Smarter Water catchments and River Evenlode Water Quality

A brief prepared by the Evenlode Catchment Partnership water quality working group, October 2021.

Thames Water has invested £3 million in their new 'Smarter Water Catchments' initiative for the River Evenlode. The project is a collaborative one, and sees Thames Water and local stakeholders 'working together to improve the River Evenlode for its communities and wildlife.'

Despite this commitment, the Evenlode Catchment Partnership (ECP) a group of local organisations that is working as part of this project to protect the river, has continued concerns about catchment water quality. This briefing paper summarises these concerns. In short, we believe that progress that is being made to reduce pollution from soil runoff is being hampered by a lack of progress on reducing pollution from sewage treatment works. This situation has resulted from a combination of inadequate investment in sewerage infrastructure, poor regulation, and the failure of planning authorities to assess the impact of increased housing on sewage pollution. We have identified some priority actions that must be taken with urgency to return the river to a healthier state.

The ECP is an evidence-based organisation. This report uses evidence collated by local 'citizen scientists', the Environment Agency (EA) and Thames Water, with the latter two organisations often providing data under the Environmental Information Regulations (EIR). Further analysis has been carried out by Professor Peter Hammond, formerly of the Big Data Institute in Oxford. A full list of our sources can be found as footnotes at the end of the brief.

Report Summary

- The two biggest reasons that waterbodies in the catchment fail to meet 'Good Ecological Status' (GES) under the Water Framework Directive (WFD) are agricultural run-off and point source discharge from sewage treatment works operated by the water company Thames Water.
- A key pollutant is the nutrient phosphorus. When present at high concentrations, phosphorus causes algal blooms which lead to reduced oxygenation of the water. This effect, called 'eutrophication', is very ecologically damaging. The EA estimates that, on average, 65%of phosphorus entering the Evenlode originates from Thames Water sewage treatment works, with this figure reaching 80% along some stretches of the river.
- Some of this phosphorus comes from treated sewage effluent, but independent analysis of data by Professor Peter Hammond suggests that the problem is exacerbated by regular (and possibly illegal) spills of untreated sewage.
- Despite claims by senior management that the EA is an 'evidence led' organisation, their current level of environmental monitoring is inadequate for understanding the true ecological cost of sewage pollution. The EA is also failing to enforce laws designed to prevent sewage pollution.
- Current actions in place to reduce sewage pollution are limited given the extent of the problem. Plans to reduce phosphorus pollution from treated sewage have been significantly delayed.
- **Good progress is being made in reducing agricultural run-off, but they cannot hope to improve the water quality in the river alone. Urgent action is needed to reduce sewage pollution if water quality in the River Evenlode is to be returned to a healthier state.**

Condition of the river

EA monitoring of the river is currently inadequate for understanding the nature of water quality problems in detail. In 2000, 262 phosphorus measurements were taken by the EA from 21 different locations. By 2019, the number of EA measurements had almost halved to 135 and three locations had been dropped completely[i]. Data from both the EA and citizen scientists (see below) reveal that soluble reactive phosphorus concentrations in the river regularly exceed 0.1 mg/l (the government-recommended upper limit) and sometimes reach nine-times this.[ii]

In the late 1990s, the EA was also monitoring phosphorus at sewage treatment works on a monthly basis. They have not monitored these sites at all since 2008[i].Thames Water has provided monitoring data for these locations since 2015, but it only measures phosphorus four times a year[iii]. Even based on this limited data, EA models predict that, on average, 65% of phosphates in the river come from sewage treatment works, but in some areas contributions are up to 80%[iv].

Citizen scientists have to some extent filled this sampling void to provide a clearer picture of the extent to which treated and untreated sewage discharges are impacting the river. They have been measuring phosphorus conditions across the entire catchment since early 2019 and have found significant and consistent differences in phosphorus concentrations upstream vs downstream of the sewage treatment works in Milton and Moreton-In-Marsh that are not being detected by the EA[ii]. At Milton, a citizen scientist has also detected impacts on the invertebrate populations living in the river[v]. Recent work by Oxford Rivers Project has shown levels of gut bacteria including *E.coli* were 100 times the concentration deemed hazardous to human health below the sewage treatment works at Church Hanborough – evidence which points to the fact that discharges of raw sewage are exacerbating the already severe problems in the river[vi].

Evidence of regular raw sewage input to the river

According to data obtained via the EIR, Thames Water routinely discharges untreated sewage into the Evenlode. This is permitted to happen only in exceptional circumstances, yet between September 2019 and June 2020, 9 sewage treatment works spilled untreated sewage into the Evenlode for a total of 8,344 hours (348 days – nearly a whole year of untreated sewage entering the river!)[vii].

Evidence collated by volunteers suggests that many of the spills are illegal based on current permits. Detailed analysis by Prof Peter Hammond on data obtained via the EIR[vii] shows that spills are happening for two reasons: 1. Failure to treat the legally required volume of sewage through the main works prior to spilling of untreated sewage; and 2. Infiltration of groundwater into the sewerage system (proscribed under the permits issued to Thames Water by the EA). He has also identified breaches of permit at a number of other works, including the works at Church Hanborough where hazardous levels of *E. coli* were measured in spilling sewage. ECP member Mark Purvis has compared current local population data with current vs required sewerage capacity[viii]. These calculations do identify a number of Thames Water sewage treatment works that have insufficient capacity, and several others which are unable to treat sewage at a rate sufficient for the true population of the area served by the works. Overloading of selected works has been apparent since 2016 when a Water Cycle Report commissioned by West Oxfordshire District Council highlighted the lack of capacity of Cassington sewage treatment works[ix].

Prof. Hammond's work identifies illegal spills by examining the volume and timing of effluent flows out of the sewage treatment works. In addition, The ECP faces a lack of clarity over

the suitability of the legal permits that are placed on works. Thames Water contest the calculations made by Mark Purvis, and the ECP have recently requested to see the data and calculations made by both parties. The EA point out that one of the treatment works in question – Milton-Under-Wychwood – has been operating under a 'temporary' permit for the last ten years. Regardless of whether sewage spills are legal or not, it is disappointing to see that raw sewage is impacting the river on such a regular basis.

Actions to reduce pollution

a) Pollution from raw sewage

Planned improvement works in the Evenlode over the next five years will increase the storage capacity at Finstock, Little Compton, Middle Barton, and Moreton-in-the Marsh, as well as the treatment capacity at Milton-Under-Wychwood. However, these plans are limited in nature given the extent of sewage discharges. They do not go far enough to significantly improve water quality in the Evenlode, particularly in light of the extensive housing development planned, with every 100 houses adding approximately 30 tonnes of raw sewage per day to the network[x].

Meanwhile, multiple breaches of treated sewage effluent and CSO (Combined Sewer Overflows) permits have been reported to the EA. Despite the frequency of raw sewage spills into the river (see above), the EA has only officially recorded two major or significant crude sewage pollution events into the River Evenlode over the seventeen-year period between 2001 and 2018[xi]. Limited resources and guidance from Defra are preventing the EA from robustly enforcing the law.

The spilling of untreated sewage allows Thames Water to achieve inflated scores for discharge compliance in the annual Environment Performance Assessment prepared by the EA. Not only do these false data help to mask the true level of pollution by Thames Water, they also provide an overly positive picture of compliance to the financial regulator, OFWAT. This situation gives clear profit advantage to Thames Water, and we are concerned that this is reflected in the limited nature of the planned upgrades to sewage works.

b) Pollution from treated sewage

Plans to reduce phosphorus inputs to the river from treated sewage effluents have stalled. During the planning stages to build the current 5-year investment plan ("Asset Management Planning cycle 7", or AMP7), which took place in 2019, no sewage works in the Evenlode catchment met the threshold to install phosphorus removal. On revisiting this more recently, the EA has identified 4 sewage works which do indicate a positive cost-benefit result[xii]. In advance of the upcoming planning process for the next AMP cycle, due in 2024, the EA and Thames Water have been in discussions to understand whether the delivery of these schemes could be brought forward; this would involve additional investment which was not previously allocated in PR19.To date, this investment has not been secured. Until investment is found, we cannot expect any reductions in phosphorus inputs from treated sewage until the late 2020s.

c) Pollution from diffuse sources

The ECP is actively engaged in a number of initiatives to reduce diffuse (mainly agricultural) pollution, and Thames Water is supporting trial interventions at a number of locations in the catchment with the aim of reducing diffuse source run-off. These schemes began delivery in 2016 and will continue into the future.

Support from the EA has enabled us to identify over 10 land-based interventions that will also reduce run-off. A number of these schemes are being taken through to detailed design and will be delivered within the next year.

The ECP are working with Natural England to deliver pollution reduction measures under the present Countryside Stewardship scheme and the soon to be rolled out Environmental Land Management Scheme (ELMS).

With FarmEd we are also supporting local 'farm clusters' and regenerative agriculture in the catchment. These longer-term projects aim to shift the way agriculture works to improve the natural environment, including reduce diffuse run-off.

As a group, we are concerned that all of these initiatives will be ineffective if not combined with immediate action to reduce sewage pollution.

The Future

Without the following actions, water quality in the Evenlode will remain poor, and will fail to meet the government target of achieving 'Good Ecological Status' by 2024:

- TW must ensure compliance with its statutory discharge permits for STWs and cease discharging untreated sewage. The EA must regulate effectively and ensure compliance with statutory permits. Failure of the water industry to meet these requirements must be met with robust enforcement action.
- Upgrades of sewage treatment works and network infrastructure must be carried out promptly both to ensure compliance with existing discharge permits and to allow adequate headroom for the challenges posed by rapid development.
- Thames Water must commit to securing investment for the recommended installation of phosphorus removal, and phosphorus stripping should be installed as soon as possible at key STWs across the catchment.
- The slow improvement in reducing diffuse run-off must accelerate under ELMS

The ECP will continue to work in good faith with all partners, statutory and non-statutory, to achieve Good Ecological Status in the River Evenlode and its tributaries. The Partnership is, however, significantly hampered in this aim by the continued pollution of the rivers from Thames Water sewerage assets, by the lack of effective regulation and enforcement of sewage discharges by the EA, and by the failure of the planning authorities to adequately assess the impact of increased housing on sewage pollution. As a partnership, we are committed to ensuring that these issues are brought to light so that the above actions can be taken and the river returned to good health.

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[i] Physico-chemical spot sampling data 1976 – present, provided to the ECP by the Environment Agency on 27/8/2021.

[ii] Environment Agency data accessed at https://environment.data.gov.uk/water-quality/view/landing on 15/10.2021. Citizen science data collected using FreshWater Watch and accessed at https://freshwaterwatch.thewaterhub.org/our-data/explore-our-data on 15/10/2021.

[iii] Sewage effluent water quality monitoring data 2015 – present, provided to the ECP by Thames Water on 17/8/2021.

[iv] Environment Agency SAGIS modelling outputs, obtained by ECP member Vaughan Lewis.

[v] Data collected by ECP via Angler's Riverfly Monitoring Initiative, 2018 – present.

[vi] The Oxford Rivers Project interim report is publicly available here: https://www.thames21.org.uk/wp-content/uploads/2021/09/Oxford-interim-report.pdf

[vii] Analysis by Prof. Peter Hammond based on data covering period from September 2019 – June 2020. Data obtained via EIA. Example provided as annex.

[viii] Analysis by Mark Purvis. Data obtained via EIA.

[ix] Water Cycle Study for WODC undertaken by AECOM 2016

[x] Information provided by Thames Water

[xi] Data obtained from EA National Incident Reporting Network as part of Natural Capital baseline assessment for the ECP: https://storymaps.arcgis.com/stories/0974e9b1cf0542a0b7ce3e95b6a9eb30