GROUNDWATER RISE: how it affects the SESRO project, as acknowledged by Thames Water, from the Thames Water presentation at Oxfordshire County Council HQ – 12th Feb 2024

Summary:

- Rise of 'about 1 metre' stated by TW engineer at County Council meeting in February 2024
- Councillors from the County and Vale are on record as witnessing the statement
- Very high water table so the effect will be devastating

Introduction GARD members and campaigners have occasionally been asked on the doorstep: "W*hat are the facts about the rise in Hanney and Steventon groundwater levels caused by SESRO?*"

Context In answering, we will use the slide presentation of Thames Water at Oxfordshire County Council on 12th Feb 2024, which is a matter of written record, and the verbal admissions made at that meeting by Thames Water staff and consultants. Thames Water has refused to put these into the minutes, but stakeholders and councillors present (including Cllr Sally Povolotsky, Steventon and East Hanney Vale councillor) affirm the statements.

Types of Flooding The flooding concerns revolve around:
Fluvial flooding – essentially from surface (river or brook) flow;
Groundwater Flooding – caused by the rise in water table underground as it reaches the surface in periods of high rainfall;
Leakage flooding – caused by failure of the Reservoir containment (which could be a failure of the 'seal' of impervious material (clay) under the water, or a failure of the embankments themselves.
As far as the last one is concerned, as there is still (even after 20 years) no proper design of the Reservoir, we cannot say much, except that this is a novel type of reservoir at this scale, and Thames Water have never built anything like it.

As far as *Fluvial Flooding* is concerned, Thames Water have not done any proper studies and certainly none since 2006-7. Like their lack of design, they have a shocking lack of enough detail about the ground conditions and soil characteristics over the SESRO site. It is known that SESRO will cover large areas of the Flood Plains north of Hanney and seal them over with the Reservoir lower skin. This flood plain has to be replaced or 'compensated'. In 2018, Thames Water's Reservoir Feasibility Report stated that lost flood plain for any Reservoir larger than *half t*he present design could not be adequately compensated for. By 2023, with no detailed (or even new) design, they were saying that the lost flood plain would be compensated 'on site'. There are no details given in their reports, and at the Feb 2024 meeting, they admitted they had not done any new modelling of Fluvial Flooding, so no-one should trust their claims.

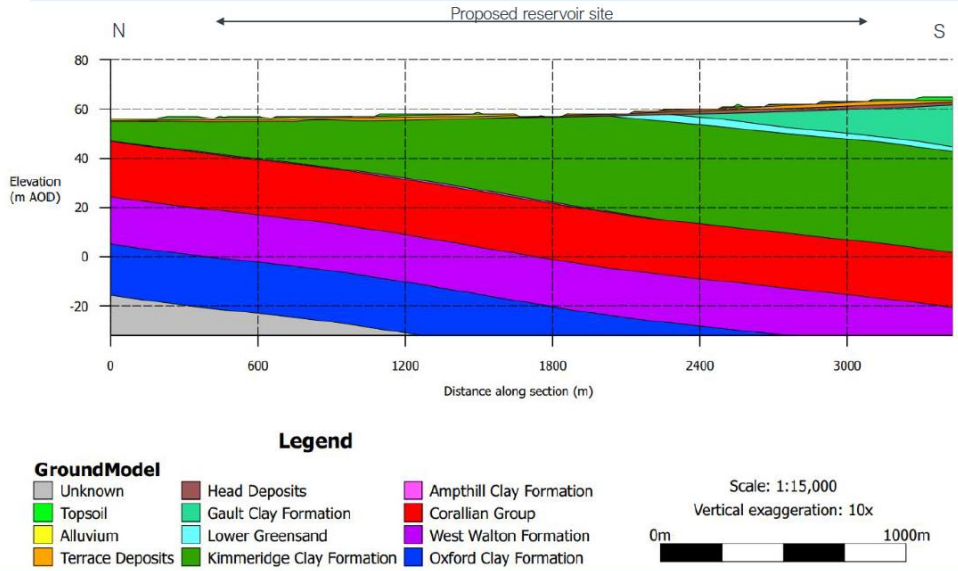
On *Groundwater Flooding*, some new work was announced at the Feb 2024 meeting. As everyone knows, the 'water table' (level of groundwater) in this area (Steventon, East Hanney, South Drayton and the island villages to the west of East Hanney) is very high, especially in winter, and hence we have a large area of waterlogged fields in the vicinity stretching down to the Ock. Anyone who has experience of digging a hole in the garden in winter will know that one can quite quickly reach 'running' water. The most recent flooding events in Steventon and East Hanney (at least three this year) have featured a significant number of older properties (with no damp course) where flooding has occurred essentially by water coming through the floor, so groundwater level is a very important issue in this area.

Groundwater flow is very complicated through the top layers of the soil on the SESRO site and affected by the presence of a thin, porous layer of 'Greensand' between the two impervious layers of Gault Clay (at the south end of the site) and Kimmeridge Clay at the north end. Groundwater modelling therefore needs a large number of borehole measurements across the site to calibrate the models which the hydrologists build to calculate the effects of a structure like SESRO.

The main effect modelled for SESRO by the Thames Water consultant hydrologists comes from the fact that the water volume contained in SESRO goes down 10 metres below ground level (as well as the embanked above-ground portion of 20 metre height). *It thus presents a sealed layer down to a depth well below the groundwater level (*the top of which is at around 0.5 - 1.0 metre down)
This seal causes a diversion in the underground flow of the groundwater (which is in general normally heading for the Ock on this site.)

Description of Current Situation – Groundwater

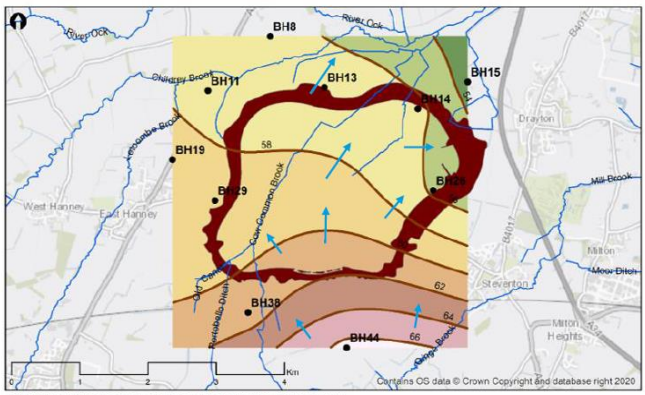
Geological cross section – extracted from Thames Water's 3D geology model from gate 2 concept design



- This is a cross section through the bedrock geology taken from our 3-dimensional geology model.
- The bedrock geology dips down to the south-east

Description of Current Situation – Groundwater

Groundwater flow direction – Superficial deposits



SESRO, Illustrative plan based upon work completed for RAPID Gate 2, showing conceptual understanding of the groundwater flow direction

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Study Area | Reservoir | Rivers | Contour | Modelled direction of groundwater flow

mAOD

52 - 54 | 54 - 56 | 56 - 58 | 58 - 60 | 60 - 62 | 62 - 64 | 64 - 66 | 66 - 68

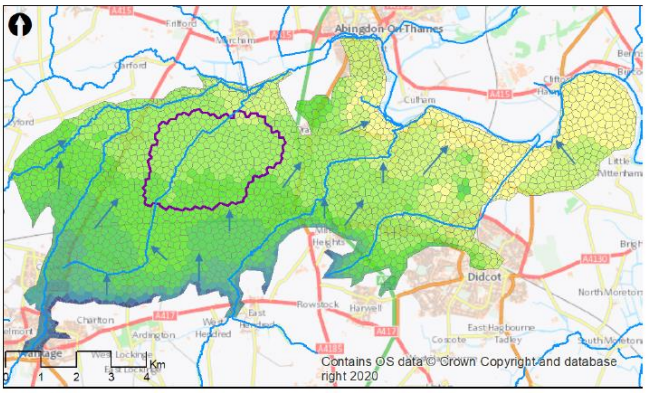
- This map shows the modelled groundwater flow direction in the superficial deposits
- Groundwater flow generally follows topography, with flow coming from the south, and then shifting towards the east.
- Groundwater flow in the superficial deposits is influenced by the watercourses across the site, and the larger watercourses in the north and east.

Thames Water had never really got to grips with the groundwater effects until 2024 (after the Public Consultation on the smaller 100 million ton SESRO). As we indicated above they still had not (and still have not) made enough borehole measurements to build a model of the flow with the accuracy needed. Nevertheless, under pressure from OCC for the Feb 2024 meeting, their consultants (Mott Macdonald) made an assessment of Groundwater effects from SESRO.

They presented the results at a meeting at County Hall in February 2024, stating that there would be an effect of "up to 1 metre" on the Groundwater level. GARD members and many councillors from OCC and the Vale were present (some on Zoom). Cllr Sally Povolotsky, Cllr Andy Cooke, (Drayton VoWHDC), Cllr Robert Clegg (Marcham VoWHDC) and Dr Chris Wilding (Steventon Parish Council) are prepared to go on record as witnesses of this statement. We have included the four most relevant slides from the Mott Macdonald hydrologist. You can see the effects mentioned of the diversion of flow (third slide). You will perhaps notice the very similar levels of the ground (second slide) and the water table (third slide).

Potential Impact of Reservoir – Groundwater

Impact on groundwater flow in superficial deposits and Lower Greensand



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Rivers
Proposed reservoir outline
Groundwater flow direction at present

Historical modelled groundwater levels (winter 2001) [mAOD]
45 - 50 | 51 - 55 | 56 - 60 | 61 - 65 | 66 - 70 | 71 - 75 | 76 - 80 | 81 - 85 | 86 - 90 | 91 - 95 | 96 - 100

SESRO, Illustrative plan based upon work completed for RAPID Gate 2, showing historical modelled groundwater levels from winter 2001

In 2022 an initial groundwater model was created focussing on superficial deposits. Work continues on this model to ensure its accuracy in reflecting real groundwater flows (pending further data collection).

Without an engineered solution, this preliminary groundwater modelling shows that groundwater levels would rise to the south and east of the reservoir, as groundwater which would currently flow north is diverted by the reservoir to the east.

The diversion of the watercourses around the reservoir and replacement floodplain storage will help to partially mitigate the groundwater flood risk.

An additional engineered solution (a groundwater drain) to manage groundwater levels is currently being included into the design (see next slide)

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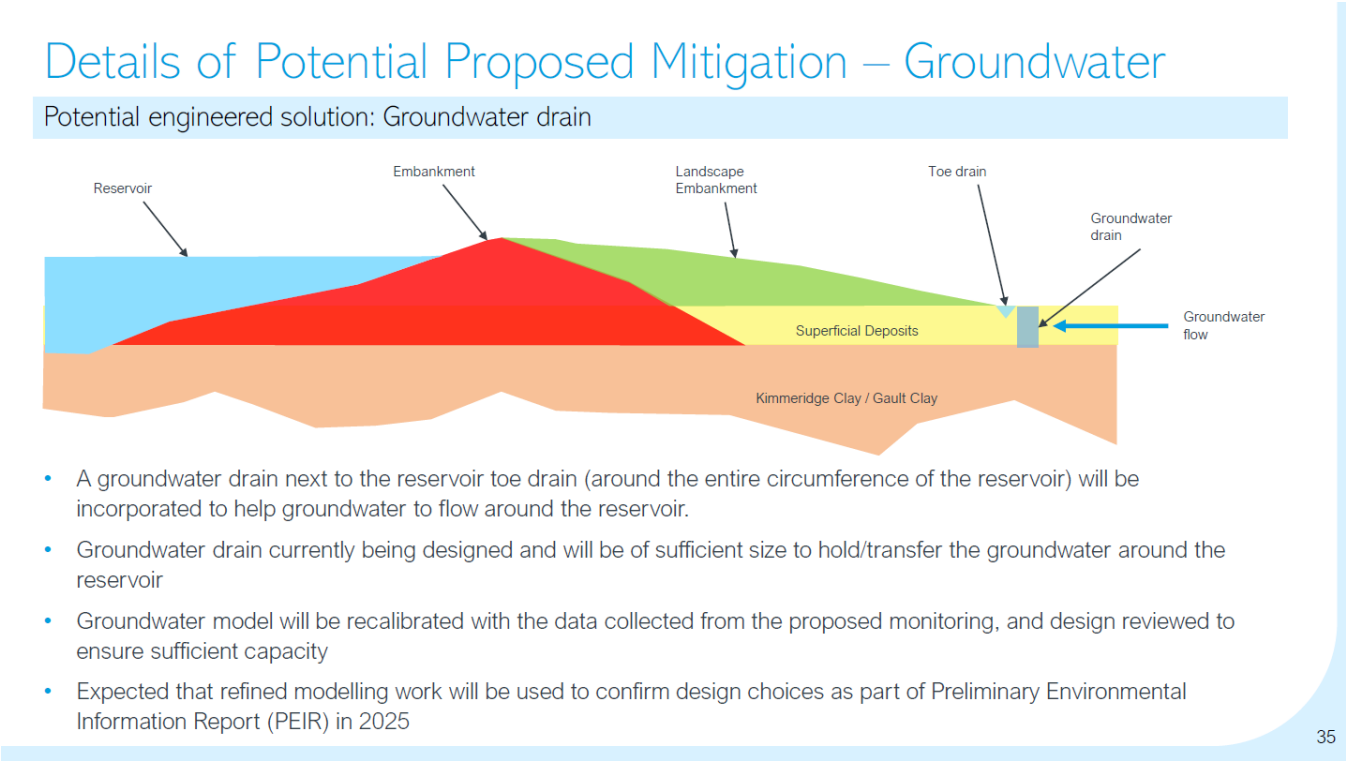
The amount of the rise was not written on the slides, but the figure was mentioned in verbal answers. It was clear that this was regarded as important, as the 'groundwater drain' had been hurriedly imported into the design (fourth slide). This feature was nowhere to be seen in the 'design' presented to the public in the 2023 draft Water Resource Management Plan. The groundwater drain's 'design' is no more than the cartoon shown on the fourth slide. Thames Water did not give any details in the 2024 Pre-Development Consent Order consultation, and, in fact, chose to ignore Groundwater altogether. GARD and its technical experts met Thames Water and its reservoir engineers on 1st October 2024, and there were still no details of the size, workings or effect of the groundwater drain.

As to the area affected, the presentation in February 2024 mentions the effects being largest at the south and east sides of the reservoir. In questioning this transpired to refer to Steventon, East Hanney and South Drayton (south of the A34). There is no statement on record as to whether this encompasses the total effect at the 'South-east' side. We are pretty sure that Grove would be OK, and eg. Garford would also be OK. The effect on South Abingdon in a rainy winter - where the Groundwater drain is intended to put its diverted water into the Ock – is, we would guess, not easy to establish without a much better model of the floodplain.



What you can do now:

- Share this leaflet with friends and neighbours
- Join GARD if you are not yet a member. Go to the GARD website Abingdon Reservoir - Group Against Reservoir Development click on JOIN US
- Sign the petition if you have not yet done so here's the link Stop Thames Water's costly mega-reservoir – fix the leaks! | 38 Degrees
- Email the secretary for a bright poster to display in a home or car window, or to give to friends. gard.secretary@gmail.com
- Write to your MP:
  Olly Glover MP (Didcot and Wantage) olly.glover.mp@parliament.uk
  Layla Moran MP (Oxford West and Abingdon) layla.moran.mp@parliament.uk
  Charlie Maynard MP (West Oxfordshire) charlie.maynard.mp@parliament.uk.
- Write to your Councillors (see GARD website for details) and Parish Council Chair. Please copy GARD into your email letters: gard.secretary@gmail.com

Derek Stork
GARD Chairman
March 2025