Dear Sir or Madam,

Thank you for the opportunity to scrutinize this further and less-redacted information. It is somewhat concerning that, as Thames Water had been requested and required to provide such environmental information beforehand, they did not do so until forced, but it is good that you ensured they did so.

I am unable to give detailed scrutiny of the quantity of documentation presented (606 pages over 9 separate documents) in the short timescale, and I know that the Chair of the Vale of White Horse District Council Climate Emergency Advisory Committee was disappointed that they would not have time to properly review it. I am fully aware that this is not the fault of RAPID or OFWAT; your hands were forced by the unfortunate reluctance of Thames Water to provide unredacted information in a suitable timescale.

The key areas of my original response were the change to WFD (especially concentrating on flood risk), embodied carbon issues, costing and technical need, and a comparison with the Severn-Thames-Transfer option (and option that seems to me to be more deserving of the title "Strategic" than the Abingdon reservoir).

I am therefore focusing primarily on the environmental aspects of the report, although I did scrutinize all nine documents (as some elements could be gleaned from others). I will endeavour to cover the crucial carbon calculation, natural capital assessment (as the only element close to the costing from before that has been further explained), flooding elements of the WFD (the other issues remain extant), and a quick glance at the technical need, other issues, and comparison with STT.

**Summary up front**

Once again, and betraying my military background, I will summarise the report up front:

- Carbon
    - Carbon calculation is still absent and prevents evaluation of the assumptions, parameters, limits given, methodologies, quantification tools, and modelling. The description of the technique used (which appears to be parametric estimation) indicates that it is highly limited and unreliable in this sort of project. My questions on the completeness of the figures provided in terms of both embodied carbon and carbon cost of construction therefore remain unanswered, unfortunately.
    - They note themselves that their figures "should not be relied upon at this early stage of development."
    - What information can be gleaned indicates that the operational carbon cost may well omit methane outgassing from flooded vegetation
    - The Vale of White Horse target of Net Zero carbon emissions by 2045 looks to be impossible should the reservoir be approved, even with the (suspect) figures provided.
- Natural Capital
    - This entire category is wholly reliant on potential recreation provision to become positive. It is made clear that comparison is only possible between options rather than use of absolute values due to the assumptions that need to be made – and these were also emphasized as being "best case."
    - It is reiterated that such recreation benefits may be impossible due to INNS concerns

    - There is more detail on potential mitigations of these concerns; it is now very clear that these could well be costly, environmentally damaging in other ways, and/or implausible or impractical
    - The level of risk of there being no or minimal recreation possible is very fuzzy ("Medium")
    - All other "benefits" are actually mitigations – all of which are totally possible without the reservoir and, indeed, are only currently not possible due to the reservation of the land for the potential reservoir. Should this submission be rejected, we hope that this land reservation will be finally removed.
    - Social capital issues are extensive and mitigations proposed look highly ineffective
- Flood risk
    - There is still a complete lack of provision of modelling details
    - What is provided seems contradictory to Thames Water's original claims
    - The modelling is apparently only high level and effectively in draft and subject to considerably more work and confirmation – which, given the potential impacts to many people, is highly concerning and should have been completed prior to any assessment of broad feasibility
- Other
    - There still appear to be significant questions as to whether regulatory compliance with WFD directives is even possible.
    - Thames Water seem to have decided in advance that SESRO will go ahead immediately after the RAPID process and the (arguably more strategic, important, and far faster and less novel or contentious Severn-Thames Transfer link) will be punted into the 2080s.
    - It is clear that whilst the STT may still be necessary even if SESRO is completed, there may well be no need for SESRO following STT (from the answer to the resource benefit query).

**Carbon Calculation**

In anticipation of the calculation being made available, I did spend some time reading up on carbon calculation, especially as it applies to large-scale construction projects in general and water-projects (reservoirs especially) in specific. I would by no means characterize myself as remotely expert in this field, even so, but I would hope to be able to ask intelligent questions when presented with the specifics.

Unfortunately, in those 606 pages, there was only a one page summary *describing* the technique used for the calculation, but with no data, assumptions, specifics of the GHG quantification methodology used, carbon emissions quantification tools used, or modelling used to support it; merely a reiteration of the claimed numbers once more. They assure us that the calculation "complies with PAS 2080", but that is simply a framework standard that is supposed to look at the whole value chain, "aiming to reduce carbon and reduce cost through more intelligent design, construction and use."

The little information given as to the calculation method raises more questions than it answers. For example, was the Environment Agency carbon calculator tool for construction used? (Again, when reading up, I encountered "Greenhouse gas emissions of water supply and demand management options", Science Report – SC070010, from the EA which mandated this tool be used. I am not

aware of whether or not this has been changed since the document was written, or, indeed, if the tool was used at some point – Thames Water are not clear on that)

The intent of PAS 2080 is to ensure "carbon is consistently and transparently quantified at key points in infrastructure delivery which promotes sharing of data along the value chain."

Transparency is a key word in the PAS 2080 standard; I'm not sure that one could accurately ascribe "transparency" to what has been presented so far, especially seeing that Thames Water needed to be forced to release more information.

This submission, despite the hundreds of pages, is therefore disappointing in so much as it doesn't cover one key element of the request for extra information in all of that extra data.

**Technique apparently used**

Looking at the one-page summary of the technique used, it appears to be a form of parametric estimation.

As you quite possibly already know, this is a rule-of-thumb technique used for project estimation – if a builder is to estimate the cost or time for a house build, they plug in the number of rooms, bathrooms, reception rooms, and come out with an approximate figure. It is, of course, limited in so much as if you try to use it for, say, a large hotel, or a recreation centre, you'd be hopelessly inaccurate: there are not only qualitative differences, but differences when scaling something up or down a long way (economies of scale and diseconomies of scale, as well as differences needed to be applied at different scales). If parametric estimation IS used, it is essential establish that the parameters are valid. Otherwise, as said in the IT world: "Garbage in-garbage out."

The parametric technique for the carbon cost was apparently the only one used for the calculation.

It apparently uses their Asset Planning System to give a capex and opex cost for individual components, which are converted into CO2 equivalence. That "APS holds over 6 million embedded carbon values" is not really relevant; any components not applicable to this reservoir are not relevant.

**Construction and operation**

As the electricity grid is progressively decarbonising, we are most interested in the construction phase (much of which cannot be decarbonised, unlike the electricity used in the operation). To be fair to Thames Water, I am therefore considerably less concerned with their estimates on the operational phase, at least where it pertains to electrical power required to operate it. After all, post-2040, we *should* be in a rather lower-carbon situation for electrical power. If we are not, I cannot exactly blame Thames Water!

Focusing on construction, we read (focusing in the capex costs that will then be translated into CO2e): "Capital costs are developed from a scope of lines of investment…"

That doesn't give us much to assess. We're down to:

- Thames Water used a list of capital costs derived from lines of investment
- They have lots of components in their register
- They converted those capital costs into CO2 equivalent (one assumes by using the Treasury Green Book conversion factor, but this is not made clear).

They do state that the calculation is based upon “code, volume, size and/or attributes unique to the project.”

Which attributes? Should these not be made clear and their contributions available to be assessed?

After all, a megaproject of this size is both qualitatively and quantitatively different to far smaller ones. The amount of transport work and earth-moving construction and other construction work done would be rather different to a pipeline or a Farmoor-sized reservoir (closing significant roads such as the Hanney Road and rebuilding it elsewhere, for example, would not usually be done for smaller projects).

Project Management best practice would use comparative estimation for an initial baseline figure (locating a comparable bunded reservoir of similar size in a similar environment and country), but this may be impossible as none exist in Europe (to my knowledge). Failing that, bottom-up estimation (including an estimate of the moving machinery and transport costs required for the site, as well as the embodied carbon of the facility and the opportunity cost of the loss of the permanently flooded land) should be carried out. This would require a fairly complete Work Breakdown Structure, and may be presumed to be implausible prior to Gate 1, but in the absence of either, the carbon calculation cannot be presumed to be at all accurate. A difference of over an order of magnitude from that given would not be at all implausible.

To their credit, I do see the statement

> "**The content of the Carbon Report is draft and relates to material or data which is still in the course of completion in travel to Gate 2, and should not be relied upon at this early stage of development"**

Later in the short carbon report, it is ironic to note the statement in section 3, page 9,

> "...contesting that focussing on carbon reduction will lead to cost reduction..."

While I applaud the sentiment, the estimation technique used actually *reverses* this. If the carbon calculation is based on capex and opex and converting that at a fixed rate of pounds-to-CO2e, then anything that would reduces either would be automatically translated across to carbon reduction. Carbon reduction that was **not** reflected in capex and opex would, it appears to the layman reading this document, therefore not be covered in the calculation. Only reductions in capex and opex would reduce the calculated CO2 emissions, regardless of what reductions they were (so cost savings that reduce or remove anything used for emissions reductions would, paradoxically, result in a calculation giving lower emissions when, in practice, one would see higher emissions).

**Methane outgassing**

However, this section does give something to look at: operational carbon calculation seems to completely emit methane outgassing from subsurface carbon or from exposed reservoir drawdown areas.

To be fair to Thames Water, these elements have come to the fore more recently and shown that reservoirs - even before electrical consumption for operation - are net carbon sources and increases their calculated carbon footprint by over 50% [*Global carbon budget of reservoirs is overturned by the quantification of drawdown areas*, Keller, Marce, Obrador, Koschorreck, Nature Geoscience 14, 402-408 (2021), and *Greenhouse Gas Emissions from Reservoir Water Surfaces: A New Global Synthesis* by Deemer, Harrison, et al, BioScience, Volume 66, Issue 11, 1 November 2016, Pages 949–964].

However, this certainly must be borne in mind when comparing strategic options.

**Damage to Net Zero Target**

Mitigation attempts will take decades to come to fruition. The carbon costs of construction will be incurred immediately. This will ensure that the target of net zero by 2040 for the District will be impossible.

**Natural Capital Assessment**

No information on the costings is available. To be fair, I can see an argument for that being commercially sensitive to a degree. Accordingly, the only similar area for investigation is the Natural Capital Assessment – something that is of keen interest to the residents of the area in any case.

One thing that leaps out to anyone reading this is that the Natural Capital Assessment relies hugely on perceived recreational benefits. And that these may be significantly limited by the INNS issues.

**Overall calculation**

The reported positive change in natural capital value is primarily due to the significant increase in recreation value expected for the site, which outweighs the decrease in ecosystem value of food production – although improvements in all the other services are also reported in comparison to the baseline, without recreation they are insufficient both alone and in combination to outweigh the loss in food production value.

The calculations must be treated with caution. Quoting from the report:

> "Sensitivity analysis concluded that the results were sufficiently robust to allow comparison between options on the basis of their natural capital values, but caution should be used when citing the absolute values as these are contingent which transfer values are used in calculations;"
>
> "Results should be compared with assessments of construction and operational carbon emissions to provide a full lifecycle carbon assessment" and "there may be significant carbon losses during land use change and it will take time for new landcover to become established before net sequestration rates increase"

The comparisons between options (the only area where the calculations are of use) indicate that the smaller the reservoir, the better.

**Recreation and INNS**

INNS analysis requires all vehicles and people coming into and out of the site to be checked in and out. It should be borne in mind that the site is larger than the town of Abingdon. The cynic in me would say that for all walkers in that huge area to comply with boot washing in a location that would allow wastewater to be safely disposed of (especially if it remains optional) would be somewhat optimistic.

It notes that concrete should be used for hard surfaces - which are admitted to be visually unappealing, environmentally damaging, and costly.

The proposal for deer fencing around the perimeter of the site? As mentioned above, it's larger than the town of Abingdon; I struggle to see the practicality of this, and of inspecting and maintaining it.

Looking at going beyond the bare minimum of allowing walkers on the site to recreational use of the water, I note:

> "Recreational use of waterbodies has been found to be responsible for approximately 40% of aquatic INNS introductions in Europe"

And

> "All recreational users of the reservoir and angling pond must log in and out of site and confirm on the sign in sheet that they have cleaned and inspected their equipment for INNS before and after use. When cleaning and inspecting, they must implement the Check Clean Dry campaign guidance.
>
> Ask recreational users to familiarise themselves with the aquatic INNS recorded in the local area and report any sightings on site to a member of staff. Provision of photographic evidence and location details should be encouraged, so that any INNS reports can be investigated."

In essence, all the limitations on recreational activity would be costly (and I have yet to see anywhere that these are captured), sometimes implausible or impractical, have a carbon impact in both construction and operation, and - given that without recreational activity, the natural capital cost is certainly very strongly negative; this needs to be made very clear.

On the risk levels of “Low”, Medium”, and “High” – what do they actually mean in practice? As the recreation is the sole make-or-break factor for positive or negative Natural Capital, it’s critical to understand whether a given rating means “will happen” or “won’t happen”!

And, given the calculation method used seems to either multiply or add the risk factors together, I would challenge that methodology. Shouldn’t the risk be the highest individual risk that happens? (chain theory – a chain is only as strong as its weakest link. You can’t average the strength of the chain links to find the breaking strain; merely the strength of the weakest one. Should there be multiple weak links, then, yes, one would emphasise that, but only one link needs to fail for it to break).

To quote the document once more:

> “In relation to the asset risk assessments, under baseline conditions the site would be considered a ‘medium risk’ according to the RAG scale applied. The full removal of all terrestrial recreational activities or aquatic recreational activities means the site would be considered a ‘low risk’. This result illustrates the elevated risk that recreational activities, especially those in the aquatic environment, present in relation to the transfer of INNS. Further work is needed as part of Gate 2 to balance the risk of INNS transfer and the potential cost of biosecurity measures with the large socio-economic benefits that can be gained from allowing recreation at the reservoir.”

Given that the provision of substantial recreational benefits is the crucial element in terms of natural capital, swamping all other areas by far, I would have hoped to glean a better idea than “Medium Risk” and, paraphrasing, “We’ll have to look at that later as to whether we get any of these in practice.”

I do accept that this is simply Gate 1 and it would require some effort to analyse, but as it is the key element between “positive” and “negative,” I’m very disappointed that it wasn’t a necessary item of information to clear Gate 1.

**Mitigation prospects**

Benefits given include such things as the conversion of arable land to other roles.

This does not need construction of a huge reservoir to achieve! We are currently prohibited from changing the land use to improve the carbon footprint because it is reserved for reservoir use. Release this, and we can achieve all the other "benefits" (read "mitigations" for the reservoir) without the cost.

The carbon benefit of the implementation of deciduous forests, for example, is given as a benefit of SESRO. This, though, is, as above, explicitly a mitigation, not an inherent benefit of the reservoir. Once again, this could easily be achieved without the huge carbon cost of the reservoir if Thames Water would simply release their reservation of the land.

I would hope that, should SESRO not be approved by this process, Thames Water will be required to release their long-standing reservation on this land to allow for such benefits to be realised by others.

**Social Capital**

Pulling from the environmental report (as it realistically pertains here), there is a lengthy list of disbenefits with minimal plausible benefits and some rather minimal attempts at mitigation. For example:

> "Increase in traffic and other transport during construction e.g. HGV movements and the increase in local noise levels and dust etc."

… has, as the proposed mitigations

> "… controlling dust though dampening of haul roads and earthworks, along with other standard good practice for large construction sites."

I rather doubt that dampening haul roads and "standard good practice" will hugely mitigate this area. I won't belabour the point by going through other elements point by point, but these are not rare.

Under the section on the Under Vale of White Horse Local Plan 2031:

> "Therefore, considerations for collaborative effort between SESRO and the Vale of White Horse Council can maximise the beneficial synergies surrounding socio-economic and environmental projects and programmes."

I would contend that concealing much of this and needing to be ordered to release the incorrectly redacted information, and then resulting in us having minimal time to review these 606 pages doesn't really work towards this collaborative effort ideal.

On a personal note, as [redacted] I have experienced a distinct absence of any such attempts for collaborative effort.

**<u>Flood Risk</u>**

The changes to watercourses necessitated by the construction of Europe's largest-ever bunded reservoir on the floodplain is the key concern for my residents. The rather brief note by Thames Water in their original submission that the elevated risk of floods caused by building a huge and

heavy structure on a floodplain, which had been noted to be an unmitigable red risk in all previous submissions, was now actually not a problem, did cause some raised eyebrows.

Particularly as there were minimal details (and no calculation) given at the time. As this would be for a reservoir with multi-decade (if not century-plus) expected lifespan and would, if flooding were to be caused, affect thousands of people in Abingdon and surrounding villages (who already have some flooding issues) and cause considerable financial damage whenever it were to occur, this is of considerable interest to us.

Unfortunately, in all those 606 pages, information on flooding is rather sparse.

Under the natural capital stocks:

> "It is important to note that this assessment only shows the contribution of natural capital stocks, such as woodland and grazing marsh, to flood storage potential, and does not provide a comprehensive assessment of overall flood risk and protection of properties provided by the scheme as a whole."

In the WFD and Environmental Assessment Reports:

> "…the impacts include:
>
> • The diversion of existing channels to the west and east around the reservoir footprint to maintain flow connectivity;
>
> • Loss of watercourse(s) and catchment area underneath reservoir footprint; • Surface water run-off originating from the reservoir bund;
>
> • An increase in flood risk from a reduction in flood storage capacity within the floodplain; and,
>
> • Construction activities potentially adversely affecting the watercourses and wetlands, for example via increased fine sediment input and pollution runoff.
>
> At present, for the purposes of Gate 1, the analysis of these impacts has been limited to higher flow (flood) modelling being undertaken by Mott MacDonald (see **Technical Annex A1, Appendix E.1**). For Gate 2, changes to flows will also require environmental assessments to understand how flow may change within study reaches 1, 2 and 3 in particular."

Ironically, given the flood of information to review, Technical Annex A1 appears to have been omitted, so the scale of modelling, assumptions and parameters used, and limitations are opaque to us.

In addition:

> "Mott MacDonald's flood modelling had broadly determined the reservoir scheme would likely not affect the workings of the upper catchment areas. This is largely due to the assumption that all incoming channels which are cut off as a result of the construction of the reservoir would be diverted around the reservoir to the east and west (see Section 4.4.2 in the Geomorphology chapter). However, a more detailed analysis of the impact(s) of these realignments on the affected watercourses, as well as the receiving watercourses, will be required at Gate 2 to understand the changes in flow within each river section."

This is incompatible with their original explanation that "2D modelling" now shows that the flood risk is countered due to the catchment area of water falling on the reservoir. The assumption that watercourses would be easily diverted to have minimal (or positive) effects to the floodplain.

I would have very much liked to see the specifics of any modelling, especially given that there will doubtless be ground displacement on the clay floor of the Vale due to 150 megatonnes of water (varying from that maximum to a variable minimum level, according to the utilisation illustrations in EAR Annex B1). I had hoped that hydrogeological effects would be taken into account in the flood calculation – but I cannot know whether or not they have been as it has not been presented.

That the modelling is apparently only high level and effectively in draft also makes one somewhat concerned. As this could be a showstopper (one would presume), I would have hoped that it would be more carefully investigated as part of overall feasibility assessment prior to Gate 1. After all, should it crop up later, it would have been wasteful of public funds to not terminate the project at Gate 1.

**Other WFD issues**

On such things as the WFD analysis, there seemed to be significant outstanding effects (it appears likely that it may be impossible to achieve regulatory compliance with the objectives to prevent deterioration of any WFD element of any water body, prevent the introduction of impediments to the attainment of 'Good' WFD status, and to ensure that the legally binding programme of water body measures… to protect and enhance the status of water bodies are not compromised).

**<u>Other</u>**

It was also notable that from Thames Water's opinion of the opportunities to align Water Resource Management Plans (Table 11-29), that Thames Water appear to have already decided on their own initiative which Strategic Options will be carried out at which times, anticipating the entire RAPID process:

> "Severn to Thames Transfer: In the shorter term, the construction programmes do not align (SESRO in 2030s and STT in 2080s)"

This does ring a few alarm bells – especially as the titular preface of "South East Strategic…" would far better be applied to the water link that would connect the whole water-stressed South-East to the South-West, Wales, and Cumbria, where water is far more plentiful.

As an aside, should there be a strategic concern over drought, a 3-year project involving methods with which the companies are all well-experienced would surely leap to prominence over a decade-plus one with a scale of project beyond anything the company has done before? Novel projects, especially on the megaproject scale, versus small projects with which one has extensive experience, plus decade-plus timeframes versus three years… One would have put this criterion to the fore, and, personally, the idea of punting it to 2080 and later looks, at the very least, contentious.

The look at potential synergies does appear to indicate that whilst SESRO would not obviate the potential need for STT, STT could well obviate the need for SESRO. As well as the comparisons between the two so starkly favouring STT, it could be argued to be wasteful of public funds to continue with SESRO at all (as well as damaging to carbon targets and unnecessarily delaying drought resilience due to the differing timescales of the two projects)

Beyond this, I hope that any and all other aspects will have been brought up by other stakeholders; I have been limited in opportunity of time in this short review period for such a considerable amount

of documentation (and the lack of relevant information on the key areas of which I had interest was rather disappointing).

To summarise, then:

- The carbon calculation provided is still wholly lacking, appears based on a technique that is suspect in this situation, and fails to be of any reassurance at all.
- The Natural Capital Assessment looks less and less robust as the potential for extensive recreational use looks riskier and riskier
- The "environmental benefits" are solely based on mitigations that are only prohibited at the moment due to Thames Water's long-standing reservation on the land
- The flood risk calculation was still not provided, is noted to be uncertain in any case, and leaves me wholly un-reassured.
- Thames Water seem intent on pre-empting the decision of the RAPID process and delaying any STT until the 2080s
- STT would, as well as being cheaper on capital grounds, involve significantly less embodied carbon, far less disruptive, hugely quicker to construct (important if there is an increasing drought risk), almost certainly remove the need for SESRO. The reverse is not at all true.

One final plea as a Councillor: for decades, we have been unable to change the use of this reserved land. We could easily achieve all the benefits Thames Water suggests as their mitigations, and more – without incurring the huge negative environmental costs of this reservoir. I recognise that it would be unusual not to allow this proposal forwards past Gate 1, albeit the lack of detail surrounding potential showstoppers and persistent lack of transparency on such things as the carbon calculation and flood risk calculation could potentially merit such early rejection. However, should these issues remain of concern at the Gate 2 point, I would request that RAPID, should they decide to reject it at that point, ensure that Thames Water is required to remove their reservation on this land to permit better use of it.

Yours faithfully,

[redacted]

(Drayton Ward of Vale of White Horse District Council)