mitigation measures to be considered, including habitat enhancements.*	Modelling work has also been commissioned to help support the further environmental assessment of this option.

Log of individual stakeholder comments

Comment Ref	Stakeholder	Date	Report	Topic	Consultee representation	Thames Water Response
51	EA	03/11/2016	Fine Screening Report	Fine screening: groundwater	*EA50 Section 5.2.8 (page 53): The Hertfordshire and North London team are unaware of any discussions regarding the Arla Foods licence trade option. Please would you provide further information on this? Would it also be worth noting the work on achieving sustainable catchments and the implications this may have on these options?*	The Arla Foods option has been raised as a confidential site in previous discussions with the EA, which is why they may not be aware of it. Response on the confidential option has been included in the consideration of this option. Those options affected by the work on achieving sustainable catchments will be highlighted in the groundwater feasibility report where necessary.
52	EA	03/11/2016	Fine Screening Report	Fine screening approach	*EA51 General comment: Where has optimisation of existing network been considered?*	TW is progressing development of a network blueprint to 2100 which will identify potential network reinforcements required to address future supply demand balances and network risks.
53	EA	03/11/2016	Fine Screening Report	Fine screening approach	*EA52 Table 5.13 (page 56): It isn't clear how the screening decisions have been made based on the assessment of the criteria especially when section 5.4.1 states that options have been screened out on cost. Further explanation should be provided.*	Rejection reasons are linked to the relevant criteria but more work is required to more clearly articulate this in the rejection responses.
54	EA	03/11/2016	Fine Screening Report	Fine screening: DRA	*EA53 Section 5.4.1 (page 57): With reference to scenario 2, there are wider environmental impacts associated with the Mogden DRA option that may pose a similar risk to that assessed for navigation. There is a fundamental question over whether the water is available for DRA in terms of depleting flows in the Tideway.*	Modelling work has also been commissioned to help support the further environmental assessment of this option.
55	EA	03/11/2016	Fine Screening Report	Fine screening approach	*EA54 Section 5.4.1 (page 57): Should there be a scenario with the reservoir option not being available, to ensure all scenarios have been considered? What is the justification for not carrying out this scenario?*	Scenarios have been updated to include one where a reservoir is not available
56	EA	03/11/2016	Fine Screening Report	Fine screening: DRA	*EA55 Section 5.4.2.2 (page 59): The Mogden water reuse has been screened out due to Teddington being significantly cheaper – but what if Mogden reuse performed better under environmental and social assessment? Will this even get assessed as already screened out before this stage?*	The proposed Mogden reuse option discharges a short distance upstream of the intake location at Walton and so there would not be a significant length of river that would receive augmented water quantities. The environmental review at this stage (see Table 5.13 of fine screening report) has not identified any significant environmental benefit for Mogden water reuse, compared with Teddington DRA. If significant environmental issues on the Teddington DRA option are identified at a later date then the Mogden reuse option would need to be revisited.
57	EA	03/11/2016	Fine Screening Report	Fine screening approach	*EA56 Section 5.4.2.5 (page 60): Chinnor and Marsh Gibbon reservoirs have been screened out due to cost- but the final programme does not have to be least cost. Is there a risk with screening out all alternative reservoirs options to just have one going forward for model selection? Does it mean the model is not given the best chance to select overall best value programme that is sustainable and resilient?*	The Abingdon, Marsh Gibbon, and Chinnor reservoirs were all considered at fine screening and performed similarly across all six dimensions apart from cost, but the difference in relation to cost is significant given the significantly greater distance between the reservoir sites and the point of abstraction/discharge for the Marsh Gibbon and Chinnor reservoirs. It is therefore envisaged that Marsh Gibbon and Chinnor would perform worse than Abingdon were they passed to programme appraisal.
58	EA	03/11/2016	Fine Screening Report		*EA57 Section 5.5 (page 61): There is a general concern over screening out options that are feasible but not preferred compared to other options within same option type – is there a risk that the model won't have enough options to select? It is important that this is transparent, and that it doesn't appear that a programme of preferred options is being selected prior to consultation on the plan.*	Thames Water are comfortable that there are enough options to undertake a robust programme appraisal process. There is also the potential for a large contribution to deficit reduction through demand management and a number of small options in additional to the large options on the constrained list
59	EA	03/11/2016	Fine Screening Report	Fine screening: reuse	*EA58 Section 5.5.1 (page 61): The Deephams STW effluent re-use option will need to take into account the outcome of the Lower Lee Reservoir investigation. There is the possibility that a proportion of the transferred water could be required to augment the flows in the River Lee downstream of the intake points.*	Thames Water acknowledge the possibility that investigations into abstractions from the Lower Lee could impact upon the Deephams reuse option. Investigations are continuing in consultation with the EA to assess the effects of Thames Water's Lower Lee abstractions and the Deephams reuse option may need to be reviewed once initial conclusions from this work become available.
60	EA	03/11/2016	Fine Screening Report		*EA59 Section 5.5.3 (page 61): Will this be looked in conjunction with the Abingdon reservoir option – or is this a stand-alone option? When do options get considered in-combination for performance?*	The option for a combined Abingdon reservoir and Severn Thames Transfer has been considered as an option is the raw water transfers feasibility report but has not been included on the Feasible List as it does not provide any significant additional deployable output benefit
61	EA	03/11/2016	Fine Screening Report		*EA60 Section 5.5.5 (page 62): As stated in EA53, there doesn't appear to have been an assessment of environmental risk / disbenefits.*	These issues have been considered in the Feasibility assessment work. Modelling work has also been commissioned to help support the further environmental assessment of the option. The scope of the modelling work has been agreed with the Environment Agency.
62	EA	03/11/2016	Fine Screening Report		*EA61 Section 5.5.6 (page 62): Significant fish protections measures (active acoustic deterrents, x7 3mm passive wedge wire screens) were required for the current Beckton desalination plant. A second plant at this location would require similar levels of protection at the intake point in the Tideway. Eel Regulations 2009 would also now apply for any new abstraction. The requirement for this level of environmental protection should be considered when assessing this option.*	These considerations will be addressed in the conceptual design report
63	EA	03/11/2016	Fine Screening Report		*EA62 Section 6 (page 64) : Is this section still to be updated? Would we expect to see the Severn Thames transfer and reservoir options included for SWOX?*	The New Reservoir and Raw Water Transfer options for SWOX will be included in the next update of the report.
64	EA	03/11/2016	Fine Screening Report		*EA63 Section 11 (page 78): Would be helpful to explain generic screening criteria at some point in this report?*	No specific criteria have been defined, instead the generic options have been reviewed to identify those option types that are considered to have potential to provide feasible specific options
65	EA	03/11/2016	Fine Screening Report		*EA64 Table 11.3 (page 80): The constrained list appears to be quite small – is this a sufficient number for the model to pick optimum solution? Will there be enough options to fully undertake scenario testing?*	Thames Water are comfortable that there are enough options to undertake a robust programme appraisal process. There is also the potential for a large contribution to deficit reduction through demand management and a number of small options in additional to the large options on the constrained list
66	EA	03/11/2016	Fine Screening Report		*EA65 Section A.4 (page 85): No consideration of temperature of effluent versus ambient river temperatures when considering water quality.*	Temperature has been considered along with other parameters at a strategic level in the screening stage. Modelling work has also been commissioned to help support the further environmental assessment of the option.

Log of individual stakeholder comments

Comment Ref	Stakeholder	Date	Report	Topic	Consultee representation	Thames Water Response
67	EA	03/11/2016	Fine Screening Report		*EA66 Table B.1 (page 87): Further clarity should be provided to describe how these assessments then result in the screening decision. Will the cumulative effects take account of the CEA being undertaken by WRSE?*	The CEA for WRSE will be consulted when carrying out the cumulative assessments for Programme Level SEA/HRA/WFD assessments.
68	EA	03/11/2016	Fine Screening Report		*EA67 Table B.1 (page 87): Further commentary should be provided for the SEA and WFD criteria given that this will be looked at in detail at the next stage. What "rules" have been applied to give the positive and negative scorings?*	The SEA and WFD assessment in the fine screening report are based on a strategic level understanding of the likely environmental effects of the option. For SEA, each option has been assessed against key environmental constraints information and a strategic consideration of likely beneficial effects against the SEA topic areas. Where minor to moderate adverse effects are likely, a red semi-circle is signified; where major adverse effects are likely, a full circle is applicable. For beneficial effects, a full green circle signifies major beneficial effects and a green outline circle signifies minor to moderate beneficial effects. A blue circle indicates neutral or negligible effects. For WFD, a red semi-circle indicates a low to medium risk of WFD status deterioration, whilst a full red circle indicates a high risk of WFD status deterioration for at least one element. A blue circle indicates a neutral or negligible risk of WFD deterioration.
69	EA	03/11/2016	Fine Screening Report		*EA68 Table B.1 (page 87): Statement regarding INNS and control via treatment. Will this mitigate the risk completely, and therefore is this reducible? What would be the impact on costs?*	The costs of treatment have been included in the feasibility and fine screening report costings. While treatment will significantly reduce the risk, it will not eliminate the risk completely. See updated paper on INNS risks and mitigation by Dr David Alridge, the national expert on INNS, that is included as part of the Raw Water Transfers Feasibility Report Update. The text in Table B.1 will be reviewed.
70	EA	03/11/2016	Fine Screening Report		*EA69 Table B.1 (page 87): No commentary on costs, yet figure 3.6 appears to show that the variable costs associated with these options are significantly different to other options.*	Commentary on costs will be added to the assessment tables.
71	EA	03/11/2016	Fine Screening Report	Supported STT	*EA70 Table B.1 (page 87): Further justification should be provided to support the statement that a supported transfer would mitigate impacts of climate change. Would it? Has the work looking at coincident droughts between the Thames and Severn catchments also considered Vyrnwy as well? The reliability of these resources and their incumbent networks during recent droughts / dry weather periods should be confirmed.*	Further work is ongoing to assess the impact of partially supported STT options using stochastic flow series that includes for future impact of climate change. Initial findings are provided in Raw Water Transfer Feasibility - Update (January 2017) and further information will follow in the updated feasibility report.
72	EA	03/11/2016	Fine Screening Report		*EA71 Table B.2 (page 88): Again, no commentary provided on costs but some difference between sub-options.*	Commentary on costs will be added to the assessment tables.
73	EA	03/11/2016	Fine Screening Report		*EA72 Table B.3 (page 89): The commentary suggests that reservoirs provide greater resilience to outage events affecting existing supply system. Has the issue with algae been considered at all, particularly as it is likely to increase in the future with climate change?*	The reservoir options have been designed with mitigations specifically to address concerns around the water quality impacts of Algae blooms. These mitigations include increasing reservoir depth, including multiple draw off towers and including aeration to provide mixing.
74	EA	03/11/2016	Fine Screening Report		*EA73 Table B.3 (page 89): Further justification should be provided to support the statement that "smaller reservoirs provide less protection against drought". Would two smaller reservoirs not provide more resilience against other hazards such as pollution or outage events?*	In the short to medium term large reservoirs potentially provide surplus resource that provides additional resilience compared with a smaller reservoir. Two smaller reservoirs of equivalent capacity built at the same time would provide the same benefit but at substantial additional cost. The large reservoir options also include multiple inlet/outlet towers (with off takes at different levels) which would help mitigate the impact of pollution/algae events.
75	EA	03/11/2016	Fine Screening Report		*EA74 Table B.4 (page 90): Need to acknowledge the concerns about reducing flow in the Upper Tideway.*	The section on the environmental impacts of the Teddington DRA option will be updated once the hydrodynamic modelling and associated assessment have been completed.
76	EA	03/11/2016	Fine Screening Report		*EA75 Table B.4 (page 90): There will be substantial pumping associated with the Teddington option which will be energy intensive. This raises issues with regards to climate change and resilience (will there be more than one set of pumps? What happens during a power cut?) that need to be considered.*	Process and transfer pumping requirements for the Teddington DRA option are significantly low than for other large resource options. Embodied and operational carbon are monetised and included in the cost dimension.
77	EA	04/11/2016	Desalination Feasibility Report	Limit on desalination abstraction Beckton / Crossness (max 300 Ml/d)	**Section 6.4 (page 48)** In relation to option 2c (Estuary South, Thamesmead), the report states that a precautionary approach has been taken and capped the additional desalination capacity to 300 MLD because of issues with salinity. Please provide information on what this precautionary approach is based on.	The 300 Ml/d cap was based on an initial high level assessment of the likely threshold for additional brine discharges to the Lower Thames tideway in the area between Beckton and Crossness/Thamesmead. The initial assessment took account of the existing brine discharge volume at Gateway desalination works and the estimated brine discharges from the new desalination options. The cumulative salinity of these (untreated) brine discharges was then compared to low tide salinity values. The cap would keep the salinity levels within 10% of the existing baseline conditions. Further work is being carried out currently to assess the mitigation measures for the brine discharges for each desalination option and more detailed salinity assessment work is underway to provide a more accurate upper limit on the desalination and re-use schemes that could be operated without adverse effects on salinity.

Log of individual stakeholder comments

Comment Ref	Stakeholder	Date	Report	Topic	Consultee representation	Thames Water Response
78	EA	04/11/2016	Desalination Feasibility Report	Desalination: salinity effect on Thames	**Section 6.4 (page 48)**: We would be particularly interested in predictions of inputs of concentrated brine from the desalination options to the Thames. With potential discharge at or close to Beckton STW being considered, the river is still brackish at this location, and in a low flow situation the Beckton STW contributes c. 12% of the "freshwater" flow. If this then became brine it would result in a 1 in 8 dilution which could shift the summer salinity in that reach quite considerably (probably variable between 6-16PSU, with the higher values in low flow summers). From the experience of Marine Monitoring colleagues, the fauna around Beckton outfall is quite poor, but raised salinity within the more general area may have biological effects potential. Species generally (invertebrates, algae, diatoms) all tend to show a distribution closely linked to salinity, with very often a 100% turnover in species composition between the fresh and the marine ends of the estuary (i.e. with regards to diatoms you will not find any species in common at the two ends of the range, as freshwater ones give way to more brackish specialists who in turn give way to fully marine taxa). Therefore, changes in salinity will have a significant impact on the fauna and flora. Some species are also mobile and migrate to different areas of the estuary at different times of year to feed or breed, so again changes in the salinity gradient may impact these behaviours.	The concentration of brine discharges is being assessed as part of the Conceptual Design Report work and will feed into the cumulative assessment of the impact of desalination and wastewater reuse options in the lower Thames Tideway on the salinity regime. Mitigation measures are being assessed as part of the conceptual design work.
79	EA	04/11/2016	Desalination Feasibility Report	Desalination: salinity effect on Thames	**Section 6.4 (page 48)**: The impact of density of brine must also be considered. Brine is denser than water, and may sink to smother the bed unless there is sufficient mixing to homogenise it vertically within the water column. Has this been considered? A concentrated hit of brine may cause osmotic shock to invertebrates and fish not adapted to cope with such high levels.	The density effects of brine discharges is being assessed as part of the Conceptual Design Report work and will feed into the cumulative assessment of the impact of desalination and wastewater reuse options in the lower Thames Tideway on the salinity regime. Mitigation measures are being assessed as part of the conceptual design work.
80	EA	04/11/2016	Water Reuse Feasibility Report	Water Reuse: Environmental degradation assessment of options	**General Comment**: Subject to more detailed proposals (which include environmental assessment) we can only comment on generic risks which are potential deterioration due to changes in flows in both fluvial and tidal environments and also the effect on river water quality and therefore ecology due to the augmented and reduced flows at the respective locations. You should carry out a full investigation into risk of environmental deterioration due to these proposals.	Further assessment will be carried out as part of the Conceptual Design work and in the subsequent WFD assessment of options taken forward to the Constrained Options list, in line with the WFD assessment methodology that was published in summer 2016. The WFD assessments will be of a strategic nature consistent with the strategic nature of the WRMP, as opposed to the very detailed WFD assessment that would need to accompany a licence/permit application. Further details can be found in the published WFD assessment methodology on the WRMP19 section of the Thames Water website.
81	EA	04/11/2016	Water Reuse Feasibility Report	Water Reuse: Reduction in freshwater dilution flows	**General Comment**: On initial observations, it would appear that the Beckton, Crossness and Deephams proposals carry less risk to the tidal Thames environment than the two options relating to Mogden. This is due to the relatively high dilution of the tidal Thames environment in comparison with that at the Mogden discharge area. We have previously raised concerns with the net reduction in 'freshwater' dilution flows in the upper Tideway due to removal of the Mogden effluent to enable extra river abstraction upstream as part of the Teddington DRA option. Similar concerns apply to the reuse options as well.	Comments are noted and will be considered as part of the modelling work being carried out on the Mogden options and the subsequent cumulative effects assessment of options affecting the Thames Tideway
82	GARD	31/10/2016	Fine Screening Report	Crossness reuse screening decision	The 190Ml/d Crossness reuse option should be retained as it could be required if Abingdon reservoir were to perform poorly in programme appraisal due to the need to cope with a three year drought. In addition the unit cost of the combined Crossness and Beckton options can be expected to be a lot less than the unit costs for the individual schemes. (GARD response pp1, 7)	Whilst it is the case that a combined Crossness and Beckton reuse option could be more cost effective than a stand alone Beckton reuse option, Thames Water are of the view that implementation of both desalination and reuse options at both Beckton and Crossness would result in excessive reliance on reverse osmosis treatment processes and that the risk to deployable output associated with delays in ramp-up/availability of plant during a drought creates unacceptable risks.
83	GARD	31/10/2016	Fine Screening Report	Lower Lee DRA screening decision	**Water Quality** The 150Ml/d Lower Lee DRA option should be retained. (GARD response pp1). It is inconsistent to be developing water reuse options on the one hand and then to screen out an option on the other hand because of the high proportion of STW effluent in the river. In any case, the problems of water quality at low flows can be avoided by simply not using the scheme at times of low flow - this will reduce the deployable outputs of the scheme, but not substantially. *"We propose that the Lee direct river abstraction should be taken forward to the next stage with the assumption that the scheme may not operate continuously. If there are to be periods when the scheme cannot be used because of water quality, this should be determined by proper water quality analysis, taking account of improvement to water quality in the River Lee as a result of the Deephams reuse scheme."*	The Lower Lee DRA (Direct to supply) option has been reviewed and is now rejected at feasibility stage owing to water quality risks. The Lower Lee DRA (indirect to King George V) option has now been carried forward to fine screening from the feasibility report in its place.

Log of individual stakeholder comments

Comment Ref	Stakeholder	Date	Report	Topic	Consultee representation	Thames Water Response
84	GARD	31/10/2016	Fine Screening Report	Lower Lee DRA screening decision	**Deployable output** *"Similarly, the rejection on grounds of uncertainty of deployable output suggests that the minimum flow available in droughts will determine deployable output. This is not the case – with the direct river abstraction operated in conjunction with the Lee valley reservoirs, deployable output is determined by the volume of river water that can be abstracted in the critical drought, between the start of reservoir drawdown and the lowest point of reservoir drawdown."* *"The deployable output should be determined by proper hydrological analysis, taking account of the scheme operating in conjunction with the Lee valley reservoirs."*	Thames Water evaluates resources using WARMS2 and examines the availability of any source across a range of conditions over the period of record available, in many cases going back to 1920. However in some instances flow records are not available over an extended period and judgements can only be made based on the information available. Thames Water are undertaking work with consultants and independent experts to determine the deployable output achievable.
85	GARD	31/10/2016	Fine Screening Report	Lower Lee DRA screening decision	*"The analysis should determine the optimum size of abstraction – balancing the volume of water that can be abstracted during a drought with the cost of the aqueduct and pumping station."*	The point is noted and further work is ongoing to understand the potential volume of water that is available for abstraction.
86	GARD	31/10/2016	Multiple reports	General	Absence of hydrological analysis in the feasibility reports is a major weakness - particularly in relation to the new reservoir and raw water transfer reports. (GARD response pp1, 4)	Reports from Atkins on the potential yield of the Severn Thames Transfer and the Upper Thames Reservoir under future droughts will be referenced in the raw water transfers feasibility report and the fine screening report.
87	GARD	31/10/2016	Fine Screening Report	Marsh Gibbon & Chinnor screening decision	If the smaller reservoir options are retained for the next phase of investigation then the Marsh Gibbon and Chinnor sites should also be studied to the same level of detail as Abingdon, including geotechnical investigation. (GARD response pp2)	Marsh Gibbon and Chinnor reservoir sites have been screened out as they perform significantly worse than the Abingdon reservoir site and the desalination and reuse options on cost grounds across the options sizes.
88	GARD	31/10/2016	Fine Screening Report	Marsh Gibbon & Chinnor screening decision	*"We understand that the original selection of Abingdon as the preferred site, back in the 1990s, was primarily because it was one of the few sites able to accommodate a large 150 Mm3 reservoir. This argument doesn't apply for the reservoir options of 75 Mm3 or less, so Abingdon, Chinnor and Marsh Gibbon should be examined to the same standards for the smaller reservoir sizes"* (GARD response pp2 and pp23)	All those reservoirs taken through to Stage 3 of the Feasibility Report were subject to the same level of assessment and all three reservoirs mentioned were taken forward to the fine screening stage. At the Fine Screening stage, Abingdon was selected to be included in the Feasible Options list as the site was more cost-beneficial for the smaller size reservoirs in comparison to Marsh Gibbon and Chinnor.
89	GARD	31/10/2016	Fine Screening Report	Transparency of costs	*"The decision to screen out Chinnor and Marsh Gibbon seems primarily to have been made on the basis of cost – "excessively costly compared to reuse, desalination and Abingdon reservoir". Thames Water should provide a breakdown of the comparative costings between the three sites, including the estimated quantities of the main construction items (e.g. earthworks, rip-rap, pipework, concrete). We appreciate that Thames Water do not wish to reveal unit cost rates for commercial reasons, but they could be quoted in a fake currency to disguise the true cost." (GARD response pp2 and pp23)*	Consideration is being given to this. We are waiting for a position statement from OFWAT as discussed at the Technical Stakeholder Meeting on 8th November
90	GARD	31/10/2016	Fine Screening Report	Marsh Gibbon & Chinnor screening decision	*"We understand that the proposed embankments at Abingdon have exceptionally flat slopes because geotechnical investigations revealed the weak soils available at the site. If the embankments at Chinnor and Marsh Gibbon have been assumed to have the same slopes as Abingdon, the costs will have been over-estimated in the event that the local soils allow the embankments to be designed steeper. The feasibility reports show no detail of embankment cross-sections, which leads us to suspect that this has not been considered in appropriate detail."* (GARD response pp2 and pp23)	The embankment design at Abingdon includes slope angles of between 1:4.5 and 1:6, which are much flatter than embankments with granular shoulders but not unusual for embankments formed of clay, on clay foundations. The primary constraint on determining the cross section of such embankments is the risk of very slow rates of strength gain within the foundation clay due to consolidation as the fill is placed. This issue is present for any dam with a clay foundation - the clay present at the Abingdon site (Kimmeridge and Gault Clay) is broadly the same as at Marsh Gibbon and Chinnor. The reservoir at Chinnor is founded on the Gault Formation, a stiff, over consolidated clay also present at the Abingdon Site. The reservoir at Marsh Gibbon is founded on Oxford Clay of the Peterborough Formation, again a stiff, over consolidated clay. Therefore the limiting foundation characteristics (and primary dam material) is broadly the same at those sites, so the use of the same embankment section is justifiable at a feasibility study level.
91	GARD	31/10/2016	Fine Screening Report	Marsh Gibbon & Chinnor screening decision	*"The reports say that there is geological uncertainty in relation to the Marsh Gibbon and Chinnor sites – that uncertainty could lead to the scheme costs being over-estimated, not under-estimated. Therefore, the geotechnical investigations should be carried out on those sites before a decision is made. This would enable embankment slopes to be properly designed for each site and enable more reliable estimates."* (GARD response pp2 and pp23)	The level of geological risk, along with all other major project risks, was accounted for at Feasibility Study stage by determining an appropriate level of Optimism Bias (OB) for each option. The level of OB applied for the Marsh Gibbon and Chinnor Reservoir sites was nearly the same (within 1%) of that for Abingdon, reflecting the large geological risk associated with all reservoir options simply due to the scale of the earthworks involved, and given that many other major project risks are consistent across reservoir locations. Therefore the enhanced geological risk associated with the lack of geotechnical investigations (GI) at the other reservoir sites has not had a significant impact on the cost estimates produced. GI at these other sites would inform a more optimal embankment profile for the Chinnor and Marsh Gibbon sites, but as the clay at those sites is similar to that found at the Abingdon site, the use of the same embankment section at all of these sites is justifiable at a feasibility study level.
92	GARD	31/10/2016	Fine Screening Report	Phased Abingdon reservoir development	Options for phased development should be dropped as they do not make full use of the site potential and would cause excessive disruption and property blight. (GARD response pp2 and pp24)	The impacts of the phased options will be taken into account in the Strategic Environmental Assessment and Environmental Metric that form part of programme appraisal. Given that there is a reduced deployable output and increased cost associated with the phased options they would only be selected if the deficit profile and optimal programme enabled the second phase to be substantially deferred beyond construction of the first phase.

Log of individual stakeholder comments

Comment Ref	Stakeholder	Date	Report	Topic	Consultee representation	Thames Water Response
93	GARD	31/10/2016	Fine Screening Report	Resilience to drought & climate change	The Deployable Output is based upon historical droughts that do not include a three-season drought, under which scenario the Upper Thames Reservoir would not be resilient.	Please refer to report on the resilience of the Upper Thames Reservoir
94	GARD	31/10/2016	Fine Screening Report	Unsupported STT	Feasibility report provides no evidence to support screening out of unsupported transfer. GARD view is that it could provide a valuable first stage of a development. GARD analysis presented (pp 9-12) includes information on the speed of recovery from drought in the Severn catchment due to differences in catchment geology.	Analysis of the resilience of an unsupported transfer to future droughts has been conducted. This has concluded that the yield of an unsupported 300Ml/d transfer is approximately half the Deployable Output derived using WARMS and historical droughts. Response provided in Raw Water Transfer Feasibility - Update (January 2017)
95	GARD	31/10/2016	Fine Screening Report	Supported STT	GARD view is that the potential DO for the supported transfer may not include the potential for an unsupported element and as such the potential transfer volume is under-sized and potentially up to 500Ml/d could be possible.	The feasibility report will be updated to reflect the further work done looking at different combinations of transfer capacity and support. Where there is a proportion of the transfer that is unsupported then this will be taken into account.
96	GARD	31/10/2016	Fine Screening Report	STT water quality & ecology	Concern about lack of detail on required mitigation to water quality and ecology impacts in the water quality and ecology study.	Further updates provided in Raw Water Transfer Feasibility - Update (January 2017)
97	GARD	31/10/2016	Fine Screening Report	STT water quality & ecology	Concern that no attempt appears to have been made to learn from inter-regional transfers, particularly the Ely-Ouse to Essex transfer.	This has been discussed at stakeholder meetings as part of the Phase 2 water quality and ecology study and arrangements are being made to speak to the Environment Agency and relevant water companies involved in the Ely-Ouse Essex Transfer scheme. Feedback from these discussions will be shared with all stakeholders.
98	GARD	31/10/2016	Fine Screening Report	Resilience to drought & climate change	GARD presents analysis of DO under climate change and extended drought for existing London supplies, STT and Abingdon reservoir. The analysis concludes that: reservoir options are less resilient to extended drought than STT options. (GARD response pp30 - 36)	Thames Water has commissioned Atkins to undertake a stochastic assessment of the yield for the unsupported Severn Thames Transfer (STT) and for the Upper Thames Reservoir (UTR). This work has concluded that the yield of an unsupported STT is substantially reduced, whereas there is only a small reduction in the yield of the UTR. The Fine Screening Report has been updated to take account of the findings from the Atkins work.
99	GARD	31/10/2016	Fine Screening Report	Resilience to drought & climate change	GARD presents analysis of DO under climate change and extended drought for existing London supplies, STT and Abingdon reservoir. The analysis concludes that: unsupported transfers are less resilient to climate change than in the longer term. (GARD response pp30 - 36)	Thames Water has commissioned Atkins to undertake a stochastic assessment of the yield for the unsupported Severn Thames Transfer (STT). This work has concluded that the yield of an unsupported STT is substantially reduced under potential future drought scenarios. The Fine Screening Report has been updated to take account of the findings from the Atkins work.
100	GARD	31/10/2016	Fine Screening Report	Supported STT	GARD challenge the location and volume of discharge for the Severn-Thames Transfer. Why not a larger volume further downstream than Radcot? Why not a restricted discharge at times of low flow at Radcot?	Further work has been carried out on the Severn Thames Transfer discharge locations and volumes. Response provided in Raw Water Transfer Feasibility - Update (January 2017)
101	GARD	31/10/2016	Fine Screening Report	Resilience to drought & climate change	There is an urgent need for assessment of the resilience of all options to climate change and severe drought using the "stochastic drought library" produced through the recent Water UK work.	Options that will be affected are flow dependent options such as Severn Thames Transfer and Upper Thames Reservoir. Modelling using stochastically generated droughts has been conducted for these two options and will be used to update the resilience assessment in the Fine Screening Report. Stochastic modelling for other options is not currently proposed.
102	Chris Binnie	18/10/2016	Fine Screening Report	Unsupported STT	this is rejected as "*hands off flow prevents abstraction at times when water is needed by Thames Water*." My understanding is that a critical drought period for TW LWRZ lasts about 18 months from spring one year to autumn the next. I find it surprising if there was no flow at all in the Severn above the hands off flow during this whole critical period. From memory a transfer of about 300 Ml/d gave a deployable output of well over 100 Ml/d. The HoF has changed since then but I believe not by enough to substantially change the numbers. This would be sufficient to be the first stage of a multi stage transfer scheme. As the USTT would not have to pay UU or STW any charges for augmentation schemes, this would be a cheaper first stage. Please would Thames Water revisit this option and let me know how much water would have been available for transfer during the critical droughts.	Further work on the resilience of unsupported transfers is reported in the update note on the Raw Water Transfers Feasibility Report.
103	Chris Binnie	18/10/2016	Fine Screening Report	Supported STT	The middle Severn includes Minworth effluent, Draycote expansion, and Mythe excess. This has been rejected at stage 3 but the individual elements have been passed at stage 3. The Middle Severn has the benefit of being able to be phased as required. Thus it is not clear as to why the Middle Severn scheme in total has been rejected.	The Middle Severn option proposed by Severn Trent Water was rejected in favour of the Lower Severn option. The two options are mutually exclusive. The Middle Severn option includes a pipeline from Eathorpe to Farmoor and overall requires a significantly greater length of pipeline than the Lower Severn option that would use the Deerhurst Pipeline. Also, by abstracting lower in the catchment the Lower Severn option provides greater adaptability in that it can it offers more potential future options for means of support. So as to allow phased implementation of the means of support Severn Trent Water was requested to unbundle the support options which resulted in the Mythe, Minworth and Draycote support options being considered as separate elements. These support elements can then be implemented in a phased manner as part of programme appraisal.

Log of individual stakeholder comments

Comment Ref	Stakeholder	Date	Report	Topic	Consultee representation	Thames Water Response
104	Chris Binnie	18/10/2016	Fine Screening Report	Supported STT	My memory is that there is a quote somewhere that the Severn Thames transfer needs storage. But the elements of the Severn transfer include Minworth effluent which is continuous so does not need storage unless a high threshold is exceeded, Vyrnwy which is storage, Mythe which has a deployable output, and an augmented Draycote reservoir which is storage. Thus it is not clear why any further storage in the Thames catchment is required.	Storage in the Thames catchment has not been included for the Severn-Thames Transfer (STT), although a small lagoon has been included to receive water arising from flushing of the pipeline during commissioning/ramp-up. A separate option has been considered looking at the combined benefit of the STT and a new reservoir in the Thames catchment but this has found that there is no significant additional benefit associated with the combined option as under historical droughts there would be sufficient water in the Thames catchment to fill the reservoir.
105	Chris Binnie	18/10/2016	Fine Screening Report	Farmoor operation	Farmoor stage 1 was designed for the Oxford City Corporation to supply water to Oxford. Were storage to be required to even out water quality variation then there are many water filled gravel pits. Alternatively, Farmoor stage 2 was designed for the TWA to be able to release water into the river to provide a supply to London. I don't know if that has been used but the facility was built. Thus, if needed, Farmoor stage 2 should suffice to minimise water quality variations.	This comment is addressed in the Raw Water Transfer Feasibility update
106	Chris Binnie	18/10/2016	Fine Screening Report	Resilience to drought & climate change	The Vyrnwy reservoir has been classified as a 180Ml/d scheme. Is this what Vyrnwy can provide as a deployable output to UU. However, in reality it is a volume of water during a drought period, and drought periods in the Thames catchment and the Vyrnwy catchment vary in timing, vi a future drought could be bad in the Thames catchment but not so strong in mid Wales. Thus the volume of Vyrnwy releases could (subject to regulation losses being minimised) presumably be adjusted to provide at least as much increased DO to Thames Water. is this flexibility being considered?	United Utilities and Natural Resources Wales have stated that the the maximum reliable yield of Vyrnwy available to Thames Water is 180 Ml/d
107	Chris Binnie	18/10/2016	Fine Screening Report	Phased Abingdon reservoir development	Fine screening report page 44 talks of a phased Abingdon being 75 Mm3 + 75 Mm3. This is also referred to in the Reservoir feasibility report. .... I understand that it would be needed to keep the first phase 75 Mm3 operational whilst one was constructing the second phase. In which case the second phase could not be another 75 Mm3 as there would be the separation embankment and the sterilised fill underneath it. Thus somewhere your documents talk about 70Mm3 + 50Mm3. This is much more realistic for a phased two part Abingdon reservoir. This is quoted as having a DO of 238 Ml/d. Again much more realistic.	The feasibility report considered a 75+75Mm3 option but this was subsequently reviewed and has been replaced with the 30+90 and 70+50 options for conceptual design to be carried forward to programme appraisal together with the single phase options.
108	Chris Binnie	18/10/2016	Fine Screening Report	Resilience to drought & climate change	the deployable output of the Abingdon reservoir is based on the historic flow sequence. My understanding is that the WRMP guidelines encourages water companies under resilience to take a longer term look at drought considerations. Several water companies now use stochastic assessment. This allows one to assess the resilience against two dry winters. The Atkins work for Water UK used stochastic analysis. How does stochastic assessment affect the DO of the reservoirs and also the interbasin transfers? Should not TW base its WRMP on stochastic DO rather than historic DO?	A stochastic assessment of the Upper Thames Reservoir yield has been conducted and the report will be used to inform the resilience assessment in the fine screening report.
109	Chris Binnie	18/10/2016	Fine Screening Report		previous TW WRMPs took a 2% regulation loss from Abingdon reservoir to London. Elsewhere I have seen regulation losses of 5% used. It was said by Dave Cook, the water resources manager of the TWA at the time, that during the later stages of the 1976 drought, in the Goring Gap there was a great flow out of the river into the adjacent groundwater. What is the current assumed regulation loss for the reservoirs and the transfers and what evidence is there to support the number assumed ?	2% is a working assumption for the River Thames that has been agreed with the EA, this figure will reviewed as appropriate. A figure of 10% for losses has been agreed with the EA for the River Severn.

Log of individual stakeholder comments

Comment Ref	Stakeholder	Date	Report	Topic	Consultee representation	Thames Water Response
110	Chris Binnie	18/10/2016	Fine Screening Report	Desalination	DESALINATION Fine screening report page 55 states "There is a potential limiting factor on desalination capacities due to possible increased salinity levels in a given reach of the Tideway. A precautionary approach to the environmental assessment has been adopted that has resulted in a limit of 300 Ml/d of additional desalination capacity in any single reach of the River Thames, but subject to further analysis(i.e. estuarine modelling) it is expected that higher levels may be acceptable. " The HPA report "The Thames recreational users study 2007" table 5 shows the mean salinity at Beckton of 1.56 ppt. This compares with sea water of about 32 ppt. Thus there is a limited sea water effect at any of the sites in the between the barrier and Erith. TW will have much more data from its existing desalination plant at Beckton. The tidal flow downstream of the barrier is large and the salinity variation due to higher abstraction, say an extra 300 Ml/d, is likely to be small. In any case desal plants can operate at a range of different salinities up to full sea water of 30ppt. Thus the Beckton 300 Ml/d or 500 Ml/d extra, should not be screened out on source grounds although Beckton 300 Ml/d might be screened out because there is only space at Beckton STW for an extra 150 Ml/d.	Further work is being undertaken to consider the cumulative effects of reuse and desalination on the Thames Tideway.
111	Chris Binnie	18/10/2016	Fine Screening Report	Reuse	Battersea reuse/desal The Thames Water Ring Main crosses the Tideway at Battersea with a shaft on the south side of the river. Near the ring main shaft is the Thames Water Heathwall CSO site of the Southern Low level Interceptor. Thus were it possible to find enough land in this vicinity it should be possible to have either a desalination or effluent reuse plant discharging into the ring main. This would be a good strategic location as it could serve as an extra input point to the ring main near its centre.	The Heathwall CSO site is small and restricted with no sufficient land available for desalination treatment and raw water storage or reuse treatment and land required for blending. Consideration is being given to determine whether other brownfield land is potentially available within the vicinity of the Heathwall CSO / Battersea TWRM shaft. Brownfield sites near to the CSO and TWRM shaft are consented for development with several under construction or constructed.
112	Chris Binnie	18/10/2016	Fine Screening Report	Direct River: Mogden Effluent	Mogden STW reuse ....Question as to why the augmented transfer could not be 500 Ml/d..... capacity available from Mogden is 503 Ml/d. Diversion of the effluent from Mogden would mean a reduction in discharge to the Tideway at Isleworth Ait, in turn leading to lower water levels at low tide for a distance downstream. This could, at times, impact the ability of certain boats to navigate that stretch of river at low tide. One argument could be that the diversion would merely return the river levels to what they were before the Mogden STW was built in the 1930s. True. There is no knowledge of any commitment given by Thames Water to always discharge large amounts of treated effluent from the Mogden STW.A mitigation measure would be to dredge a channel in the centre of the river to maintain navigation. A second mitigation measure would be to reduce the transfer rate at critical times. ..... It is possible that the result would be a combination of a small amount of dredging at critical locations and a transfer reduction at critical times. The extent of the transfer reduction would have to be established by modelling. It would of course require discussion with the PLA. Whatever, it would appear that this option could add about 200 Ml/d to this cheap option and that it does require consideration.	The capacity of the Teddington Direct River Abstraction option is discussed in Section 5.1.3 of the Direct River Abstraction Feasibility Report. While the Dry Weather Flow for Mogden is in the region of 500Ml/d a substantial proportion of this relates to infiltration and trade flows. When infiltration and trade flows are excluded Thames Water's forecast of the minimum projected discharge reduces to 305Ml/d. Infiltration flows have been excluded as no information has been available on the how sewer infiltration in the Mogden catchment has been affected under historical drought conditions (e.g. 1975/76) and it is not practicable to model the impacts of severe drought on infiltration in the catchment with any certainty. Trade flows have been excluded as under severe drought conditions they would be expected to be affected by the impact of non-essential use bans, and whilst there would still be some trade flows, we have not taken account of the fact that demand restrictions would also be expected to reduce domestic flows. Furthermore, the Environment Agency have requested that Thames Water ensure that some flow from the existing Mogden outfall is retained so that it will not go from "off" to "on" suddenly, which could result in a first flush of pollutants to the river.
123	Chris Binnie	05/11/2016	Fine Screening Report		**Deployable output during a drought period.** The documents seem to assess deployable output as the lowest supply that can be provided during the critical drought. That would be true for a water supply zone with a single source. In this case the London WRZ is an integrated water supply zone ....Thus, in general terms, the deployable output in the London WRZ is not the lowest supply available (be it during an hour or a day) during the critical reservoir draw down period, but the total volume available during the critical drought reservoir drawdown period.	Thames Water evaluates resources using WARMS2 and examines the availability of any source across a range of conditions over the period of record available, in many cases going back to 1920

Log of individual stakeholder comments

Comment Ref	Stakeholder	Date	Report	Topic	Consultee representation	Thames Water Response
124	Chris Binnie	05/11/2016	DRA	Lower Lee DRA screening decision	Lower Lee Three Mills Lock.150 Ml/d. Hydrology: "There is also significant uncertainty around the Deployable Output ...due to limited information on the hydrology." page 60.As I understand it the Deephams STW discharge has a dry weather flow of 177 Ml/d, reuse page 26 so why is there concern over the available flow? I understand there is also another major STW in the catchment just north of KGV reservoir which would add to the flow, as well as the natural flow of the River Lee.	Thames Water are undertaking work with consultants and independent experts to determine the deployable output achievable.
125	Chris Binnie	05/11/2016	Fine Screening Report	Lower Lee DRA screening decision	Water quality: "Potential significant water quality issues –pending data." The text refers to the potential for arsenic contamination. It is possible to treat for arsenic. Any such water can be treated, even 100% sewage effluent as in Windhoek. It seems illogical to reject this option because, at times, it has a high sewage effluent content. There are two options for this scheme, 1a transfer to KGV and treat at Coppermills 1b to treat locally and put into supply. At stage 3 1a was screened out as it was more expensive than 1b. Subsequently 1b was rejected in the fine screening report for water quality reasons because it was being put directly into supply. That would not apply to 1a. However 1a was not readmitted. This seems barmy. 1a ought to be brought back in. it might subsequently fail on cost grounds but at least it would be rejected on its own merits. Thus, the reasons for screening out option 1 need reconsidering properly.	Option 1.b is being carried forward to fine screening and Option 1.a will be rejected at the feasibility stage due to water quality risk. It is considered that given the difficulty in reliably predicting potential contamination events (e.g. due to Arsenic contamination) then Option 1.a (for abstraction and treatment for direct supply) presents an unacceptable degree of water quality risk, unless significant bankside storage is provided.
126	Chris Binnie	05/11/2016	Fine Screening Report	Lower Lee DRA screening decision	Further, fine screening report page 55 states that "The Deephams reuse scheme is mutually exclusive with the Lower Lee direct river abstraction." The Deephams reuse scheme has a DO of 60 Ml/d whilst, unsurprisingly the Lower Lee DRA has a original DO of 150 Ml/d. If Deephams 60Ml/d goes ahead there is then 150Ml/d less the 60Ml/d = 90 Ml/d available from the lower Lee. Thus the Lower Lee transfer to KGV 1a should be considered at 90 Ml/d.	There remains significant uncertainty around the potential Deployable Output of the Lower Lee option with a range of 49 to 138Ml/d currently under consideration. Work is being carried out to review the potential Deployable Output of both the Lower Lee and Deephams options, recognising that there is a degree of mutual exclusivity between the two options.
127	Chris Binnie	05/11/2016	Fine Screening Report	Direct River: Mogden Effluent	Option 3, 3a Mogden to Teddington to Thames/lee tunnel. Available water 4.2.3 refers to this as being up to 500 Ml/d whereas the table shows this as 300 Ml/d. This is discussed on page 42 " Average dry weather flows for discharge are typically 500 Ml/d. The minimum projected domestic flow received by Mogden is 305 Ml/d. This value does not include infiltration or trade flows. On the basis that infiltration and trade flows would continue at near to their normal rate during the early stages of the drought drawdown, 500 Ml/d, then a reasonable assumption for the average available water during the drought period would appear to be at least 400 Ml/d, and maybe closer to the normal flow of 500 Ml/d.	See response to Comment 112.
128	Chris Binnie	05/11/2016	Fine Screening Report		Capacity of the Thames Lee tunnel "Currently the Thames Lee tunnel is understood to have a capacity of 410 Ml/d ." This compares not very favourably with the design capacity of 120 Million gallons a day, about 500 Ml/d, see ICE paper 6578 by Cuthbert and Wood para 10. The reasons for the shortfall should be investigated and, if appropriate, the capacity uprated. It is suggested that increasing the abstraction rate at the end of the Thames/lee tunnel could increase its capacity, maybe to close to the 500 Ml/d design capacity. The capacity of the Thames/Lee tunnel of between 410 Ml/d to 500Ml/d and the availability of greater amounts of treated effluent at Mogden during early parts of the drought period, adds reason to uprate the Mogden/ Teddington scheme to over 400 Ml/d, rather than the 300 Ml/d currently shown.	The Thames Lee tunnel capacity is constrained by the pump out capacity at Lockwood (440Ml/d) and by concerns over air entrainment and negative pressures at flows above 350Ml/d. In order to understand the feasibility of restoring the tunnel to its original design capacity further work would be needed including assessment of the allowable minimum and maximum surge pressures in the tunnel. This will be considered as part of the raw water system cross-option study and in updating the direct river abstraction feasibility report

Log of individual stakeholder comments

Comment Ref	Stakeholder	Date	Report	Topic	Consultee representation	Thames Water Response
129	Chris Binnie	05/11/2016	Fine Screening Report		Maximising the system "For the option to have a deployable output benefit, it must be possible for the water that is currently in the tunnel to be abstracted further upstream into the existing west London raw water reservoirs, so as to allow the Thames lee tunnel to be dedicated to the proposed new Teddington intake at times of operation." Page 43/4. This is only true to achieve the full extra DO benefit. Should it not be possible to increase abstraction upstream so the Thames lee tunnel is not available in full, then the scheme would still increase the use of the Lee tunnel when sufficient water was not available in a drought to use its full capacity. Thus, providing extra water from Mogden under such occasions, would still increase the deployable output of the London WRZ, albeit not by as much.	A cross-option study is being conducted that will identify changes that may be needed to the raw water system (abstracting from the River Thames into the west London raw water reservoirs) so as to ensure that the benefit can be fully realised from the Teddington DRA option and other options that augment flows in the River Thames.
130	Chris Binnie	05/11/2016	Fine Screening Report	Direct River Abstraction	3b similar but to west London reservoirs. " Includes a new intake immediately upstream of Teddington weir and a new transfer to the existing west London raw water storage reservoirs." Page 21. At stage 2 this option has been modified to reach Queen Mother reservoir. But this is the Thames valley reservoir furthest from Teddington. For instance the Queen Elizabeth reservoir is about one third the distance, and the Queen Mary reservoir is not much more than half the distance and is larger than Queen Mother in plan area. Unsurprisingly this option is rejected "cost comparison higher when compared with 3a" I can find no reason for the selection of Queen Mother reservoir.	The option was developed to maximise the number of reservoirs that could benefit from the transferred flows. The option is however very costly compared to discharge into the Thames-Lee raw water tunnel and so is rejected. Were the option for discharge into the Thames-Lee Tunnel to fail to proceed then further consideration will be given to alternative discharge locations.
131	Chris Binnie	05/11/2016	Fine Screening Report	Direct River Abstraction	Option 4 A variant on option 3. "up to 500 Ml/d of effluent could be transferred from Mogden STW to Teddington weir. However, for option 4, instead of a new abstraction point at Teddington weir, the existing abstractions upstream of Teddington would be increased. There are six Thames Water abstraction points upstream of Teddington." Page 22. A new Surbiton intake, at up to 500 Ml/d, was screened out for lack of land space at the Surbiton works. It is not clear if a smaller scheme would be viable. However there is no mention of the potential to discharge into those sections of the river from which the other intakes abstract. There should be space at some of these locations thus such schemes need to be included in the stage 2 reassessment.	Transfer upstream of Teddington would require significant additional conveyance when compared with the option for discharging into the Thames-Lee Tunnel. If the discharge point were substantially downstream of the abstraction point then this could lead to a reduction in river flows in the intervening river reach which is unlikely to be acceptable from an environmental perspective. The option for discharging into the Thames-Lee Tunnel is considered the best value Teddington DRA option variant.
132	Chris Binnie	05/11/2016	Fine Screening Report	Direct River Abstraction	Option 5 Beckton effluent transfer up the Tideway tunnel here is no technical reason why the Thames Tunnel needs to have the storage capacity it has, thus it could have a water pipe installed in it. Thus this option should not have been screened out when it was and should be reconsidered.	Tunnelling contracts have been awarded on for the Thames Tideway Tunnel project and Tunnel Boring Machines are under construction. It is therefore no longer practicable to change the size of the tunnel, including a pipe within the tunnel without increasing its size would reduce storage capacity and have an impact on the project's effectiveness. Given these issues and the presence of an alternative option based upon transfer of Mogden effluent the option for transfer of Beckton effluent has been rejected.
133	Chris Binnie	05/11/2016	Fine Screening Report	Direct River Abstraction	Option 6 Lower Roding direct to supply. The option is rejected as *"Following an analysis of the river flows, resilience and availability of flows were found to be a major constraint for this option (see Appendix B)"page 27.* *This appears to be based on Appendix B page 75 "Abstraction over the May to September 1976 period would have yielded only a total of about 484 Ml across the full period."* *But the 1976 single season drought, whilst unusual, is not the critical drought period for the London WRZ. The critical drought period for the heavily reservoired London WRZ is a two summer season period. Thus the 1970s drought for London WRZ should be analysed over the period 1975/6. More importantly still, the two summer season droughts, 1921/2 and 1933/4, are more critical than the 1975/6 drought for the London WRZ. Thus the analysis in Appendix B is not robust.* *Secondly the fact that the source does not provide a DO of 17 Ml/d is not a reason for discarding it. Its deployable output should be calculated properly, probably approaching 10 Ml/d over the critical two summer season drought period, and then its cost benefit assessed.* *There are two configurations for this source, pumping 11km to the Lee valley reservoirs or treat locally and put into supply, page 27."Treatment on the site and direct supply may require network reinforcement however the conveyance would be minimal and the complexity of construction reduced."* *Thus this option, whilst only likely to have a DO of about 10Ml/d, should not have been screened out at stage 1 and should be reinstated.*	The Lower River Roding DRA option could have some limited potential to slow drawdown of London storage during periods when the London storage is not full and there is water available in the River Roding above the hands-off flow. However, unlike other options (e.g. supported transfers, reservoirs, storage, reuse) the option would not provide any significant resource during the critical summer drought period when the reservoirs are being drawn down (an average of 3Ml/d during May-September 1976). In addition the poor quality of the flow record available for the lower Roding (flow records only go back to 1950 at the downstream gauging station at Redbridge) means that there would be significant uncertainty associated with the yield arising from conjunctive use of the Roding. Finally were the option carried forward, an assessment of resilience to future droughts would be needed, which would be likely to further reduce the already limited potential benefit of the option.

Log of individual stakeholder comments

Comment Ref	Stakeholder	Date	Report	Topic	Consultee representation	Thames Water Response
134	Chris Binnie	05/11/2016	Fine Screening Report	Crossness reuse screening decision	Reuse Beckton reuse, up to 300Ml/d transferred to upstream KGV, is retained at stage 3 and at fine screening. However Crossness reuse 190 Ml/d is screened out in the screening report because " A scenario is not currently envisaged in the what if analysis above over the 80 year planning period where both Crossness and Beckton reuse are both required." Page 59. The two sources together total 490 Ml/d, substantially less than the 800 Ml/d stated as the shortfall. Further the extra tunnelling required to connect Beckton to Crossness is limited, maybe 2km. Thus Crossness reuse would provide an economical second stage. This aspect should be reconsidered in the fine screening report.	Rejection reasoning updated to include the Thames Water position that if both the desalination and reuse options at both Beckton and Crossness were developed then this would lead to it having an excessive proportion of its Deployable Output being based upon membrane treatment processes. In its experience at Gateway Desalination plant, such processes can be unreliable and be subject to ramp-up delays, which would impact on the effectiveness of the options if they occurred during a drought. The Crossness reuse option has not therefore been carried forward to the constrained list.
135	Chris Binnie	05/11/2016	Fine Screening Report	General	Scenario analysis Figure 5.2 of the Screening report selects a number of options to meet certain criteria. The previous page says this was done broadly on least cost. However no cost data or analysis of any kind has been provided. This is a serious weakness and renders it not possible to comment on the options in the table.	The cost charts included in Section 3 of the report have been used to inform the "what-if" analysis. It is important to recognise that this analysis is not intended to prejudge the programme appraisal work which will be seeking to identify the best value programme. The "what-if" analysis
136	Chris Binnie	05/11/2016	Fine Screening Report	General	There do appear to be inconsistencies in that Deephams reuse is after the small Abingdon in scenario 1 but before in scenario 2 and similar for desal Beckton in scenarios 3 and 4. These seem inconsistent and should be explained.	Due to the lead time associated with building a reservoir it is expected that a large option may be required before a reservoir. This explains the change in order between scenarios. Note the scenarios and analysis have been updated taking account of other comments received.
137	Chris Binnie	05/11/2016	Fine Screening Report	Reservoir	Further, on a crude estimate of timing it may well not be possible to construct Abingdon reservoir under scenarios 2 and 3 in time to meet the supply/demand balance requirements.	The what-if analysis has been updated such that a new reservoir is not included in the first 200Ml/d of options. It is important to recognise however that the what-if analysis is not intended to prejudge the programme appraisal work which will be seeking to identify the best value programme and will take account of (amongst other things) deficit profiles and lead times specifically.
138	EA	16/09/2016	Direct River Abstraction Feasibility Report	Executive Summary	Is there any reason for which criteria is assessed at each stage?	The Thames Lee tunnel capacity is constrained by the pump out capacity at Lockwood (440Ml/d) and by concerns over air entrainment and negative pressures at flows above 350Ml/d particularly in the narrower "experimental length". In order to understand the feasibility of restoring the tunnel to its original design capacity further work would be needed including assessment of the allowable minimum and maximum surge pressures in the tunnel.
139	EA	16/09/2016	Direct River Abstraction Feasibility Report	Executive Summary	A list of "main risk areas" has been included for the feasible options list. What are the plans to address these risks and at what stage of the options appraisal process? How will uncertainty around these elements be carried forward in the appraisal of the options?	Report text not updated. Most of these risks are investigated further either in the fine screening report or concept design. An element of risk is carried into the WLMT process through target head room. · Deployable output – Additional modelling required to confirm, this is on-going · Land purchase and planning – further investigation at concept design · Water quality and treatment requirements – confirmation of process at concept design · Conveyance construction methods assumed – further investigation at concept design. · Impacts on navigation in the Tideway – Modelling to be undertaken by HR Wallingford in the next quarter. PLA have been involved in scoping to ensure that their comments are addressed. · Abstraction upstream of Teddington Weir – further investigated at concept design and in HR Wallingford modelling. · Impact of reduction of effluent volume into the River Thames at Isleworth Ait – Included in HR Wallingford modelling.
140	EA	16/09/2016	Direct River Abstraction Feasibility Report	Executive Summary	How has the interaction with other options that may influence conditions in the River Thames been considered, for example, Severn-Thames Transfer? Is this a "risk area"?	Report text not updated. The interaction amongst different options is addressed in the Lower Thames control diagram. This is also covered in the fine screening report, and mutual exclusivities have been excluded. Water coming in from the Severn-Trent transfer will not cause a material deterioration to the Thames as this would not be permitted.
141	EA	16/09/2016	Direct River Abstraction Feasibility Report	General	Formatting issue – extra bullet point required for Culham option.	Noted – report updated.
142	EA	16/09/2016	Direct River Abstraction Feasibility Report	Direct River: Identification of Option Variants	You have noted that Stage 1 assessment has only been completed on the option level and not sub-options. How have you ensured that this assessment is representative of the sub-options? Is there a risk that there could be significant differences between the sub-options against the Stage 1 assessment criteria?	Report text not updated. No, there is no risk of this. The same criteria (but with increasing levels of detail) were applied at each stage. At each stage, if a new sub-option arose, it was first assessed against the Stage 1 criteria, and if appropriate, moved into Stage 1 of the report and screened out at the stage. (e.g. option 4 – Surbiton and option 6 – CAMS options.)
143	EA	16/09/2016	Direct River Abstraction Feasibility Report	Direct River: New intake at Culham	Licence 28/39/15/0006 is still in force. This paragraph suggests it has expired or been revoked. However we do have queries with the quantities quoted. The base licence (and average) is for 4.54Ml/d, however, we believe the variation in 1988 increases this to 9.09Ml/d peak. There is a HOF linked to the additional flow, linked to Days weir.	The EA's abstraction licence register (licence no 28/39/15/0006) says the peak limit in the licence is 9.091Ml/d and 1663.871Ml/a, but this was under a variation that expired in 1992. We have subsequently confirmed with Tom Entwhistle of the EA that the current licence is 4546m3/day, peak and average. No amendment to report required.
144	EA	16/09/2016	Direct River Abstraction Feasibility Report	Direct River: Mogden Effluent	We'd appreciate further detail on your assumptions with how these options will impact the operation of the LTOA. What assumptions are made about contributions to the Teddington Target Flow if the discharge is upstream of Teddington Weir?	No update to report. The option should have minimal impact. The point of the scheme is to replace current fresh water being discharged over the weir is being replaced by treated effluent to allow the fresh water to be abstracted and put into supply. Hydraulic modelling will be undertaken to confirm impacts.

Log of individual stakeholder comments

Comment Ref	Stakeholder	Date	Report	Topic	Consultee representation	Thames Water Response
145	EA	16/09/2016	Direct River Abstraction Feasibility Report	Direct River: Mogden Effluent	Please can you advise how the current Mogden flow has been considered (if at all) as part of the existing Tideway flow under the TTF and LTOA? Does this option change any assumptions on what the TTF are based on?	The AMP5 NEP investigation of the environmental effects of LTOA fully included the combined effects of Mogden STW discharges and LTOA/LTCD TTFs. One of the main effects identified in that investigation was the risk of oxygen problems in the upper Tideway at times of low TTFs, and the mitigation strategy advocated then led to the AMP6 NEP trials and implementation of a solution, targeted at Mogden STW. The recent revision of the LTCD agreed between the EA and Thames Water – which updated the TTF values, their seasons and associated levels of service - also adopted the environmental learning from the AMP5 NEP investigation. As part of the WRMP Thames Water has commissioned further estuarine modelling work of the upper Tideway under the range of TTFs (including those in Thames Water's Drought Plan) to evidence tidal level, salinity, sediment deposition rates, oxygen concentration impacts and any associated ecological and navigational effects, in a collaborative scope of works with EA and Port of London Authority. This will ensure that any such effects of the Mogden/ Teddington DRA option are fully understood as part of scheme appraisal in the WRMP. The EA has been consulted on our approach to the modelling and will be presented with the results when they are available.
146	EA	16/09/2016	Direct River Abstraction Feasibility Report	Direct River: Stage 1 Assessment	Please note, the assessment of a pass for water availability for Culham is correct, but only because the licence already exists. If it were a new option, it would be ruled out under the Abstraction Licensing Strategy.	Noted – the proposed scheme assumes that no more flow will be abstracted than the current licence allows. No report update required.
147	EA	16/09/2016	Direct River Abstraction Feasibility Report	Direct River: treated flows placed into supply	This option has been previously discussed but has always been constrained by WQ related issues. The majority of the flow in the Lower Lee is derived from the Deephams STW discharge. The upgrade of Deephams STW that is taking place this AMP will contribute towards improving the quality of the discharge from the STW. However, the historic legacy of contaminated land in and around the Lower Lee remains a concern. This will be much more problematic to resolve and could be a technical constraint on this proposal. It has good that this has been acknowledged in the report.	Thank you, noted. No action required.
148	EA	16/09/2016	Direct River Abstraction Feasibility Report	Direct River: treated flows placed into supply	CRT operate the Lee Navigation. Under s.66 of the WRA 1991 any proposal to abstract water from the Lee Navigation channel(s) is subject to the licence being held by CRT. You will need to understand the legal and financial implications of this requirement in your assessment of this option. There will be a requirement to safeguard the flow needed for the existing fish pass at Three Mills Lock and any required discharge of flow into the tidal Lee. Cascade Consulting has previously investigated and reported on the tidal River Lee. This data will need to be reviewed.	Thank you, noted. No report update required.
149	EA	16/09/2016	Direct River Abstraction Feasibility Report	Direct River: treated flows placed into supply	The Lower Lee (above Lee bridge Gauging Station) is being investigated due to potential impact from you abstraction to supply the Lower Lee Reservoirs. There is potentially the option, subject to the outcome of the investigation, that a new Lower Lee abstraction might form part of the solution should an impact be demonstrated. This investigation is to report by winter 2017. This on-going investigation should also be considered alongside this WR planning option.	Thank you, noted. No report update required.
150	EA	16/09/2016	Direct River Abstraction Feasibility Report	Direct River: treated flows placed into supply	We would be willing to consider further this option with you, however, at this time we have not undertaken to compare the proposed abstraction quantities with the available flows, and/or constraints that might operate. This would need to be considered further should you decide from an operational perspective that this proposal did warrant inclusion in your final selection of options.	Noted – A study have been commissioned to investigate the deployable output and likely operational regime for the River Lee option. This will inform the quantities that would be considered for abstraction.
151	EA	16/09/2016	Direct River Abstraction Feasibility Report	Direct River: treated flows placed into supply	It may also be useful to make reference to the interaction with the Deephams reuse option as well.	A study is being undertaken to investigate water availability in the River Lee for both of these options.
152	EA	16/09/2016	Direct River Abstraction Feasibility Report	Direct River: transfer to Farmoor Reservoir	As with comment EA6, please check peak and average licence quantities.	The EA's abstraction licence register (licence no 28/39/15/0006) says the peak limit in the licence is 9.091Ml/d and 1663.871Ml/a, but this was under a variation that expired in 1992. We have subsequently confirmed with Tom Entwhistle of the EA that the current licence is 4546m3/day, peak and average. No amendment to report required.
153	EA	16/09/2016	Direct River Abstraction Feasibility Report	Direct River: direct supply to SWOX	The commentary states that it is not known if Culham STW can process the additional flows. This constraint doesn't appear to be picked up for further work later on in the report. At what stage will this uncertainty be confirmed?	This will be considered further at concept design, if the option is taken through fine screening. No report update required.

Log of individual stakeholder comments

Comment Ref	Stakeholder	Date	Report	Topic	Consultee representation	Thames Water Response
154	EA	16/09/2016	Direct River Abstraction Feasibility Report	Direct River: Mogden Effluent	Reference should be made to the RSA investigation which took place in AMP5 on the Upper Tideway, which showed impacts on water quality. Any discharges or reductions in flows will have an impact here and need to be considered. This option is quite a concern for colleagues in Kent and South London team. We need to understand if this proposal will reduce freshwater flow in the tideway as it is critical to tideway water quality. Mogden contributes substantially to the dry weather flow, so we need to be sure this proposal does not reduce flows and impact on the resilience of the tideway, making it more sensitive to summer storm events, increasing the number water quality incidents in the upper tideway. We also need to ensure it does not transport water quality issues upriver to Teddington. Mogden's discharge permit and storm discharges are regulated by our KSL (South London) Land & Water team. If this option will ultimately result in a net reduction of 300Ml/d, there will be little or no base flow into the Thames. The option needs to be investigated fully to determine all the risks. The net removal of 300 ML/day of the Mogden effluent has potential for deterioration in water quality and hence biology in all affected reaches and this must be fully researched and justified in any preferred proposal. Note: there may also be interest from the PLA if there is any possible impact upon navigation i.e. changes to charted depths, low flows or increased dredging requirements. Doesn't sound like these would be an issue, but they need to screen them in or out as appropriate.	Noted – the report can be referenced, but this option has been included **as a result of** this investigation. Further modelling on water quality is to be undertaken by HR Wallingford. Modelling of the removal of the Mogden effluent from Isleworth Ait and transfer to Teddington Weir will be undertaken as part of this study to understand the likely effects on water quality, sediment transfer and depths in the river. These issues will be understood further once this modelling is complete. No update to report.
155	EA	16/09/2016	Direct River Abstraction Feasibility Report	Direct River: Mogden Effluent	As we have raised through email correspondence and at the meeting held on 01 November 2016, we have concerns about the environmental impact of this option. This proposal will reduce freshwater flow in the tideway which is critical to tideway water quality. Mogden contributes substantially to the dry weather flow, so you must ensure that this proposal does not reduce flows and impact on the resilience of the Tideway, making it more sensitive to summer storm events, and increasing the number of water quality incidents in the Upper Tideway. You must also ensure that this option does not transport water quality issues up-river to Teddington. The net removal of 300 ML/day of Mogden effluent has the potential for deterioration in water quality and hence biology in all affected reaches and this must be fully researched and justified in any preferred proposal.	Understood. See response to above. Modelling being undertaken to assess impacts
156	EA	16/09/2016	Direct River Abstraction Feasibility Report	Direct River: Mogden Effluent	The commentary mentions that consideration will need to be given to any impact of reducing the discharge at Isleworth Ait on the tidal Thames. The nature of these additional assessments will need to be specified.	Scope of modelling has been agreed with the EA. No report update required.
157	EA	16/09/2016	Direct River Abstraction Feasibility Report	Direct River: Stage 2 assessment	For all options, how have the impacts on the WFD hydrological regime (flow compliance) as a supporting element in WFD been assessed?	For each option going forward to concept design, hydraulic modelling and detailed hydrological assessment will be undertaken to confirm the potential effects on WFD flow compliance as part of the formal WFD assessment of options. The assessment in the feasibility report takes a strategic view as to whether there is a likely risk to deterioration between status class for any WFD element, with amber signifying a potential risk and red indicating a likely risk. The risk in relation to flow compliance has been based on the volume of abstraction and understanding of the flow regime of the downstream water bodies.
158	EA	16/09/2016	Direct River Abstraction Feasibility Report	Direct River: Stage 2 assessment	How does the reduction in flow relate to WFD compliance and the "Amber" rating? There is also no mention of Oxford Canal drought permit option here but is referenced in Option 2b?	Report commentary has been updated to make it clearer that the Amber rating relates to potential risk to water quality in Farmoor reservoir arising from the abstraction at Culham, which may possibly carry a risk of deterioration of water quality in the reservoir. There is no likely risk of deterioration to the WFD flow compliance given the small volume of abstraction relative to the flow in the Thames. The review of the Oxford Canal drought permit has now been completed and this shows there would be no impact on flows in the River Thames. Reference to the Oxford Canal drought permit has been removed from the commentary for Option 2b.
159	EA	16/09/2016	Direct River Abstraction Feasibility Report	Direct River: Stage 3 assessment	For all options, again there is no reference to WFD Hydrological regime compliance	Stage 3 assessment focuses on the mitigation measures that may be required to address potential risks that were identified at Stage 2. This is a strategic level assessment and identifies where environmental issues may arise and what mitigation may be required. WFD is considered in a strategic, indicative context at this stage rather than at the more detailed component level which will be carried out on those options taken forward. Stage 2 identifies possible risks to WFD compliance and Stage 3 possible mitigation measures, with the level of difficulty in implementing the mitigation reflected in the R/A/G assessment. No report updated required.
160	EA	16/09/2016	Direct River Abstraction Feasibility Report	Direct River: Stage 3 assessment	Option 3a - There is no reference made to the potential depleted reach in the Amber section. Also no WFD hydrological regime compliance assessment	This is alluded to in the Water Source Availability section but we will strengthen text to bring out the risks associated with the potential for flow depleted reach.
161	EA	16/09/2016	Direct River Abstraction Feasibility Report	Direct River: Stage 3 assessment	Option 3b - For option, again there is no reference to WFD Hydrological regime compliance	This is alluded to in the Water Source Availability section of Option 3a but we will strengthen text to bring out the risks associated with the potential for flow depleted reach.

Log of individual stakeholder comments

Comment Ref	Stakeholder	Date	Report	Topic	Consultee representation	Thames Water Response
162	EA	16/09/2016	Direct River Abstraction Feasibility Report	Direct River: Assessment Criteria	There hasn't been any consideration of the environmental impact of any of the proposed schemes beyond whether they are likely to directly impact on designated sites or species. We appreciate that this was not one of the criteria used for Stage 1, 2 or 3 assessments, but a high-level assessment would have been useful for stakeholders to better understand the likely impacts of the options and comment on them.	Noted. Environmental impact beyond the scheme sites will be investigated for options that pass fine screening in later design investigations.
163	EA	16/09/2016	Direct River Abstraction Feasibility Report	Direct River: Beckton Effluent transfer	The Beckton WWTW based solution (option 5) whilst not taken forward appears to have a lower deterioration risk as the discharge is made into a higher dilution, less sensitive part of the Thames estuary. Nevertheless deterioration risk should be assessed if this is explored further.	If this option is revisited, this will be considered.
164	EA	16/09/2016	Direct River Abstraction Feasibility Report	Direct River: Mogden Effluent	We have previously mentioned the need to consider impact of temperature of effluent compared to the water being discharged to. Please include further detail regarding the modelling that you will be carrying out to address this.	Modelling work has also been commissioned to help support the further environmental assessment of the option, including temperature effects.
165	EA	16/09/2016	Direct River Abstraction Feasibility Report	Direct River: Mogden Effluent	If this option goes ahead, there will need to be robust agreements with regards to incident management – i.e. actions you will take to help minimise impacts of incidents.	Noted
166	EA	16/09/2016	Direct River Abstraction Feasibility Report	Direct River: Mogden Effluent	We understand that the discharge location of the effluent is still to be decided. If the discharge location is upstream of Teddington weir, the report states that the Mogden transfer should not be the same value as the Teddington Target Flows (TTF) if it were to be located upstream of the weir and acknowledges there may be a need to review the conditions around the permitted volumes of abstraction. As mentioned before, you should undertake modelling to understand the impacts this option will have on the Upper Tideway. Once this is completed then further work will be needed to confirm if the LTOA / TTF and conditions of any new abstraction can be revised appropriately / effectively to minimise the impact on the tidal Thames. In low flows, if the Mogden outflows is used in some way to top up flows and achieve the existing TTF targets, it would certainly have an impact immediately downstream of the weir and possibly abstractors, regardless of it being tidal. It would be useful to confirm the volume of the new abstraction to understand the scale of the impact it could have beyond Teddington.	- Modelling will be undertaken. See replies to EA2, EA7, EA17 and EA20. These will be reviewed with the LTOA/TTF (Report text not updated. Most of these risks are investigated further either in the fine screening report or concept design. An element of risk is carried into the WLMT process through target head room. · Deployable output – Additional modelling required to confirm, this is on-going · Land purchase and planning – further investigation at concept design · Water quality and treatment requirements – confirmation of process at concept design · Conveyance construction methods assumed – further investigation at concept design. · Impacts on navigation in the Tideway – Modelling to be undertaken by HR Wallingford in the next quarter. PLA have been involved in scoping to ensure that their comments are addressed. · Abstraction upstream of Teddington Weir – further investigated at concept design and in HR Wallingford modelling. · Impact of reduction of effluent volume into the River Thames at Isleworth Ait – Included in HR Wallingford modelling.) '- The volume of abstraction is max 300Ml/d
167	EA	16/09/2016	Direct River Abstraction Feasibility Report	Direct River: Mogden Effluent	Please can you confirm the DWF associated with Mogden? SlimWims indicates 559Ml/d DWF but the report states 320Ml/d.	DWF average 500Ml/d, correct. However, DWF as low as 320Ml/d have been recorded.
168	EA	16/09/2016	Direct River Abstraction Feasibility Report	General	The Mogden effluent transfer and abstraction at Teddington, as well as the Lower Lee Surface abstraction at Three Mills lock have the potential to impact on estuarine sediment dynamics if they are taken forward as permanent (non-drought related) options. The Teddington / Mogden option could see muddy cohesive areas move landward within the main tidal estuary. The Bow Creek option could see muddy cohesive areas shift northwards within Bow Creek (there are unlikely to be impacts on the wider tidal Thames from this option). A geomorphological report looking at the impact of estuarine sediment dynamics is recommended in support of both options.	The Lower Lee surface abstraction option is not currently being taken past fine screening. Modelling to confirm sediment transfer is being undertaken for Mogden.
169	EA	16/09/2016	Direct River Abstraction Feasibility Report	Direct River: Mogden Effluent	The report states that the effects of reduced flows into the tideway would need to be mitigated against. Please provide further details about how low flows can be mitigated.	this will need to be confirmed by the results of the modelling.
170	EA	16/09/2016	Direct River Abstraction Feasibility Report	Direct River: Option Validation	The acceptability of these options very much depends on the details: the size and duration of any depleted reaches, the quality of any compensation flow etc. Any new abstraction will also need to comply with fisheries legislation regarding screening to prevent entrainment of eels and other fish species.	Noted. Concept design report for Mogden transfer includes screens which are eel compliant.

Log of individual stakeholder comments

Comment Ref	Stakeholder	Date	Report	Topic	Consultee representation	Thames Water Response
171		16/09/2016	Direct River Abstraction Feasibility Report	Direct River: Option Validation	We would like to work with you regarding the modelling of water quality with respect to WFD (EQS) chemicals. It is important to ensure that the levels of EQS chemicals are modelled so that we can assess WFD compliance with respect to chemical quality for priority and priority hazardous substances and other substances specifically set EQS's within WFD annexes. For example, dissolved oxygen must be modelled as it is a WFD physico-chemical parameter which should not deteriorate. To understand whether the EQS Maximum Allowable Concentration and Annual Average standards will be met you will need to model the concentrations of Priority and Hazardous substances and "other substances" specified in the directives (WFD and EQSD) under the predicted flow and effluent quality scenarios possible. We have some data on the existing background concentrations of these substances (collected for the last two RBMP classification cycle exercises).	The modelling that has been carried out considers the existing levels of EQS parameters in the river and the impact of the discharge on WFD compliance associated with the discharge.
172	EA	17/09/2016	Direct River Abstraction Feasibility Report	Direct River: Option Validation	With regards to the hydrodynamic modelling, please provide further information on reason for modelling to London Bridge.	The scope of the model is not limited to London Bridge. However, previous studies for the NEP AMP5 investigations of the Lower Thames Operating Agreement used London Bridge as a cut-off and there were no effects identified that far downstream. If effects are identified further downstream due to the Mogden DRA schemes (e.g. to hydrodynamics, water chemistry, water quality or ecology), these will be reported.
173	Sarah Wardell	17/10/2016	Direct River Abstraction Feasibility Report	Direct River: Mogden Effluent	Whilst the need for a higher level of Mogden effluent treatment is recognised, the scopes appear to focus on risks associated with lower flows and the impact on navigation. Besides navigation, there are risks from the scheme to flow / level, hydromorphology, water quality and ecology. This will impact both the fluvial reach to Teddington and the estuary, both upstream and downstream of the Mogden outfall location.	Modelling being undertaken to assess impacts
174	Sarah Wardell	17/10/2016	Direct River Abstraction Feasibility Report	Direct River: Mogden Effluent	You should provide an assessment of the changes on flow/level, hydromorphology, water quality and ecology as a result of your proposal and show there will be no deterioration and also achievement of relevant environmental standards are achieved. Due to the probable impacts of flow related effects, a simple assurance that no deterioration in water quality (achieved by enhanced effluent treatment) will occur is not sufficient	Modelling being undertaken to assess impacts
175	Sarah Wardell	17/10/2016	Direct River Abstraction Feasibility Report	Direct River: Mogden Effluent	An assessment against specific proposed and potential future operating modes of the scheme, including in drought (permit/order) and also storm (impact of storm discharges on estuary water quality) conditions, is necessary.	A modelling study is being undertaken into the impact on water quality (and sediment transfer) for the Teddington-Mogden option, including looking at the impacts of different abstraction volumes. The results of this modelling will be incorporated into the conceptual design report.
176	Sarah Wardell	17/10/2016	Direct River Abstraction Feasibility Report	Direct River: Mogden Effluent	The modelling scenarios included in the Hydrodynamic modelling scope clearly show the effluent will form part of the Teddington Target Flow. However, in the feasibility report it was still being deciding whether the effluent would be discharged up or downstream of Teddington weir. We need a clear assessment of the impacts in the Upper Tideway with the Mogden outfall diverted so it would be beneficial from a hydrology perspective for you to focus on flow impacts around the location of the current Mogden outfall, particularly at low flows and tides as that is where effects would be most visible. The location of the outfall relative to any new abstraction intake also needs to be clarified as soon as possible to understand the degree of 'blending' of the effluent that will take place and the quality of the water that will be passing over the weir at lower flows.	Modelling being undertaken to assess impacts
177	Sarah Wardell	17/10/2016	Direct River Abstraction Feasibility Report	Direct River: Mogden Effluent	The Thames Tideway is due to come online next AMP and therefore we are interested if and how this is being considered in conjunction with this proposal. We would also ask for you to consider the impacts of any sub-daily fluctuation in discharge of effluent at the new location.	Sub-daily effects are to be modelled and we will also examine if there are any cumulative effects associated with the Thames Tideway scheme, although this is not considered likely in relation to the Mogden DRA option.
178	Sarah Wardell	17/10/2016	Direct River Abstraction Feasibility Report	Direct River: Mogden Effluent	Mogden STW discharge is for tidal waters, if this is relocated to non-tidal Thames then would there be a change to the consent and water quality requirements? I.e. a higher standard?	Tertiary treatment has been assumed necessary as the discharge consent was assumed to be changed. The WQ assumed in the feasibility report is that of the Hogsmill STW discharge which is in the non-tidal reach and is the closest discharge to proposed location. This discharge consent is a higher standard to the existing Mogden STW discharge consent.
179	Sarah Wardell	17/10/2016	Direct River Abstraction Feasibility Report	Direct River: Mogden Effluent	Minimal (or no?) freshwater flow entering the tideway, which already receives very little of the natural freshwater flows. You will need to confirm whether this is WFD compliant or if it would represent deterioration.	Modelling being undertaken to assess impacts

Log of individual stakeholder comments

Comment Ref	Stakeholder	Date	Report	Topic	Consultee representation	Thames Water Response
180	Sarah Wardell	17/10/2016	Direct River Abstraction Feasibility Report	Direct River: Mogden Effluent	Combined with the above, then the elevated temperatures associated with treated effluent re-use being discharged into the semi-tidal Teddington to Richmond pound, may result in a thermal uplift of this section of river above the normal ambient river temperatures. This has the potential to favour some fish species (e.g.. Cyprinids), but may limit the area of available habitat to other more sensitive species (Salmonids and estuarine migrants). TWUL/HR Wallingford should look at this risk in more detail. There are EA data for temperature in the upper Tideway, and in order to ascertain the likely impact upon river ecology, they should model the extent of any thermal changes, especially in the half tidal reaches above Richmond. Would any upward temperature shift in these reaches favour the establishment, or spread of existing, invasive species e.g. Quagga mussel, Ponto-Caspian shrimps, Chinese mitten crabs etc.? This needs to be considered and would feed into your WFD assessment	Modelling being undertaken to assess impacts
181	Sarah Wardell	17/10/2016	Direct River Abstraction Feasibility Report	Direct River: Mogden Effluent	Ambient river temperatures are likely to be approaching the upper limit for some migratory fish species, such as smelt (*Osmerus eperlanus*). There is little metabolic headroom for this species to accommodate long term temperature changes, therefore whilst they don't extensively utilise the Richmond to Teddington area, they are present in the area affected d/s of Mogden. Consideration of the Option 3 proposal should include assessing potential impacts upon this species. This should include any significant changes to the head of tide (saline limit) resulting from the shift in Mogden flow to Teddington. Smelt use head of tide area for spawning, so any shift in this may move them onto less suitable habitat.	Modelling being undertaken to assess impacts
182	Sarah Wardell	17/10/2016	Direct River Abstraction Feasibility Report	Direct River: Mogden Effluent	Any changes in flow that result in increased sedimentation and therefore a regular maintenance dredging requirement to maintain navigation would be considered detrimental. Currently, there is minimal dredging/disturbance in the upper tidal Thames.	Modelling being undertaken to assess impacts
183	Sarah Wardell	17/10/2016	Direct River Abstraction Feasibility Report	Direct River: Mogden Effluent	They should also model the effects of a temporary cessation of effluent flow at Teddington, as if there are operational problems at Mogden that affect final effluent quality, then they may need to cease discharging at Teddington and revert to the original discharge or storm tanks.	The proposed operating philosophy would address this. If the water quality is not satisfactory, discharge and abstraction would cease.
184	Sarah Wardell	17/10/2016	Direct River Abstraction Feasibility Report	Direct River: Mogden Effluent	There are also concerns that the combined and well established EA/TWUL operational response to hypoxia incidents that cause fish mortalities in the tidal Thames, is also considered in detail as part of the scoping for Option 3.	Review when modelling complete
185	Sarah Wardell	17/10/2016	Direct River Abstraction Feasibility Report	Direct River: Mogden Effluent	Mogden flows are a key element in our management of such incidents in the Tideway and how any changes would affect our response, in terms of storm tank discharge, hydrogen peroxide dosing, deployment of oxygenation vessels and the potential for final effluent quality to deteriorate during storm events will all need to be addressed.	These issues would be explored as part of the more detailed design once the modelling work has been completed.
186	Sarah Wardell	17/10/2016	Direct River Abstraction Feasibility Report	Direct River: Mogden Effluent	We would need very robust procedures in place to deal with any pollution incidents affecting Mogden STW or failures at the works if we do allow the majority of the Tideway the summer flow to be treated effluent. There may also be recreational use and amenity considerations associated with this.	Review when modelling complete
187	EA	04/10/2016	Cotswold Canal Transfer feasibility	Cotswold: Water resources	Based on the Severn Thames Transfer: Water Quality and Ecology Assessment - Phase 2 report, this states that 'No transfer would be on all of the time. Autumn is the most likely period for transfers, once every two years on average'. It is critical that the likely timing, duration and frequency of operation of the transfer is confirmed. Further information is required to understand how the balance between water supply and demand of the canal will be achieved and managed by CCT when any transfer is not in operation. The canal must have a sustainable water supply to meet its own demand.	Historically the canal was fed from groundwater near the source of the River Thames, which was pumped to the summit pound. A similar system could be used with reservoirs adjacent to the Thames. Alternatively an agreement could be made to use the transfer infrastructure. This has not been discussed in detail with CCT or CRT.
188	EA	04/10/2016	Cotswold Canal Transfer feasibility	Cotswold: Water resources	You / CCT should confirm whether this option is feasible, particularly with regards to the water supply demand of the canal without a transfer in operation. It is difficult to comment on the water resources associated with this canal option without a clear understanding of the timing, duration and frequency of any transfer.	See above - water supply for canal likely to be feasible but not studied in detail by TW team. The transfer is not dependent on the canal being fully operational / navigable

Log of individual stakeholder comments

Comment Ref	Stakeholder	Date	Report	Topic	Consultee representation	Thames Water Response
189	EA	04/10/2016	Cotswold Canal Transfer feasibility	Cotswold: Canal losses	Again, further information is requested on confirmation of the timing, duration and frequency of the operation of any transfer into the canal to provide detailed comments on the losses.	Suitable information on the timing, duration and frequency of the operation of selected size and type (supported/unsupported) of Canal transfers is set out in the Phase 2 Water Quality and Ecology Report. Appendix A of that report sets out graphical representation of the timing, duration, regularity and magnitude of 100Ml/d unsupported, 240Ml/d unsupported, 100Ml/d fully supported and 240Ml/d fully supported Canal transfers. Summary description of each of these is included in Appendix I and replicated in the introductory text of chapters 16, 17, 20 and 21 of that report. The main difference is associated with whether support is in place, rather than alternative operating conventions. Unsupported transfers, would result in frequent increases in flow of [the transfer rate] for short (~32-60d/y up to ~55d continuously) periods in autumn once every 2-3 years, increasing to long periods (~82-130d/y up to ~100d continuously) once every 10 years and in any months once every 50 years. Supported transfers, would result in frequent increases in flow of [the transfer rate] for medium (~44-100d/y up to ~100d continuously) periods in late summer and autumn once every 2-3 years, increasing to long periods (~130-200d/y up to ~190d continuously) once every 5 years and in any months once every 50 years.
190	Neil Edwards (RWE Generation UK)	31/10/2016	Raw Water Transfers Feasibility	General	*"There are a number of power station assets dependent on reliable supplies of water in possible donor regions. It is therefore essential that as part of the assessment the potential impact of the proposed transfer on the donor region water resource position and users dependent on it is considered fully."*	Have requested more information from Severn Trent Water on impact on power stations on the River Trent when Minworth effluent is removed for transfer.
191	Neil Edwards (RWE Generation UK)	31/10/2016	Raw Water Transfers Feasibility	General	*"Regarding reception points on the main stem of the R. Thames, a potential advantage in reception points upstream of the strategically important Didcot power generation site is that subject to technical, regulatory and commercial access to the transferred (and potentially associated stored) water, an upstream location may allow potential future water constraints on the Didcot site to be managed more effectively and reliably. This may allow thermally efficient power plant at the Didcot site to play a greater role in underpinning national electricity security of supply in the coming decades. "*	Didcot is near Culham so any discharge upstream of Culham would support the river Thames at the abstraction point for Didcot power station
192	EA	04/11/2016	Raw Water Transfers Feasibility	Raw Water: Water Quality and ecology	Please can you provide further reasoning why you have discounted the potential impact of temperature as negligible?	This is the initial view based on a high level screening of the likely risks presented by the option and considering the likely time of year for the option to be used (at times of low flow when ambient temperature is likely to be high and temperature differentials between the river and discharge low). Temperature risk is being investigated further as part of the modelling work and development of the Conceptual Design for this option.
193	EA	04/11/2016	Raw Water Transfers Feasibility	STT water quality & ecology: CC Mitigation	We understand that treating water at Deerhurst before transferring could potentially reduce many of these issues, however, we do have concerns with the statement "invasive species and algae will be removed as far as practically possible". Have all options to ensure complete removal of INNS been considered? Are there any other drivers for not ensuring complete removal e.g. cost?	EA draft guidance on control of the spread of INNS requires water companies to take all necessary steps to mitigate/prevent the spread of INNS and prevent new pathways being created **even if other pathways already exist.** Dr David Alridge, the national expert on INNS, has provided an updated paper on INNS risks and mitigation as part of the Feasibility Report Update.
194	EA	04/11/2016	Raw Water Transfers Feasibility	STT water quality & ecology: CC Mitigation	With regards to copper, the text implies that the River Thames will be used to dilute levels of copper from the transported water. There is likely to be an impact of copper on ecology at all levels and so adequate treatment should be considered rather than the Thames providing dilution through the naturally lower copper levels.	This has been raised with EA's water quality experts at technical meetings on the water quality assessment of the Severn Thames Transfer. There are difficulties with the new BLM standards and using dissolved copper data. The assessment has considered that the change in dissolved copper concentration from transfer may lead to a WFD status change, but probably without ecological consequence. The proposed treatment removes particulate copper but not dissolved copper and this may be sufficient. Further views are being sought from the EA on the likely ecological risks.
195	EA	04/11/2016	Raw Water Transfers Feasibility	Raw Water: Canal Technical	Table 6.5 (page 68) With regards to the Oxford Canal conveyance elements, we recommend further investigation into their feasibility. There are known water resources pressures in the Upper Cherwell. This will be dependent on the timing, duration and frequency of any transfer/conveyance. Please provide this information to allow us to understand whether these options are likely to exacerbate the known water resource issues/pressures.	Following recent dialogue, confirmation of resource availability and costs awaited from CRT. Requirement for further assessment of the option to be confirmed once this information has been received.
196	EA	04/11/2016	Raw Water Transfers Feasibility	Raw Water: Canal Technical	Reference C2-1, amber criteria (page 162) - As indicated in comments above, there are concerns with the Oxford Canal given the known abstraction pressures in the Upper Cherwell linked to public water supply and current unlicensed abstraction from the Cherwell to the Oxford Canal by CRT. We recommend further water resources assessment to confirm that this is feasible.	Following recent dialogue, confirmation of resource availability and costs awaited from CRT. Requirement for further assessment of the option to be confirmed once this information has been received.
197	EA	04/11/2016	Raw Water Transfers Feasibility	Raw Water: Canal Technical	Reference C2-2 (page 164) - Please note that the Grimsbury Mill abstraction is licensed for 10 Ml/d. It does not have a HOF but is known to have an adverse impact on summer low flows. The Banbury low flows alleviation scheme requires a flow of 10 Ml/d to be maintained at Banbury gauging station when the abstraction at Grimsbury is in operation.	Following recent dialogue, confirmation of resource availability and costs awaited from CRT. Requirement for further assessment of the option to be confirmed once this information has been received.

Log of individual stakeholder comments

Comment Ref	Stakeholder	Date	Report	Topic	Consultee representation	Thames Water Response
198	EA	04/11/2016	Raw Water Transfers Feasibility	Raw Water: Canal Technical	Reference C2-2, amber criteria (page 166) - Again, given the known abstraction (water resource) pressures, you should carry out a more detail water resources assessment to confirm this is feasible.	Following recent dialogue, confirmation of resource availability and costs awaited from CRT. Requirement for further assessment of the option to be confirmed once this information has been received.
199	CCT	26/10/2016	Raw Water Transfers Feasibility	Raw water: comparison between CC and pipeline	Page 2 of the letter: *Some examples of where we believe the stage 3 comparison is unfair:* *-Archaeological/Historic Environment* *The canal and pipeline are rated the same. This is absurd, the pipeline offers no significant advantage and is appropriately rated as amber. The canal option would bring about the restoration of one of the greatest industrial achievements of the 18th century and in doing so safeguard many important historic structures. The fact that the Heritage Lottery Fund has been willing to invest £ millions in the restoration project bears this out.* *• Landscape* *The pipeline, if laid carefully, will have a negligible effect on the landscape post construction. The canal option constitutes a major enhancement to the landscape. Where a new section of the canal was constructed recently through a rubbish tip because the Stroud Bypass had been constructed on top of the original route, it won a CPRE award. Poets used to wax lyrical about the canal when it was still in use, one describing it as a "band of silver drawn through a valley of gold". Nobody is going to say that of a buried pipeline.* *• Impact of Residential Dwellings* *Whilst it is true that one house will need to be demolished to restore the canal (and the owners know it because restoring the canal is in the Local Authority Plan), virtually all the other properties along the 36 mile line of the canal will see an increase in property value of perhaps as much as 20%. The canal adds context to many listed buildings along side it. The pipeline is marked as green and the canal amber, it is difficult to see how laying a pipeline will have a beneficial effect on properties.*	Response provided in Raw Water Transfer Feasibility - Update (January 2017)
200	CCT	26/10/2016	Fine Screening Report	Cotswold: Canal decision	*"...the Fine Screening Report clearly shows a preference for the pipeline option whilst at this stage keeping the Cotswold Canals option as a "TBC"*" due to the comparison in the RWT's report … "*The effect of this is that there is a mistaken belief that there is little to chose between the two options so it would be logical to go with the simpler one and that is the way the Fine Screening Report leans."*	Further review of the comparison between the pipeline and the canal has been conducted in the Raw Water Transfers Feasibility Report. The review has confirmed that the Cotswold Canal option has been rejected in comparison with the Deerhurst Pipeline option due to constructability, operability, cost and increased risk of transfer of invasive non-native species.
201	CCT	26/10/2016	Raw Water Transfers Feasibility	Raw water: comparison between CC and pipeline	The canal has been under rated - "***recreational benefit is rated as amber!*** *As a decision is likely to be made on the basis of benefits vs complexity, most other things being fairly equal, it is important that benefits are well understood and correctly stated."*	Response provided in Raw Water Transfer Feasibility - Update (January 2017)
202	CCT	26/10/2016	Raw Water Transfers Feasibility	Raw water: comparison between CC and pipeline	*".... a statement in the report that using canals for water transfer is outside of the experience of Thames Water and canal operators. The former may be true, the latter certainly is not."*	This will be changed in the updated feasibility report.
203	CCT	26/10/2016	Cotswold Canal Transfer feasibility	Raw Water: Canal Technical	*There is an assumption that the banks for the Gloucester & Sharpness will need raising. This seems highly improbable because a) it is a wide cross section ship canal, b) it already has a relatively high freeboard and c) additional gradient can be achieved by lowering the water level at the intake at Saul. The Canal & River Trust will confirm this. The cost of raising the G&S Canal banks would be considerable so if this has been factored in, removing the costs associated with it could make a material difference.*	A small sum of money has been allowed for bank raising and other minor accommodation works on the G&S canal. CRT operators noted that the freeboard is low in parts of the canal. Therefore this is not a significant proportion of the overall capital cost estimate.

Log of individual stakeholder comments

Comment Ref	Stakeholder	Date	Report	Topic	Consultee representation	Thames Water Response
204	CCT	26/10/2016	Cotswold Canal Transfer feasibility	Raw Water: Canal Technical	*The water consumption assumed in supporting the canal seems overly pessimistic. The preliminary design assumes lining the canal with an impermeable membrane protected by concrete. This would more or less eliminate channel leakage although some provision should be allowed to support marginal vegetation deliberately incorporated into the channel design. Lockage has been assumed at 19 Ml/d which would equate to about 76 lock fulls of water a day which is way above the anticipated peak requirement (more likely to be about 40) and is probably further exacerbated by assuming that this would apply all year round. Half of whatever quantity is used will end up in the Thames anyway and most of the other half would end up back in the G&S Canal so lockage would not significantly detract from the water quantity available for transfer.*	No lockage losses have been assumed in the estimate of losses during transfer (see note in Table 6.11 of the Cotswold Canal feasibility report, which is appended to the RWT Feasibility Report). The 19Ml/d quoted just refers to that assumed in a previous canal rehabilitation report. Actual canal losses during transfer will have a degree of uncertainty. CRT note that canal losses when water levels are raised above normal operating level are higher than under normal operating levels so higher losses during transfer can be expected than during non-transfer periods. It should be recognised that canal lining does not provide a perfectly impermeable barrier, particularly as there is deterioration and damage over time.
205	CCT	26/10/2016	Raw Water Transfers Feasibility	Raw Water: Canal Technical	*...a number of the environmental/water quality issues have been highlighted as potentially difficult. Assumptions for mitigation should be capable of being quantified by examining similar situations on existing canals, including ones used for water transfer.*	Further work has been carried out the mitigation strategies and design of the canal option, as discussed with CCT at the recent meeting.
206	CCT	26/10/2016	Cotswold Canal Transfer feasibility	Raw Water: Canal Technical	*Suspended solids are flagged as a potential issue. Suspended silt from the Severn will settle out in Gloucester Docks and not enter the Cotswold Canals system. The proposed lining method of the Cotswold Canals will more or less prevent the disturbance of the banks and the eastern side of the Thames and Severn Canal has very few connections with channels providing land drainage so silt produced by storm run off is likely to be quite limited.*	The CCT comments are valid but there is a concern that fine suspended solids would not settle out and there is a need for filtration of the transferred flow to remove particulate copper, support removal of phosphorous and remove invasive species larvae, and possibly algae. Therefore treatment has been included on both canal and pipeline options. The EA remain concerned about fine suspended solids particularly raising the issue as the risk of locally sourced suspended solids within the Cotswold Canals as an issue. River Severn-sourced sediments are agreed by all parties as not being an issue.
207	CCT	26/10/2016	Raw Water Transfers Feasibility	Raw Water: Canal Technical	*There seems to be a level of concern about creating potential routes of invasive species which is at variance with the SEA objective of creating connectivity to promote biodiversity. This is an area that needs careful planning and mitigation where appropriate but an over zealous application of the precautionary principle could seriously damage biodiversity opportunities.* ***It is our understanding that many, if not all, of the invasive species in the Severn Catchment are already present in the Thames Catchment and nearly all, if not all, of those found in the G&S Canal are already in the Lechlade area where the Cotswold Canals meet the Thames.***	EA draft guidance on control of the spread of INNS requires water companies to take all necessary steps to mitigate/prevent the spread of INNS and prevent new pathways being created **even if other pathways already exist.** Dr David Alridge, the national expert on INNS, has provided an updated paper on INNS risks and mitigation as part of the Feasibility Report Update.
208	CCT	26/10/2016	Raw Water Transfers Feasibility	Raw Water: Canal Technical	*...there are a number of potential enhancements that could strengthen the canal option in terms of resilience and energy use/carbon footprint. We would like the opportunity to explore these with your engineers as clearly there could be advantages to be gained.*	We are aware of suggestions to install solar panels and that CCT have other proposals. These could be investigated if the canal option goes forward. They would not materially change the feasibility assessment.
209	CCT	14/11/2016	Raw Water Transfers Feasibility	Raw water: comparison between CC and pipeline	**Ownership and Tenancies - should have been assessed as amber** because; especially given that the land acquisition costs are both assessed as green. There are additional legal mechanisms, such as a Transport & Works Order, that could provide CPO powers (if needed) which are not available to a pipeline. The fact that the canal has a historic route coupled with a long standing Local Authority presumption of following, and protection of, this route can actually make things simpler.	Response provided in Raw Water Transfer Feasibility - Update (January 2017)
210	CCT	14/11/2016	Raw Water Transfers Feasibility	Raw water: comparison between CC and pipeline	**Planning policy and history - should have been assed as green.** The restoration of the canal is supported in the Local Authority plans along the entire route and have been for many years. All the Local Authorities along the route are also members of the Cotswold Canals Partnership which promotes the restoration of the canal. It therefore seems reasonable to assume that the canal option will have a much greater level of support within the planning system than a pipeline. It is even possible that Local Authorities wishing to see the canal restored might be less favourably inclined towards a pipeline alternative.	Response provided in Raw Water Transfer Feasibility - Update (January 2017)
211	CCT	14/11/2016	Raw Water Transfers Feasibility	Raw water: comparison between CC and pipeline	**Land use and quality - should have been assessed as Amber.** We are not entirely sure why either are red but certainly the canal option uses land that is predominately occupied by a disused canal bed of limited recreational use over significant lengths and of sub-optimal biodiversity value.	Response provided in Raw Water Transfer Feasibility - Update (January 2017)

Log of individual stakeholder comments

Comment Ref	Stakeholder	Date	Report	Topic	Consultee representation	Thames Water Response
212	CCT	14/11/2016	Raw Water Transfers Feasibility	Raw water: comparison between CC and pipeline	**Landscape character sensitivity - should have been assessed as green.** The restoration of the canal will also restore its role as a very welcome and valued feature within the landscape. This includes the Cotswolds AONB (one of CCT's Vice Chairs is a Cotswolds AONB Conservation Board member). Existing work restoring the Cotswold Canals has won awards including one form the CPRE. It is easy to demonstrate that the canal project will have a positive effect on landscape character.	Response provided in Raw Water Transfer Feasibility - Update (January 2017)
213	CCT	14/11/2016	Raw Water Transfers Feasibility	Raw water: comparison between CC and pipeline	**Views and visual amenity - should have been assessed as green.** The arguments are similar to above. Where the canal is restored, it is a very popular destination with one section being the most heavily used footpath within the Stroud District second only to the Cotswold Way. The pipeline has nothing to offer.	Response provided in Raw Water Transfer Feasibility - Update (January 2017)
214	CCT	14/11/2016	Raw Water Transfers Feasibility	Raw water: comparison between CC and pipeline	**Employment and local economy - should have been assessed as green.** The benefits of using the canal option have been grossly underestimated. Various reports have been undertaken by consultants into the economic effects of restoring the canal and a private developer seeking planning permission for a development adjacent to the canal recently commissioned Regeneris to review and update the figures. The report, issued in May of 2016, predicts an additional annual expenditure of over £10 million per year and the creation of 244 FTE jobs by year 5 following the restoration of the whole canal. Additionally, canal restoration also attracts private sector inward investment. An analysis undertaken by Stroud District Council and using methods approved by the Homes & Communities Agency identified that the 6 mile long Phase 1A restoration of the canal through Stroud has delivered £101 million of economic benefits with 24.57 hectares of brownfield site regeneration, 21,495 sq. m of new workspace, 57 new business start ups, 687 jobs and 503 new housing units. In every measure, the outcome exceeded the targets set at the beginning of the project and usually by a substantial margin.	Response provided in Raw Water Transfer Feasibility - Update (January 2017)
215	CCT	14/11/2016	Raw Water Transfers Feasibility	Raw water: comparison between CC and pipeline	**Opportunity for Biodiversity Improvement - should have been assessed as green.** The canal has the potential to offer considerable biodiversity improvements in its own right and particularly a major level of long distance connectivity (SEA Objective 3). The Gloucestershire Wildlife Trust are a core partner in the Phase 1B project which covers the initial 4 mile section at the western end of the canal. In addition to optimising the canal itself for wildlife, the project also includes biodiversity projects on land adjacent to the canal working in co-operation with the adjacent landowners. There is no reason why such co-operation should not be extended along other parts of the canal. The Cotswold Water Park Trust is a member of the Cotswold Canals Partnership and their interest extends across the eastern section of canal. There is a challenge to facilitate biodiversity connectivity for indigenous flora and fauna without doing the same for invasive species. This is why more work is needed to establish more accurately the nature of the threats compared with the benefits and how best these are managed.	Response provided in Raw Water Transfer Feasibility - Update (January 2017)

Log of individual stakeholder comments

Comment Ref	Stakeholder	Date	Report	Topic	Consultee representation	Thames Water Response
216	CCT	14/11/2016	Raw Water Transfers Feasibility	Raw water: comparison between CC and pipeline	**Archaeology and historic environment - should have been assessed as green.** The Stage 2 Assessment (Table 5.4) had the canal correctly assessed as green (and the pipeline as red). It is unclear why the canal has been de-rated to amber (or indeed why the pipeline uprated to amber). The canal itself is an underused and in many places deteriorating heritage asset of national significance. It also sets the context of many buildings and Listed structures along its banks. The canal forms a key element of the Stroud District Council Industrial Heritage Conservation Area which was originally designated in 1987 and by 1992 covered the entire western half of the canal to the tunnel. The use of the canal for water transfer in conjunction with navigation will result in a large number of heritage structures being restored and put back into their historic use. Much of the new infrastructure needed for water transfer will be out of sight and, if designed sympathetically, will not detract from the heritage value of the canal.	A separate response will be provided to the CCT document
217	CCT	14/11/2016	Raw Water Transfers Feasibility	Raw water: comparison between CC and pipeline	Impact on resid**ential Dwellings_ should have been assessed as green**. We are unclear why the pipeline is identified as green unless it is anticipated that this equates to no effect. The canal route requires the demolition of one dwelling at Siddington where a house was built on a lock in 1974 before the canal route enjoyed protection from development in the Local Plans. The owners of this house are aware that one day it will need to be removed. Elsewhere, there are many houses located next to the canal or nearby. However, the value of these is expected to increase significantly when the canal is restored (the national average is about 18% according to the Canal & River Trust). Opening a canal has a very different effect on house values compared with a road or railway.	Response provided in Raw Water Transfer Feasibility - Update (January 2017)
218	CCT	14/11/2016	Raw Water Transfers Feasibility	Raw water: comparison between CC and pipeline	**Recreational Benefit - Should have been assessed as green.** The recreational benefit of the canal is large and it is impossible to see why an amber designation has been made. Even partially restored, it has a significant benefit. British Waterways carried out an assessment of the potential benefits of restoring the whole length of Cotswold Canals in 2001. This concluded that the restored canal would attract 1.8 million visitor days per year. Further work was carried out and a lot more detail derived in a report produced by Ecotech in 2002. The text on page 63 supports our view but that is not what is shown in table 6.3.	Response provided in Raw Water Transfer Feasibility - Update (January 2017)
219	CCT	14/11/2016	Raw Water Transfers Feasibility	Raw water: comparison between CC and pipeline	**Impact on recreation - should have been assessed as green.** There are very few negative impacts of restoring the canal in terms of recreation – shooting wildlife in areas currently inaccessible to the public being perhaps the only obvious one. Disruption during construction will be time limited as it passes through each section. The overall impact is overwhelmingly positive.	Response provided in Raw Water Transfer Feasibility - Update (January 2017)

Log of individual stakeholder comments

Comment Ref	Stakeholder	Date	Report	Topic	Consultee representation	Thames Water Response
220	CCT	14/11/2016	Raw Water Transfers Feasibility	Raw water: comparison between CC and pipeline	**Water resource and Water quality - should have been assessed as amber.** The water resources available to the canal are very similar to those available to the pipeline. We are not convinced that the work undertaken into water quality to date is sufficient to demonstrate that using the canal option would result in poorer water quality. There are pros and cons in both directions but some of the anticipated problems should be simple to mitigate and others are speculative. More work is needed. Much is said about invasive species. Zebra mussels are know to be at both ends of both transfer routes. Our understanding is that Quagga mussels are not present in the Gloucester & Sharpness Canal but are found higher up the Severn Catchment (i.e. significantly closer to the Deerhurst pipeline intake location. We also understand that Quagga mussels are to be found further down the Thames catchment. If boat traffic provides an easy means of conveyance for Quagga mussels, as is suggested, why have they not invaded the whole of the Thames Navigation already? We would like to see maps of both catchments showing the extent of the invasive species of concern. An assessment is needed as to the method of conveyance each is likely to be able to take advantage of. For example, if the water being transferred into the Cotswold Canals system is treated appropriately first, it may be very difficult for many invasive species to overcome the problem of ascending 44 locks up to the summit level of the canal in order to gain access to the Thames catchment. This also overcomes many of the concerns about what happens in periods when the transfer is not operating. The lock overflow weirs provide excellent opportunities to oxygenate the water on its way down to the Thames.	Response provided in Raw Water Transfer Feasibility - Update (January 2017)
221	CCT	14/11/2016	Raw Water Transfers Feasibility	Raw water: comparison between CC and pipeline	**Length of Conveyance.** This is probably comparable although the canal involves a lot less pipework but more pump lifts. We are confused that the 100 ML/d canal option is shown as green when it is the same route as the 300 ML/d option. Is this a hang over from when it was thought a pipeline was needed from Lechlade to Culham for the canal scheme? If so, the 300ML/d scheme has shortened by about 30km so perhaps should be the same (i.e. green).	Response provided in Raw Water Transfer Feasibility - Update (January 2017)
222	CCT	14/11/2016	Raw Water Transfers Feasibility	Raw water: comparison between CC and pipeline	**Pumping Head - should have been assessed as green.** A significant advantage of the canal route is that the actual pumping and frictional head is much less than the pipeline option. The 2010 Jacobs Report anticipated that the canal option would use only half the energy of the pipeline route. This has significant beneficial knock on effects for carbon and energy costs. We do recognise that Table 6.3 is comparing some other non-Severn Thames transfer schemes but there should be some differentiation even if this moves the Deerhurst pipeline to red.	A separate response will be provided to the CCT document
223	CCT	14/11/2016	Raw Water Transfers Feasibility	Raw water: comparison between CC and pipeline	**Water treatability/ process complexity - should have been assessed as amber.** The assessment is based on presumptions about it being significantly less complex to treat the water being conveyed by pipeline rather than the canal. This is based on treating the pipeline water at the upstream end of the pipe and at the downstream end of the canal. The removal of the silt (for which the Severn is famous) before the water enters the pipeline will be a significant challenge. This problem does not really exist on the canal scheme because Gloucester Docks does this for us. The proposed design of the restored Cotswold Canal channel will greatly reduce the levels of suspended silt which might be encountered on other canals (although this may not be excessive in this context anyway). The issue of how to almost eliminate canal water from entering the Thames has already been considered as part of the design for restoring the canal without the water transfer functionality. It involves emptying the last Lock at Inglesham by back pumping the water from the lock into	Response provided in Raw Water Transfer Feasibility - Update (January 2017)
224	CCT	14/11/2016	Raw Water Transfers Feasibility	Raw water: comparison between CC and pipeline	**Construction complexity -** We tend to agree that the canal option is more complex to construct but not to a degree that it should be discounted. If they managed to build the canal successfully when George III was on the throne 240 years ago, it should not be beyond the capability of engineers in the 21st century to be able to do the same and better.	Response provided in Raw Water Transfer Feasibility - Update (January 2017)

Log of individual stakeholder comments

Comment Ref	Stakeholder	Date	Report	Topic	Consultee representation	Thames Water Response
225	CCT	14/11/2016	Raw Water Transfers Feasibility	Raw water: comparison between CC and pipeline	**Operational Complexity -** We are content with the table but it does not reflect what is said in the preceding text on page 64. The canal may well be more complex but, we suspect, not to the degree suggested on page 64. In particular, the statement that "the use of canal to transfer water is not common practice and is therefore outside of the experience of … canal operators" is incorrect. The Canal & River Trust have extensive and long term experience of transferring water by canal in both larger and small canals than the Cotswold Canals. Indeed, Bristol Water would be in serious trouble if this were not so as they have a high reliance on the supply of	Response provided in Raw Water Transfer Feasibility - Update (January 2017)
226	CCT	02/12/2016	STT: Water quality and Ecology Assessment Phase 2	STT water quality & ecology: CC Mitigation	**Comment on Non technical summary, paragraph 11**: This does indicate a lack of imagination or lack of a serious attempt to consider alternative solutions which would identify the perceived problems.	Further work has been carried out the mitigation strategies and design of the canal option, as discussed with CCT at the recent meeting.
227	CCT	02/12/2016	STT: Water quality and Ecology Assessment Phase 2	STT water quality & ecology: CC treatment	**Comment on Non technical summary, paragraph 16:** CCT has already considered these issues in regard to the canal restoration and has solutions which we believe would overcome the issues. On this issue, we were not consulted.	Further work has been carried out the mitigation strategies and design of the canal option, as discussed with CCT at the recent meeting.
228	CCT	02/12/2016	STT: Water quality and Ecology Assessment Phase 2	STT water quality & ecology: CC invasive species	**Comment on Non technical summary, paragraph 16:** A lot of boats already access the upper Thames from downstream where many, if not all of, the invasive species can already be found. If transference was that easy, why are they not already there?	A draft EA guidance on control of the spread of INNS requires water companies to consider, where catchments are already connected, the need for mitigation based on increase in risk. David Aldridge, national expert considers there is increased risk for the proposed Severn-Thames transfers. In such circumstances the draft guidance requires water companies to demonstrate the additional risk can be effectively minimised.
229	CCT	02/12/2016	STT: Water quality and Ecology Assessment Phase 2	STT water quality & ecology: CC Mitigation	**Comment on Non technical summary, paragraph 17:** The CCT solution would work when the transfer is not running. ("Although there are mitigation treatments, which would involve abstraction, treatment and discharge of water back to the canal during transfer operations, these measures would not provide mitigation when the transfer is not in use.")	CCT ideas were discussed at a recent meeting and have been taken into consideration in assessing the risks relating to the canal operation
230	CCT	02/12/2016	STT: Water quality and Ecology Assessment Phase 2	STT water quality & ecology: CC invasive species	**Comment on Non technical summary, paragraph 17 - Additionally, recreational activities and boat traffic within the canal would also pose a risk of transferring invasive species from the canal into the River Thames**: See previous point, boats already use the Thames some will already have come from the Severn via the canal network and others from the Thames further down.	A draft EA guidance on control of the spread of INNS requires water companies to consider, where catchments are already connected, the need for mitigation based on increase in risk. David Aldridge, national expert considers there is increased risk for the proposed Severn-Thames transfers. In such circumstances the draft guidance requires water companies to demonstrate the additional risk can be effectively minimised.
231	CCT	02/12/2016	STT: Water quality and Ecology Assessment Phase 2	STT water quality & ecology: CC invasive species	**Comment on executive summary, paragraph 4 - channels downstream of Lechlade. Invasive species transfer risk is highest for Zebra Mussels:** Zebra mussels already at both ends,	A draft EA guidance on control of the spread of INNS requires water companies to consider, where catchments are already connected, the need for mitigation based on increase in risk. David Aldridge, national expert considers there is increased risk for the proposed Severn-Thames transfers. In such circumstances the draft guidance requires water companies to demonstrate the additional risk can be effectively minimised.
232	CCT	02/12/2016	STT: Water quality and Ecology Assessment Phase 2	STT water quality & ecology: CC invasive species	**Comment on executive summary, paragraph 4 - channels downstream of Lechlade. Invasive species transfer risk is highest for Zebra Mussels, Quagga Mussels** : Not thought to be in the G&S Canal but may be further up the Severn - i.e. closer to Deerhurst.	The report provides details of the extent of individual INNS species under the future baseline and what the additional risk relates to. Dr David Alridge, the national expert on INNS, has also provided an updated paper on INNS risks and mitigation as part of the Feasibility Report Update.
233	CCT	02/12/2016	STT: Water quality and Ecology Assessment Phase 2	STT water quality & ecology: CC invasive species	**Comment on executive summary, paragraph 4 - channels downstream of Lechlade. Invasive species transfer risk is highest for Zebra Mussels, Quagga Mussels and Asian Clams; Zebra Mussels are already present in the lower River Severn and the middle River Thames, Asian Clams are present in the Lower Severn and Thames Tideway, while Quagga Mussels are anticipated to colonise the lower River Severn but are absent from the middle and upper River Thames. Potential habitat changes and competition from invasive mussels would present a risk to the maintenance of the population of protected Depressed River Mussels in the middle River Thames**: Buscot is not the "middle Thames", its is very close to Lechlade.	Text to be amended accordingly.

Log of individual stakeholder comments

Comment Ref	Stakeholder	Date	Report	Topic	Consultee representation	Thames Water Response
234	CCT	02/12/2016	STT: Water quality and Ecology Assessment Phase 2	STT water quality & ecology: CC invasive species	**Comment on executive summary, paragraph 4 - channels downstream of Lechlade. Invasive species transfer risk is highest for Zebra Mussels, Quagga Mussels and Asian Clams; Zebra Mussels are already present in the lower River Severn and the middle River Thames, Asian Clams are present in the Lower Severn and Thames Tideway, while Quagga Mussels are anticipated to colonise the lower River Severn but are absent from the middle and upper River Thames**: When and where from? Is the pipeline solution more risk?	The report provides details of the extent of individual INNS species under the future baseline and what the additional risk relates to. Dr David Alridge, the national expert on INNS, has also provided an updated paper on INNS risks and mitigation as part of the Feasibility Report Update.
235	CCT	02/12/2016	STT: Water quality and Ecology Assessment Phase 2	STT water quality & ecology: CC invasive species	**Comment on executive summary, paragraph 4 - Potential habitat changes and competition from invasive mussels would present a risk to the maintenance of the population of protected Depressed River Mussels in the middle River Thames**: I assume therefore they are in the Lower Thames, in which case, if boats are a means of transfer, why are they not all the way up the Thames - or is the habitat unsuitable?	A draft EA guidance on control of the spread of INNS requires water companies to consider, where catchments are already connected, the need for mitigation based on increase in risk. David Aldridge, national expert considers there is increased risk for the proposed Severn-Thames transfers. In such circumstances the draft guidance requires water companies to demonstrate the additional risk can be effectively minimised.
236	CCT	02/12/2016	STT: Water quality and Ecology Assessment Phase 2	STT water quality & ecology: CC invasive species	**Comment on executive summary, paragraph 5 - The canal transfer option also poses the risk of introducing top mouth gudgeon into the River Thames. Prior to mitigation**: My understanding is that this is highly unlikely. Firstly, they tend to inhabit offline water bodies such as ponds, secondly, they are only known to be in one location in the Lower Severn area (but not in the river) and are eradicated as soon as they are found. (Source EA Tewkesbury)	Dr David Alridge, the national expert on INNS, has provided an updated paper on INNS risks and mitigation as part of the Feasibility Report Update.
237	CCT	02/12/2016	STT: Water quality and Ecology Assessment Phase 2	STT water quality & ecology: CC invasive species	**Comment on executive summary, paragraph 7 - species transfers; the veliger larvae of zebra**: Already in Upper Thames.	The report provides details of the extent of individual INNS species under the future baseline and what the additional risk relates to. A draft EA guidance on control of the spread of INNS requires water companies to consider, where catchments are already connected, the need for mitigation based on increase in risk. David Aldridge, national expert considers there is increased risk for the proposed Severn-Thames transfers. In such circumstances the draft guidance requires water companies to demonstrate the additional risk can be effectively minimised.
238	CCT	02/12/2016	STT: Water quality and Ecology Assessment Phase 2	STT water quality & ecology: CC invasive species	**Comment on executive summary, paragraph 7 - species transfers; quagga mussels**: Not present but pipeline intake much closer to quagga.	The report provides details of the extent of individual INNS species under the future baseline and what the additional risk relates to.
239	CCT	02/12/2016	STT: Water quality and Ecology Assessment Phase 2	STT water quality & ecology: CC Mitigation	**Comment on executive summary, paragraph 7 - Furthermore, for canal transfers, due to the open environment provided by the canal, mitigation of the risk of transferring invasive species from the Severn to the Thames is problematic and unlikely to be achieved - where available treatment could be of water removed, treated and returned to the canal**: Probably far more complex than necessary.	The conclusions are based on discussions and input from the EA and Natural England.
240	CCT	02/12/2016	STT: Water quality and Ecology Assessment Phase 2	STT water quality & ecology: CC Mitigation	**Comment on executive summary, paragraph 7 - The likely canal transfer option would see treatment of the transferred water within the Thames catchment prior to release**: This is probably the wrong solution, like the pipeline, it should be treated at the intake then gravity and locks will do the rest.	The treatment for the canal needs to be at the end of the canal as, unlike the pipeline, water quality may deteriorate within the canal enroute to the river Thames (e.g. due to algae). It would be more expensive to treat for certain INNS species and water quality parameters at the start of the canal and then have to treat the water again at the downstream end for other INNS and water quality parameters that may arise en route along the canal.
241	CCT	02/12/2016	STT: Water quality and Ecology Assessment Phase 2	STT water quality & ecology: CC Mitigation	**Comment on executive summary, paragraph 7 - This would mean that invasive species in varying life stages would be able to colonise the canal network from the Severn into the Thames catchment readily up to the treatment point and more slowly thereafter**: Only with the wrong solution.	The solution proposed is considered the most appropriate to address the identified risks. Dr David Alridge, the national expert on INNS, has also provided an updated paper on INNS risks and mitigation as part of the Feasibility Report Update.
242	CCT	02/12/2016	STT: Water quality and Ecology Assessment Phase 2	STT water quality & ecology: CC Mitigation	**Comment on executive summary, paragraph 7 - There would remain a risk that invasive species from the untreated water body of the canal could enter into the Thames, or into the canal from the Thames, via boat traffic, canal over topping during flood events, and over land migration in the case of signal crayfish**: Signal crayfish are in the Thames and almost certainly at both ends of the canal already.	The report provides details of the extent of individual INNS species under the future baseline and what the additional risk relates to. A draft EA guidance on control of the spread of INNS requires water companies to consider, where catchments are already connected, the need for mitigation based on increase in risk. David Aldridge, national expert considers there is increased risk for the proposed Severn-Thames transfers. In such circumstances the draft guidance requires water companies to demonstrate the additional risk can be effectively minimised.
245	CCT	02/12/2016	STT: Water quality and Ecology Assessment Phase 2	STT water quality & ecology: CC Mitigation	**Comment on executive summary, paragraph 13 - residual risks for invasive species and drinking water remain for canal variants, while they are reduced to negligible for pipeline variants**: I thought that zebra & quagga mussel larvae could not be filtered out effectively in the pipeline option.	Correct. The text will be amended to reflect this.

Log of individual stakeholder comments

Comment Ref	Stakeholder	Date	Report	Topic	Consultee representation	Thames Water Response
246	CCT	02/12/2016	STT: Water quality and Ecology Assessment Phase 2	STT water quality & ecology: CC Mitigation	**Comment on executive summary, paragraph 13 - This is due to the pipeline transfers incorporating online treatment mitigation, which offers a more robust operational solution to control the quality and content of water that would be transferred to the River Thames, than would the abstract/treat/return option for canal transfers**: The proposed mitigation for the canal option looks inefficient so this may be overstated.	The wording accords with the views provided by the EA and Natural England, who agree with the assessment team that the risks can be reduced as stated for pipeline transfers.
247	CCT	02/12/2016	STT: Water quality and Ecology Assessment Phase 2	STT water quality & ecology: CC Mitigation	**Comment on executive summary, paragraph 21 - Reductions in phosphorus concentrations through treatment, enabling release of transfer water at concentrations concomitant with Good WFD status, are not considered to be technically feasible without incurring excessive cost**: I understood that Thames Water have been removing phosphorus using special reed beds at STWs. There is plenty of opportunity near the eastern end of the canal to create reedbeds in the areas where gravel is being quarried.	This idea has been discussed with CCT and will be discussed with Thames Water to assess if it is a feasible option.
248	CCT	02/12/2016	STT: Water quality and Ecology Assessment Phase 2	STT water quality & ecology: CC Mitigation	**Comment on executive summary, paragraph 26 - The abstraction, treatment and discharge back to the canal would be operationally complex, and some of the water quality and ecological risks would not be mitigated when the transfer was not operational due to the full time conveyance provided by the canal:** The canal and Thames water can be kept reasonably separate when transfer is not operation and when it is, the flow velocity probably is too high for the algae to thrive. The initial flush probably remains an issue but could be overcome by directing the initial water into an adjacent hole in the ground where it would seep away into the gravel and be filtered.	Mitigation has been included in the option design to reduce the algal effects to [acceptable] minor impact.
249	CCT	02/12/2016	STT: Water quality and Ecology Assessment Phase 2	STT water quality & ecology: CC Mitigation	**Comment on executive summary, paragraph 29 - This is a particular risk for canal transfers where treatment measures are less likely to mitigate the spread of invasive species from the River Severn to the River Thames, than with pipeline transfers:** More details please. What species?	Text to be updated to include further details.
250	CCT	02/12/2016	STT: Water quality and Ecology Assessment Phase 2	STT water quality & ecology: CC Mitigation	**Comment on executive summary, paragraph 30 -** The same mitigation can be applied to whichever pumping station on the way up to the summit is considered the most effective. So long as these species are intercepted before they reach the canal summit, they will not be able to work their way up through the locks and pounds. to get through Thames.	Consideration of INNS mitigation strategies has been further developed in discussion with Dr David Alridge, the national expert on INNS. Dr David Alridge, as provided an updated paper on INNS risks and mitigation as part of the Feasibility Report Update.
251	CCT	02/12/2016	STT: Water quality and Ecology Assessment Phase 2	STT water quality & ecology: CC Mitigation	**Comment on executive summary, paragraph 30 - Furthermore, no effective mitigation measures are likely to be available to prevent the transfer of the veliger larvae of zebra and quagga mussels through water transfer, and so residual risks remain Moderate and Major respectively, the same as those in pre-mitigation assessments, and particularly for the canal variant:** There is no obvious reason why the canal should be so much worse in this respect and the pipeline is probably going to be affected earlier than the canal option with quagga mussels (if either will be). Zebras are already at both ends.	This is based on the evidence and assessment of the national INNS expert, Dr David Aldridge. Dr Alridge has also provided an updated paper on INNS risks and mitigation as part of the Feasibility Report Update.
252	CCT	02/12/2016	STT: Water quality and Ecology Assessment Phase 2	STT water quality & ecology: CC treatment	**Comment on executive summary, paragraph 34 - Pipeline transfers would add no pressure to current Low DWSPs catchment risks for clopyralid. For canal transfers only, there is potential for significant increase** : Why canal only? From what source?	The difference is in the source water quality, as evidenced by the measured water quality data.
253	CCT	02/12/2016	STT: Water quality and Ecology Assessment Phase 2	STT water quality & ecology: CC treatment	**Comment on executive summary, paragraph 35 - For all transfers there is potential for significant increase in colour in the River Thames raw water for Thames Water's Farmoor Reservoir and Lower Thames intakes** : I would have expected the pipeline to be significantly worse given the very muddy colour of the Severn. The G&S canal is probably a very similar colour to the Thames.	The assessment was based on measured water quality data to understand the differences in water colour.
254	CCT	02/12/2016	STT: Water quality and Ecology Assessment Phase 2	STT water quality & ecology: CC treatment	**Comment on executive summary, paragraph 37 - Metaldehyde, At times of transfer when both rivers are high concentration, although there may be a moderate deterioration in quality this would not increase DWSP risk.**: Is this not primarily a problem of run off after heavy rain?	Yes, and heavy rain can vary spatially and therefore lead to different timing of runoff related risks.

Log of individual stakeholder comments

Comment Ref	Stakeholder	Date	Report	Topic	Consultee representation	Thames Water Response
255	CCT	02/12/2016	STT: Water quality and Ecology Assessment Phase 2	STT water quality & ecology: CC treatment	**Comment on executive summary, paragraph 39 - Turbidity; For all transfers there is potential for significant increase in turbidity.**: Seems unlikely that transfer turbidity would be anything like as high as the turbidity in the Thames in existing high flow conditions.	The assessment has been based on measured water quality data which indicates the risk of increases in turbidity when the transfer is operating (which will occur at times of low flow rather than high flow conditions in the River Thames).
256	CCT	02/12/2016	STT: Water quality and Ecology Assessment Phase 2	STT water quality & ecology: CC treatment	**Comment on executive summary, paragraph 44- Of the transfer variants, the pipeline offers the most controllable option from a mitigation perspective, with the canal mitigation more technically complex and operationally difficult. The latter also confers a residual risk as the canal transfer will not operate all of the time, but the canal will remain a conduit for water between the catchments at all time**: The point seems to be lost that the restoration of the canal is a well supported national priority so it should be assumed that it will get done at some point. Water transfer would simply bring it forward.	The text is not related to whether or when the canal is fully restored. It is making the point that the canal will be in place all the time whereas the pipeline can be turned off when not being used for water transfer, so the risks are more controllable compared to the canal.
257	CCT	02/12/2016	STT: Water quality and Ecology Assessment Phase 2	STT water quality & ecology: CC treatment	**Comment on page 49 of 177, 3rd paragraph - Without mitigation this could lead to compromising the achievement of the WFD target Good status for phosphorus in river waterbodies, which contravenes Article 4.8 of the WFD**: It would be worth checking the G&S Canal as this could be significantly better than the raw Severn only water. EA water quality maps at the time of the 2010 public inquiry showed the G&S as having good water quality unlike the River Severn.	As stated there are no suitable measured data for reactive phosphorus in the G&S Canal.
258	CCT	02/12/2016	STT: Water quality and Ecology Assessment Phase 2	STT water quality & ecology: CC Mitigation	**Comment on page 50 of 177, 1st paragraph -** Mott's proposed engineering solution does not have soft banks. The T&S Canal does not play a major role in land drainage so runoff is unlikely to create many problems. There is one location where a small stream crosses on the level but this could perhaps be designed out. Mott's lining solution is unlikely to result in much sediment and what there might be would be highly diluted by the volume of water moving.	The CCT comments are valid but the EA remain concerned about fine suspended solids particularly raising the issue as the risk of locally sourced suspended solids within the Cotswold Canals as an issue. River Severn-sourced sediments are agreed by all parties as not being an issue.
259	CCT	02/12/2016	STT: Water quality and Ecology Assessment Phase 2	STT water quality & ecology: CC Mitigation	**Comment on page 64 of 177, section 6.1.2 3rd paragraph - There are isolated records of topmouth gudgeon Pseudorasbora parva, a highly invasive species and host to infectious diseases:** How can there be isolated records of a "highly invasive" species? One would expect an outbreak to be obvious.	A draft EA guidance on control of the spread of INNS requires water companies to consider, where catchments are already connected, the need for mitigation based on increase in risk. David Aldridge, national expert considers there is increased risk for the proposed Severn-Thames transfers. In such circumstances the draft guidance requires water companies to demonstrate the additional risk can be effectively minimised.
260	CCT	02/12/2016	STT: Water quality and Ecology Assessment Phase 2	STT water quality & ecology: CC Mitigation	**Comment on page 65 of 177- The WFD measures necessary to obtain GES or GEP for fish are site-specific but a commonly occurring mitigation measure is to increase connectivity:** I am trying to understand why increased connectivity is considered good practice in biodiversity terms and stated here as a "commonly occurring mitigation measure" but the increased connectivity offered by restoring the canal is always portrayed as a problem.	The difference is, one relates to restoring a NATURAL connectivity that has been severed by human activity, whereas the canal provides an artificial connectivity. A draft EA guidance on control of the spread of INNS requires water companies to consider, where catchments are already connected, the need for mitigation based on increase in risk. David Aldridge, national expert considers there is increased risk for the proposed Severn-Thames transfers. In such circumstances the draft guidance requires water companies to demonstrate the additional risk can be effectively minimised.
261	CCT	02/12/2016	STT: Water quality and Ecology Assessment Phase 2	STT water quality & ecology: CC invasive species	**Comment on page 67 of 177- The species was also introduced into tributaries of the Thames although establishment has not been confirmed. Given that it occurs primarily in standing water, there is a risk that it may be present in the Gloucester and Sharpness canal, although further investigation would be needed to confirm this. . The species constitutes a considerable risk, especially for canal transfer variants, due to its highly invasive nature and the infectious disease it hosts:** So a "highly invasive" species that seems to struggle to establish itself and apparently is hard to find and is being eradicated from its one known location in an isolated pond in the lower Severn area but has been "introduced into tributaries Thames" is described as a "considerable risk especially for a canal transfer"! Seems unlikely. Latest discussion with EA (on a Cotswold Canals matter) suggests that topmouth gudgeon are currently only known in one location and nowhere near the G&S. Furthermore, the main River Severn is not thought to be a favoured habitat for them.	EA draft guidance on control of the spread of INNS requires water companies to take all necessary steps to mitigate/prevent the spread of INNS and prevent new pathways being created even if other pathways already exist. Dr David Alridge, the national expert on INNS, has provided an updated paper on INNS risks and mitigation as part of the Feasibility Report Update.

Log of individual stakeholder comments

Comment Ref	Stakeholder	Date	Report	Topic	Consultee representation	Thames Water Response
262	CCT	02/12/2016	STT: Water quality and Ecology Assessment Phase 2	STT water quality & ecology: CC invasive species	**Comment on page 70 of 177, section 7.2- Introduction of water from the River Severn into the upper River Thames may introduce new mussel genotypes and introduce invasive species that are currently not present in the region. Mussel larvae are transported on host fishes, and fish movements are likely, particularly in canal transfer variants:** Its going to be very hard work as there are over 40 locks in the way and a 2 mile long tunnel which is likely to be a deterrent.	A draft EA guidance on control of the spread of INNS requires water companies to consider, where catchments are already connected, the need for mitigation based on increase in risk. David Aldridge, national expert considers there is increased risk for the proposed Severn-Thames transfers. In such circumstances the draft guidance requires water companies to demonstrate the additional risk can be effectively minimised.
263	CCT	02/12/2016	STT: Water quality and Ecology Assessment Phase 2	STT water quality & ecology: CC invasive species	**Comment on Page 71 of 177, paragraph 2 - Introduction of invasive zebra mussels (and possibly in the future, quagga mussels) from the River Severn into the upper River Thames is a considerable threat to the native mussel populations and is an issue discussed more fully in Section 8:** Please read section 8 or your own report! Zebra mussels are at Buscott - 3Km below Lechlade!!!!!!! They are already there!!!! - they don't need the canal or the pipeline to get them there.	A draft EA guidance on control of the spread of INNS requires water companies to consider, where catchments are already connected, the need for mitigation based on increase in risk. David Aldridge, national expert considers there is increased risk for the proposed Severn-Thames transfers. In such circumstances the draft guidance requires water companies to demonstrate the additional risk can be effectively minimised.
264	CCT	02/12/2016	STT: Water quality and Ecology Assessment Phase 2	STT water quality & ecology: CC invasive species	**Comment on Page 75 of 177, bullet point 4 - Zebra mussels are known as far upstream as Buscot (SU2344798102), 3km downstream of Lechlade. The species extends downstream as far as the Thames Tideway:** This statement is very important in that it does not seem to have informed much of the comment elsewhere about Zebra Mussels and the risk of transferring them	It is the increase in risk related to genetic diversity that is important, and not simply presence as explained in the report. Dr David Alridge, the national expert on INNS, has provided an updated paper on INNS risks and mitigation as part of the Feasibility Report Update.
265	CCT	02/12/2016	STT: Water quality and Ecology Assessment Phase 2	STT water quality & ecology: CC Mitigation	**Comment on Page 77 of 177, section 8.2.1 2nd paragraph -However, fouling of the pipeline by zebra mussels, quagga mussels and Asian clams are distinct possibilities that could result in reduced pipeline capacity55. By way of example, a 2.4m diameter, 4.5km long pipeline in southern England currently requires removal of approximately 1, 000 tonnes of zebra mussel biomass every five years56. Moreover, any operation that resulted in a die-off of bivalve biomass in the transfer pipes would have dramatic effects on receiving waters:** Clearly a long pipeline is likely to experience more problems than shorter ones.	Comment noted; agreed.
266	CCT	02/12/2016	STT: Water quality and Ecology Assessment Phase 2	STT water quality & ecology: CC Mitigation	**Comment on Page 77 of 177, section 8.2.2 The sluggish flow, hard wall surfaces, high nutrient status, warm temperatures and high silt loads would provide favourable habitats for zebra mussels, quagga mussels, Caspian mud shrimps, demon shrimps and Nuttall's waterweed:** But how many are actually there and if not why not if it is so favourable? Also, the silt load within the water column for the bulk of the canal is very low. Silt from the Severn settles out in Gloucester Docks and, being a ship canal, it is very deep compared with the draught of the vast majority of the boats using it. Therefore boats don't tend to disturb silt on the bottom.	Dr David Alridge, the national expert on INNS, has provided an updated paper on INNS risks and mitigation as part of the Feasibility Report Update
267	CCT	02/12/2016	STT: Water quality and Ecology Assessment Phase 2	STT water quality & ecology: CC Mitigation	**Comment on Page 78 of 177, The modelled potential for decrease in dissolved oxygen under poor quality canal scenarios may:** It seems likely that through sensible design of lock bypass weirs that good dissolved oxygen levels can be maintained	Text refers to modelling scenarios and relates to the mixing of two waters, and does not account for optimisation through design or mitigation measures.
268	CCT	02/12/2016	STT: Water quality and Ecology Assessment Phase 2	STT water quality & ecology: CC invasive species	We expect turbidity to be much less of an issue with the canal transfer compared with the pipeline due to the G&S settling out nearly off of the Severn derived silt.	The assessment has been based on the measured water quality data.
269	CCT	02/12/2016	STT: Water quality and Ecology Assessment Phase 2	STT water quality & ecology: CC Mitigation	**Comment on page 88 of 177 - Risk of prevention of improvement of fish and macroinvertebrate status of the River Thames (Leach to Evenlode) waterbody from canal transfers of reduced quality water (dissolved oxygen, zinc) or from upstream releases of reduced quality water (suspended solids):** If the pipeline is to discharge at Radcot, why is zinc a canal transfer problem only - especially when table 4.1 identified the canal option with a much lower level of zinc compared with the pipeline?	Text to be checked for consistency and amended as necessary.

Log of individual stakeholder comments

Comment Ref	Stakeholder	Date	Report	Topic	Consultee representation	Thames Water Response
270	CCT	02/12/2016	STT: Water quality and Ecology Assessment Phase 2	STT water quality & ecology: CC Mitigation	**Comment on page 88 of 177 - For canal transfer variants measures would be required to be in place to allow passage for eels to ensure compliance with the Eel Regulations 2009:** Are we sure? Measure for eel passage on the canal restoration have been confined to the short section of canal that is classified as "Main River" near Stroud only (that does not seem to stop eels from inhabiting the elsewhere canal anyway).	This refers to the pumping stations and intakes rather than to the canal itself, and would be subject to detailed assessment in dialogue with Environment Agency as to appropriate mitigation measures dependent on the final design.
271	CCT	02/12/2016	STT: Water quality and Ecology Assessment Phase 2	STT water quality & ecology: CC Mitigation	**Comment on page 88 of 177 - Risk, particularly for canal transfer, of invasion of the River Thames by topmouth gudgeon which is highly invasive and hosts infectious disease:** On the basis of the information we have from the local EA and the nbn map, that seems rather unlikely.	Dr David Alridge, the national expert on INNS, has provided an updated paper on INNS risks and mitigation as part of the Feasibility Report Update
272	CCT	02/12/2016	STT: Water quality and Ecology Assessment Phase 2	STT water quality & ecology: CC invasive species	**Comment on page 88 of 177 - In general, a significant risk of introduction of invasive species from any transfer variants:** Most of the species identified in this report are already in the Upper Thames. The risk of introduction is confined only to those that are not and these tend not to be at the western end either. The pipeline intake is probably more likely to encounter these few than the canal route.	Report is already clear on extent of individual INNS species under future baseline as discussed with CCT at a recent meeting.
273	CCT	02/12/2016	STT: Water quality and Ecology Assessment Phase 2	STT water quality & ecology: CC invasive species	**Comment on page 93 of 177, 5th bullet point - There would remain a residual risk that algal blooms within the canal could by-pass the treatment unit and enter into the Thames via boat traffic or canal over topping during flood events:** That is easy to mitigate by changing the way the last or last two locks are filled. It would have to be a quite big flood event and these don't often happen when algal blooms are at their highest. Would not algae be swept away in the high flows during and following such a flood?	Mitigation will be in place to reduce algal effect to [acceptable] minor impact, but a residual risk remains nevertheless, which is what this is referring to.
274	CCT	02/12/2016	STT: Water quality and Ecology Assessment Phase 2	STT water quality & ecology: CC invasive species	**Comment on page 94 of 177, 1st bullet point - The spread of invasive species via attachment to boats on a fully restored canal could not be controlled:** ..but isn't now in regard to existing boat traffic on the Thames, some of which passes through waters already inhabited by invasive species lower down the Thames and the rest of the inland waterway network.	A draft EA guidance on control of the spread of INNS requires water companies to consider, where catchments are already connected, the need for mitigation based on increase in risk. David Aldridge, national expert considers there is increased risk for the proposed Severn-Thames transfers. In such circumstances the draft guidance requires water companies to demonstrate the additional risk can be effectively minimised.
275	CCT	02/12/2016	STT: Water quality and Ecology Assessment Phase 2	STT water quality & ecology: CC invasive species	**Comment on page 94 of 177, 1st bullet point - There would remain a residual risk that invasive from the untreated water body of the canal could move further along the canal and enter into the Thames via boat traffic, canal over topping during flood events, over land migration in the case of signal crayfish and recreational activity:** For these reasons, it may be better to treat/filter the water before it gets into the Cotswold Canals length rather than wait until it reaches the Thames.	The treatment for the canal needs to be at the end of the canal as, unlike the pipeline, water quality may deteriorate within the canal en route to the river Thames (e.g. due to algae). It would be more expensive to treat for certain INNS species and water quality parameters at the start of the canal and then have to treat the water again at the downstream end for other INNS and water quality parameters that may arise en route along the canal.
276	CCT	02/12/2016	STT: Water quality and Ecology Assessment Phase 2	STT water quality & ecology: CC invasive species	**Comment on page 94 of 177, 4th bullet point -The removal of invasive species before transfer reduces the risk of zebra mussel populations (and/ or Quagga mussels in the future) establishing in the pipeline and causing operational problems**: Seems more sensible to me.	The treatment for the canal needs to be at the end of the canal as, unlike the pipeline, water quality may deteriorate within the canal en route to the river Thames (e.g. due to algae). It would be more expensive to treat for certain INNS species and water quality parameters at the start of the canal and then have to treat the water again at the downstream end for other INNS and water quality parameters that may arise en route along the canal.
277	CCT	02/12/2016	STT: Water quality and Ecology Assessment Phase 2	STT water quality & ecology: CC invasive species	**Comment on page 95 of 177 -Pipeline transfers offer opportunity to control the quality and content of water that would be transferred to the River Thames that is not available to canal transfers. For canal transfers water would need to be removed from the canal for filtering and treatment before being put back into the canal again**: This happens at four pumping stations on the way to the summit anyway. The non-transfer water supply strategy has not been discussed in any detail. If it uses the transfer pumps at reduced capacity or for short durations, the filtering would be there. If not, the canal is likely to be supplied by new reservoirs towards the eastern end of the canal so would not necessarily involve taking water from the Severn or G&S Canal. This could be a more or less closed system with no discharge to the Thames.	The Phase 2 report was not committed to a specific engineering design and included outline suggestions on mitigation strategies for those items identified as requiring consideration of mitigation. Further work has been carried out in recent months to firm up the design assumptions and costs and these have been discussed at a recent meeting with CCT.

Log of individual stakeholder comments

Comment Ref	Stakeholder	Date	Report	Topic	Consultee representation	Thames Water Response
278	CCT	02/12/2016	STT: Water quality and Ecology Assessment Phase 2	STT water quality & ecology: CC Mitigation	**Risks: Hydraulics -** Why is this identified as Moderate Adverse?	Comments have been discussed at a meeting with CCT as to the basis and rationale for the assessment of risks. The risk relates to the impact on river hydraulics downstream of the canal discharge with greater variation in flow conditions at times of low flow compared to the baseline position.
280	CCT	02/12/2016	STT: Water quality and Ecology Assessment Phase 2	STT water quality & ecology: CC Mitigation	**Risks: WFD status, Gloucester & sharpness canal** - This is a very large cross section canal. Flows will be slow. Suspect - Flow rates in the G&S canal are very low supplying 235Ml/d to Bristol Water and twice very low is still going to be low if doubled. The cross section of the canal is very large.	Discussions have been held with CCT to review these comments. The text will be amended to clarify that the impact is associated with changes in velocity rather than in magnitude *per se* .
281	CCT	02/12/2016	STT: Water quality and Ecology Assessment Phase 2	General	The Cotswold Canals currently have soft edges, rather than hard so do not offer the sort of mussel friendly environment found in the G&S Canal. The current Mott design, however, proposes extensive use of concrete. Some thought may be needed to optimise the design.	There needs to be a balance between biodiversity opportunities (including green corridors) and INNS management if the option is developed further. The Phase 2 report is not committed to a specific engineering design. Further work has been carried out on the treatment for INNS control as discussed with CCT at a recent meeting and in the Feasibility Report update.
282	CCT	02/12/2016	STT: Water quality and Ecology Assessment Phase 2	General	It should be possible to much reduce the risks by stopping the invasive species at the western end of the canal.	Discussions have taken place with the CCT to discuss their ideas for mitigation. Our national expert on Invasive species, Dr David Aldridge, has discussed the treatment options and their efficacy in a paper that is included in the Feasibility Report Update Paper.
283	CCT	02/12/2016	STT: Water quality and Ecology Assessment Phase 2	General	Would it be possible to blast the water with very high intensity UV light at the pipeline intake(s)?	The efficacy of this treatment technology for the life stage of target invasive organisms is low according to advice provided by the national expert on invasive species, Dr David Aldridge. A paper from Dr Alridge has been included in the Raw Water Transfers Feasibility Report Update.
284	CCT	02/12/2016	STT: Water quality and Ecology Assessment Phase 2	General	**"There are no potentially major adverse water quality effects of the 240Ml/d supported canal transfer when considering public water supply issues. There are potentially moderate effects pre-mitigation to both Thames Water's Farmoor Reservoir and Lower Thames intakes due to treatability issues, with elevated turbidity," (page 142 of 177 second paragraph)** From what source?	The assessment is based on measured water quality data from the River Severn
285	CCT	02/12/2016	STT: Water quality and Ecology Assessment Phase 2	General	Is there a reason why the 300 Ml/d pipeline has ammonia down as a Benefit and the canal as a Minor Adverse? Table 4.1 says there is only a benefit if the release were to be at Cricklade, which it won't be.	A meeting has been held with CCT to discuss their comments on the canal transfer assessments. An updated Feasibility Report will be issued and this will include an updated assessment of the water quality risks following further work since the draft Feasibility Report was issued.
286	GARD	31/10/2016	Fine Screening Report	Fine screening: Abingdon	*"SEA (i.e. environmental impact): We do not accept that the reservoir has the same environmental impact as raw water transfer, reuse, desalination and direct river abstraction. How can a 7 sq. km, 25 m high structure in a rural location and visible for miles around be equated to buried pipelines and developments at existing sewage works? The disruption to local communities will be immense for the reservoir and slight for other options. The reservoir scores should show a solid red mark for this."* (GARD response pp25)	The assessment of the Abingdon Reservoir environmental effects has been assessed on the same basis as all other options and are the effects after application of appropriate mitigation measures included as part of the option costs. Key effects identified were visual effects during operation and traffic effects and local disruption during construction. Construction effects are temporary and can be mitigated through a variety of management measures (including a dedicated railway line to minimise road traffic impacts. Visual effects would be mitigated through careful design of the embankments and extensive landscaping and tree planting to screen the reservoir embankments.
287	GARD	31/10/2016	Fine Screening Report	Fine screening: Abingdon	*"Cost: We consider that, when the deployable output of reservoir options is reduced to allow for extended droughts (see Section 6.4 below), the unit costs of water will rise by at least 30%. We also think that, when the deployable output of raw water transfer options are properly assessed as we have proposed in Section 4, the transfer options will provide the cheapest costs and the reservoir options will be amongst the most expensive. The reservoir scores should show a solid red mark for this." (GARD response pp25)*	The assessment for the resilience to severe drought sub-dimension has been updated to reflect the conclusions of stochastic analysis conducted by Atkins which finds "that the UTR can be considered to be resilient in terms of water resources planning, down to an extremely low frequency return period".
288	GARD	31/10/2016	Fine Screening Report	Fine screening: Abingdon	*"Local acceptability: The 75 Mm3 Abingdon reservoir would not be moderately acceptable locally. It would be substantially unacceptable as for the larger Abingdon options. It should show a solid red mark for this." (GARD response pp25)*	The assessment of local acceptability for the 75Mm3 reservoir has been downgraded to substantial dis-benefit in light of the GARD comments.
289	GARD	31/10/2016	Fine Screening Report	Fine screening: Abingdon	*"Phasing: The loss of 20% of the potential storage through phasing, as pointed out in Section 5.2 above, is a major drawback of phasing, as is the repeated construction disruption and prolonged property blight. Although phasing is physically possible, the options should be shown as moderately unsuitable for phasing." (GARD response pp25)*	In view of the significant Deployable Output reduction applicable to a phased reservoir the assessment for phasing has been reviewed and downgraded to a material disbenefit.

Log of individual stakeholder comments

Comment Ref	Stakeholder	Date	Report	Topic	Consultee representation	Thames Water Response
290	GARD	31/10/2016	Fine Screening Report	Fine screening: Abingdon	*"Drought: As we show in Section 6.4 below, the reservoir options would perform poorly in extended droughts because of the inability to refill over winter. All the reservoir options should show a solid red mark. Table 5.13 and the commentary on Table B.3 shows the larger reservoirs performing better in droughts. Our analysis shows this is not the case – the larger reservoirs are more affected by the lack of winter rainfall in extended droughts." (GARD response pp26)*	The work on analysis of the potential yield under stochastically generated droughts has concluded that the UTR is resilient to future droughts. On the basis of this analysis the assessment under the "severe drought" resilience sub-dimension has been upgraded to substantial benefit.
291	GARD	31/10/2016	Fine Screening Report	Resilience to drought & climate change	GARD challenge the findings on the WaterUK study on the resilience of an unsupported Severn-Thames Transfer (GARD response pp26-29)	Response provided in Raw Water Transfer Feasibility - Update (January 2017)
292	GARD	31/10/2016	Fine Screening Report	Future work programme	GARD propose a number of issues to be addressed including (GARD response pp37): *"The deployable output achievable by the 300 Ml/d unsupported Severn-Thames transfers under a range of climate change and drought scenarios, taking account of future needs of Severn Trent and other abstractors."*	A review of the expected yield under stochastically generated future drought scenarios has been prepared taking account of climate change and the impact of other abstractors. The report is published as an attachment to the update paper: Raw Water Transfer Feasibility - Update (January 2017)
293	GARD	31/10/2016	Fine Screening Report	Future work programme	GARD propose a number of issues to be addressed including (GARD response pp37): *"The deployable output achievable by a variety of Severn-Thames transfer support options, operated in conjunction with natural Severn flows, with a range of climate change and drought scenarios. There is a large number of sub-options and there appears to have been no work at all as yet to find appropriate combinations of support and transfer capacity."*	Based upon findings of water quality and ecology work as well as work on stochastically generated droughts further work has been done on combinations of support options and transfer sizes. This is now included in the feasibility and fine screening reports. Refer to Raw Water Transfer Feasibility - Update (January 2017)
294	GARD	31/10/2016	Fine Screening Report	Future work programme	GARD propose a number of issues to be addressed including (GARD response pp37): *"For Severn Trent and United Utilities, for the support options considered by Thames Water, what are the impacts on their own company supplies and what is the consequent impact on water availability in the Severn itself?"*	STT is modelled with all companies utilising their existing licenses to the maximum. The Heads of Terms also require other companies to guarantee their own supply.
295	GARD	31/10/2016	Fine Screening Report	Future work programme	GARD propose a number of issues to be addressed including (GARD response pp37): *"For all of the water companies concerned in Severn transfers, a programme of collaborative modelling is needed to understand reciprocal benefits and impacts."*	This work has been undertaken by WaterUK
296	GARD	31/10/2016	Fine Screening Report	Future work programme	GARD propose a number of issues to be addressed including (GARD response pp37): *"The deployable output achievable by the Upper Thames Reservoir options needs to be reassessed under a range of climate change and severe drought scenarios. GARD's modelling for this report has shown how the resilience of the reservoir can be drastically affected by extended droughts. How realistic are the scenarios modelled by GARD? What would be appropriate to allow for in assessing deployable output?"*	Please refer to note on the yield of the Upper Thames Reservoir using stochastically generated droughts. The report will be referenced under the drought resilience sub-dimension in the Fine Screening Report.
297	GARD	31/10/2016	Fine Screening Report	Future work programme	GARD propose a number of issues to be addressed including (GARD response pp37): *"For the Lower Lee direct river abstraction, hydrological analysis of water availability under a range of water quality constraints, combined with simulation modelling to determine the deployable output achievable if the direct river abstraction is operate conjunctively with the Lee Valley reservoirs."*	We are undertaking work with our consultants and independent experts to determine the deployable output achievable.
298	GARD	31/10/2016	Fine Screening Report	Future work programme	GARD propose a number of issues to be addressed including (GARD response pp37): *"For all options, investigation of the changes needed to the Lower Thames Control Diagram to enable the deployable output of options to be optimised while complying with the targets for Levels of Service and river flow regimes set by the regulators. From our own modelling, we have identified that significant changes are needed to the LTCD to optimise the output from various option types, even assuming no climate change. Our modelling has shown that with climate change, substantial changes will be needed to the LTCD. Deployable output cannot be reliably determined without taking this into account."*	Work done to date by Thames Water indicates that optimisation of the LTCD doesn't significantly affect the DO of options. Thames Water's analysis takes into account climate change.
299	GARD	31/10/2016	Fine Screening Report	Future work programme	GARD propose a number of issues to be addressed including (GARD response pp37): *"For the transfer, effluent reuse and desalination options, what are the operating rules needed to optimise deployable output and operating cost?"*	The Operating Strategy paper will be published along with the March update of Fine Screening report