Sampling the River Ure and its major tributaries 21st August and 9th October 2024

Image: SUP Volunteers Paul Markie and Nick Gaskell collecting samples at Aysgarth Middle Falls

(c. Gaynor James)

Report Title	River Ure Water Quality Sampling 2024
Description	Analysis and interpretation of numerous water quality parameters sampled across 45 sites on the River Ure across two days in August and October 2024
Project Reference	01F Stop Ure Pollution Water Testing
Date	04/06/2025
Drafted by	Charlotte Simons
Reviewed by	Mary Boyd, Rick Batterbee, Clare Beasant (YW)
Authorised by	Marie Taylor

Contents

Executive Summary

This report presents the findings from the water quality sampling conducted on the River Ure and its major tributaries on August 21st and October 9th, 2024. The study aimed to analyse various water quality parameters across 45 sites to establish a baseline profile, identify pollution sources, and assess the suitability of potential bathing sites.

The project was a collaborative effort between Yorkshire Dales Rivers Trust and Stop Ure Pollution, supported by volunteers and funded by Yorkshire Water. Water samples were collected by citizen scientists and analysed for physico-chemical parameters, faecal bacteria, and nutrients.

Key Findings

1. **Physico-Chemical Parameters**: The results indicated low levels of pollutants during the low flow sampling in August, with higher levels observed in October due to increased river flow and surface runoff. Phosphate and nitrogen concentrations were within acceptable limits, except for certain sites like the Tutt and Skell tributaries, which showed elevated levels .
2. **E.coli Levels**: E.coli concentrations were higher in October compared to August, likely due to storm discharges and agricultural runoff. Several sites, including potential bathing sites at Aysgarth Falls and Masham, had E.coli levels above the threshold for safe bathing.
3. **Pollution Sources**: The study identified significant pollution sources, including agricultural runoff, septic tanks, and storm discharges from sewage treatment works. The Tutt tributary showed particularly high levels of pollutants, warranting further investigation.

Recommendations

1. **Further Investigations**: Conduct detailed investigations on the Tutt and Skell tributaries to identify pollution sources and implement mitigation measures.
2. **Septic Tank Management**: Improve data on septic tank locations and promote proper maintenance to reduce nutrient and bacterial pollution.
3. **Designated Bathing Water Status**: Pursue designated bathing water status for sections of the River Ure to ensure regular monitoring and public awareness of water quality.
4. **Microbial Source Tracing**: Implement microbial source tracing to distinguish between human and livestock faecal bacteria and target pollution sources effectively.

Conclusion

The River Ure water quality sampling project has provided valuable insights into the current state of the river and its tributaries. While the overall water quality is within acceptable limits, certain areas require further investigation and targeted actions to mitigate pollution and ensure safe recreational use.

1. Catchment Overview

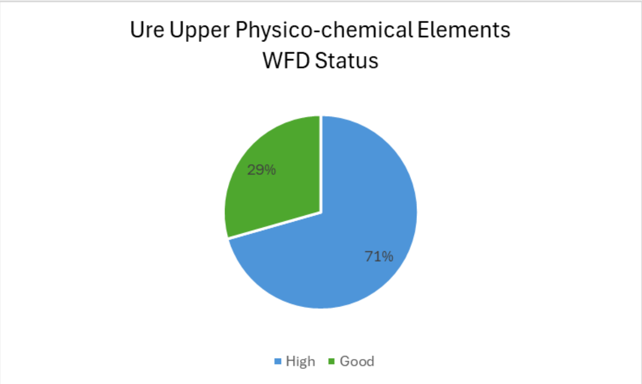
The River Ure runs across the Ure Upper and Ure Middle & Lower operational catchment areas and comprises 38 individual waterbodies under the Water Framework Directive (WFD).
Many of the smaller tributaries in the north-west of the catchment originate on the North Pennine Moors and are heavily influenced by the peatlands. From here, the River Ure winds its way south-east through the market towns of Hawes, Leyburn and Masham, to Ripon and Boroughbridge. There is a mix of rural farmland, both pastoral and arable, and wooded valleys with much of the watercourse running through the Yorkshire Dales National Park. In places the main river and its tributaries have been dammed to create lakes. Urban wastewater services are provided through both Yorkshire Water's public sewer network leading to 37 Wastewater treatment works and private sewage treatment facilities (approx. 113) mostly in the form of septic tanks.

Under the Environment Agency's Water Framework Directive assessments 39% of the waterbodies making up the river are in Good ecological status:

WFD Status	River Ure		Ure Upper		Ure Middle & Lower	
High						
Good	15	39%	12	67%	3	15%
Moderate	20	53%	4	22%	16	80%
Poor	3	8%	2	11%	1	5%
Bad						
Total Waterbodies	38		18		20	

Table 1: Ecological status of the River Ure – Environment Agency Water Framework Directive Assessment

Many waterbodies, particularly in the Ure Upper, have a High WFD status under the physico-chemical elements (acid neutralising capacity, ammonia, dissolved oxygen, phosphate, temperature, and pH) of the WFD assessment from 2022.



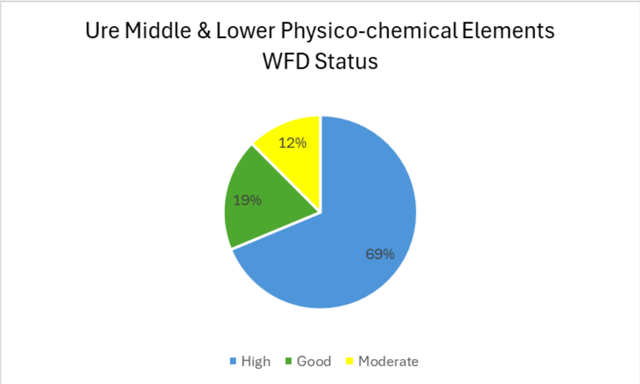


Figure 1 – proportion of Upper Ure and Ure Middle and Lower in high, good and moderate ecological status

2. Project Background

This report is the analysis and interpretation of numerous water quality parameters sampled across 45 sites on the River Ure (Yorkshire) across two days in August and October 2024. The dataset analysed includes a variety of water quality variables including pH, conductivity, temperature, faecal bacteria and nutrients. The aim of the work is to investigate the water quality across the catchment of the Ure, to identify any issues at potential bathing sites and make recommendations for future actions.

3. Project Overview

The project was a collaborative citizen science project organised between Yorkshire Dales Rivers Trust and Stop Ure Pollution, with the support of volunteers from SUP, YDRT, High Batts Nature Reserve and from Malcolm Secrett in the production of the report. Yorkshire Water supported the project with funding for the laboratory analysis and in the report writing.

On the 21st August 2024 and 9th October 2024, teams of citizen scientists took water samples from 45 sites along the River Ure and some of its major tributaries at approximately the same time on the same day. The samples were analysed by ALS Ltd for the faecal bacteria *E. coli* as well as chemical analysis including nutrients.

4. Objectives

1. Obtain a baseline for the water quality profile of the Ure Catchment
2. Identify reaches of water courses with significantly high or higher concentrations of pollutants, to target further investigation and mitigation.
3. Obtain a baseline for the *E.coli* profile of the Ure Catchment
4. Establish the water quality at potential bathing water sites on the testing dates

5. Methodology

On the 21st August and the 9th October, 10 and 11 groups of Citizen Scientists, respectively, took water samples from 45 sites along the full length of the River Ure at approximately the same time of day. The YDRT protocol for sampling was used – see Appendix 2, with all citizen scientists trained in using the survey technique. The two sampling days were selected in relation to river flow to ensure both high and low flow regimes were captured.

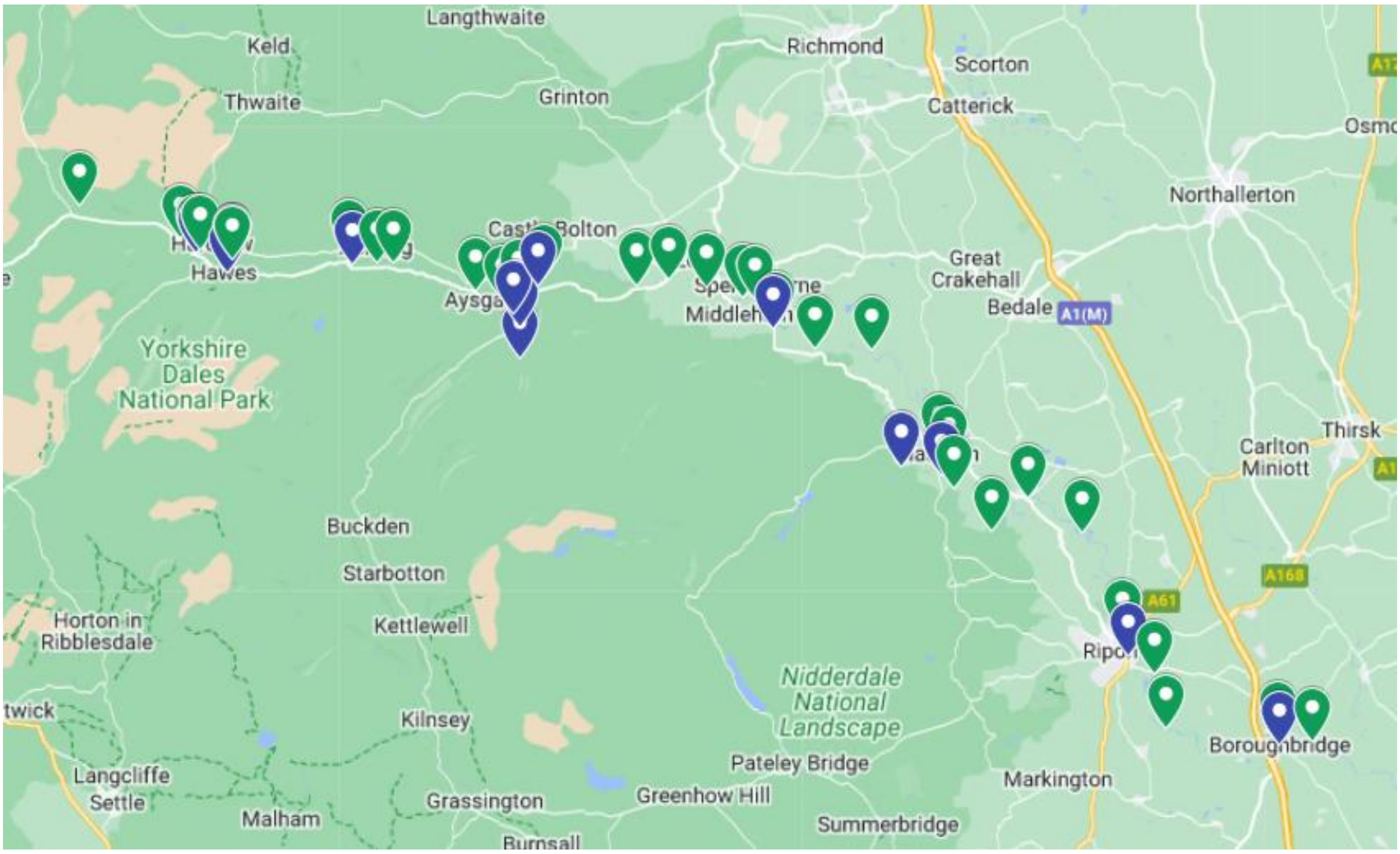


Figure 2: Map of all the sampling sites – main river sites are marked in green, tributary sites marked in blue

Temperature, pH and conductivity were all measured on site and the samples taken were sent to ALS Laboratories for physico-chemical analysis and Faecal Indicator Organisms (*E.coli*)

6. Test Variables

Physico-chemical

- Nitrogen, Total oxidised as N
- Total Organic Carbon (TOC) as C
- Orthophosphate – PO_4
- Suspended Solids
- Conductivity
- pH
- Temperature

Bacteria

- *E.coli*
- Total coliforms

7. Conditions on the sampling days

On 21st August weather conditions were stable (see table 2), and the river level at the mid-point of Masham was 0.34m. The days preceding the sampling had been mostly dry with only light rain in places. On the 19th August there was 2mm of rain and 20th August saw 0.6mm recorded at Thornton Steward (EA Hydrology Data Explorer), which is over the 0.25mm threshold to be properly classified as a 'dry day'. This was our low flow sampling day.

Table 2 – Rainfall in days preceding the low flow sample day – Defra Hydrology Data Explorer

Date	Daily Rainfall (mm)	Comment
19/08/2024	2	1.75mm above dry day threshold
20/08/2024	0.6	0.35mm above dry day threshold
21/08/2024	0	Day of sampling

On 9th October the weather conditions were not stable (see table 3), there was rain on the previous day and overnight. 7th October saw 1.6mm recorded, 8th October saw 21mm and 9th saw 1.8mm recorded at Thornton Steward. This resulted in the river being in spate conditions on the day of sampling. A moderate spate arising from the rain was running down the river at the times of sampling as shown below, making direct comparisons between sample sites on the day difficult. This was our high flow sampling day.

Table 3 – Rainfall in days preceding the high flow sample day - Defra Hydrology Data Explorer

Date	Daily Rainfall (mm)	Comment
07/10/2024	1.6	1.35 above dry day threshold
08/10/2025	21.0	19.75 above dry day threshold
09/10/2025	1.8	Day of sampling

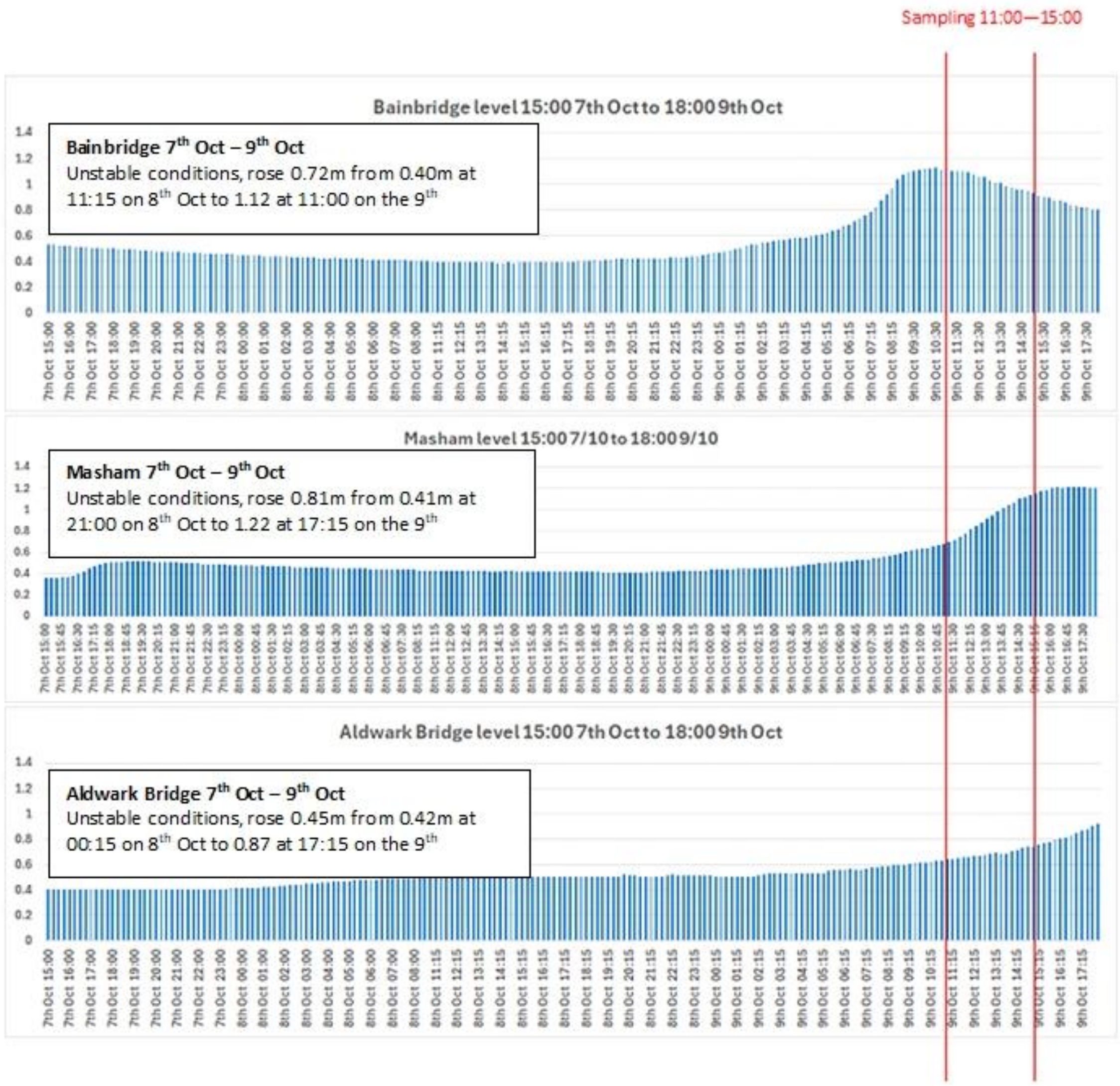


Figure 3: Changes in water levels seen on the 9th October 2024

8. Results and Discussions

a. Physico-Chemical Parameters

Phosphorus and nitrogen are essential nutrients for plant growth. They occur naturally in freshwaters but can be added to by human activity via agricultural runoff, wastewater discharge, and urban or industrial pollution. The problem of eutrophication can occur when a lake or stream becomes over-rich in plant nutrients, especially phosphorus, causing unnaturally high growth rates of photosynthetic algae, leading to 'algal blooms'. Algal blooms block sunlight, deplete oxygen through night-time respiration, as well as through the decomposition of decaying algae. Algal blooms and subsequent oxygen depletion threaten invertebrates, fish, and other aquatic plant communities.

Orthophosphate

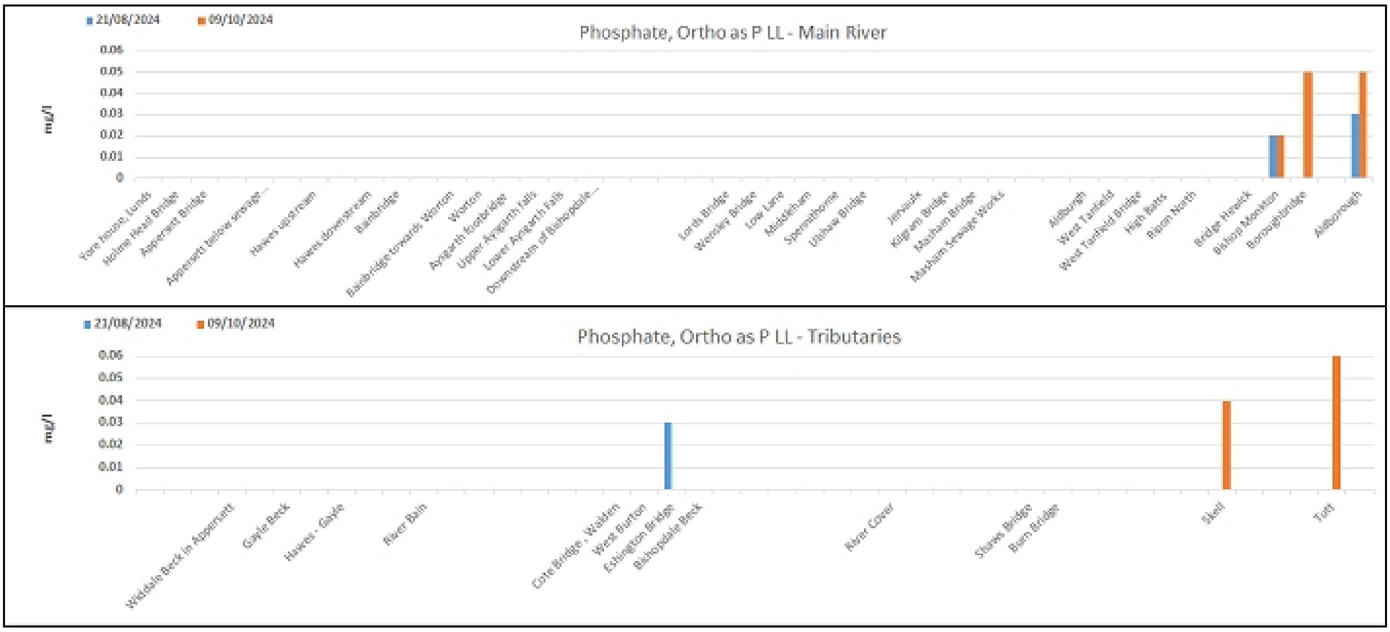


Figure 4: Measured levels of Phosphate, Ortho as P LL, on the main river and the tributaries

- In both August and October levels were below the detection limit of 0.02mg/litre at most sites with relatively high levels at only a small number of sites – these show as zero on the graph
- In August these were Eshington Bridge (tributary sample), Bishop Monkton and Aldborough
- In October these were Bishop Monkton, Boroughbridge, Aldborough, the Skell (tributary) and the Tutt (tributary)

Phosphorus (P) is a naturally occurring element that is essential for life. It originates from minerals in rocks and helps all living things to grow, repair tissues and produce DNA. The simplest form of phosphate in water is orthophosphate (PO_4). In healthy, natural river systems orthophosphate concentrations are very low – typically below 0.03 mg/L PO_4-P.

Human activity introduces additional sources of phosphorus to rivers. Important human sources of phosphorus are sewage discharges (both treated final effluent and untreated discharges via storm overflows), septic tanks and private treatment works and urban surface runoff.

Agricultural activity also introduces phosphorus to rivers. The main inputs of phosphorus are from urine and faeces generated by livestock, phosphorus rich fertilisers and soil runoff. Inputs from livestock have three main pathways: deposited directly by livestock, spread as manure or slurry as a fertiliser both to grassland and arable land or runoff from farmyards and hard surfaces. The upper parts of the Ure Catchment are mainly pastoral land with arable cropping starting to appear downstream of Leyburn.

In this project the water samples were analysed for orthophosphate and the results are expressed as the concentration of P in the phosphate (PO_4-P).

Phosphate levels are used as part of the assessment of the ecological status of a waterbody on a site-by-site basis with Environmental quality standards being based on each site's altitude and alkalinity. River types based on Upland/Lowland; High/low Alkalinity have boundary levels associated with them which relate to the WFD classification for Phosphate.

The Ure is typed as an upland low alkalinity waterbody down to Masham where it is then typed as a lowland low alkalinity waterbody. Lowland is taken as less than or equal to 80 metres above mean sea level and with low alkalinity as having a concentration of $CaCO_3$ of less than 50mg per litre.

Table 4 : details taken from Updated recommendations on Phosphorous standards for rivers – final report published August 2013

River Type	WFD classification - Annual Mean of P (and range) of Phosphate (mg/l)			
	High	Good	Moderate	Poor
Lowland, low alkalinity	0.019 (0.013 – 0.026)	0.04 (0.028 – 0.052)	0.114 (0.087 – 0.14)	0.842 (0.752 – 0.918)
Upland, Low Alkalinity	0.013 (0.013 – 0.020)	0.028 (0.028 – 0.041)	0.087 (0.087 – 0.117)	0.752 (0.752 – 0.918)

August
Aldborough – 0.09 mg/l – good to moderate
Eshington Bridge – 0.03mg/l – good

October
Skell – 0.12 mg/l – moderate
Bishop Monkton – 0.06 mg/l – moderate
Boroughbridge - 0.15 mg/l – moderate to poor
Tutt – 0.25 mg/l - poor
Aldborough – 0.15 mg/l - moderate to poor

All these values show evidence of nutrient pollution and would fail to meet the required standard of ”good” under the Water Framework Directive (WFD). The site showing the greatest evidence of nutrient pollution sources was the River Tutt in Boroughbridge.

Our results show that for the majority of sites the level of phosphorus is below the level of detection used by the lab (0.02mg/l) which using the data in table 4 indicates that the river would be classed as fitting within the high classification for phosphorus.

Having values below the detection limit does not mean that there is no phosphorus in the river. What it does mean is that the level of phosphorus is a limiting nutrient and the phosphorus in the river is being fully utilised and bound up by the benthic algae in the river, leaving no measurable amounts in the water column. Where the amount of phosphorus is more than is needed by the algae, the surplus shows in the levels measured. This is particularly obvious lower down in the system, in the Skell, the Tutt and in the main river from Bishop Monkton onwards.

From this, the site showing most evidence of nutrient pollution was the River Tutt.

Nitrogen

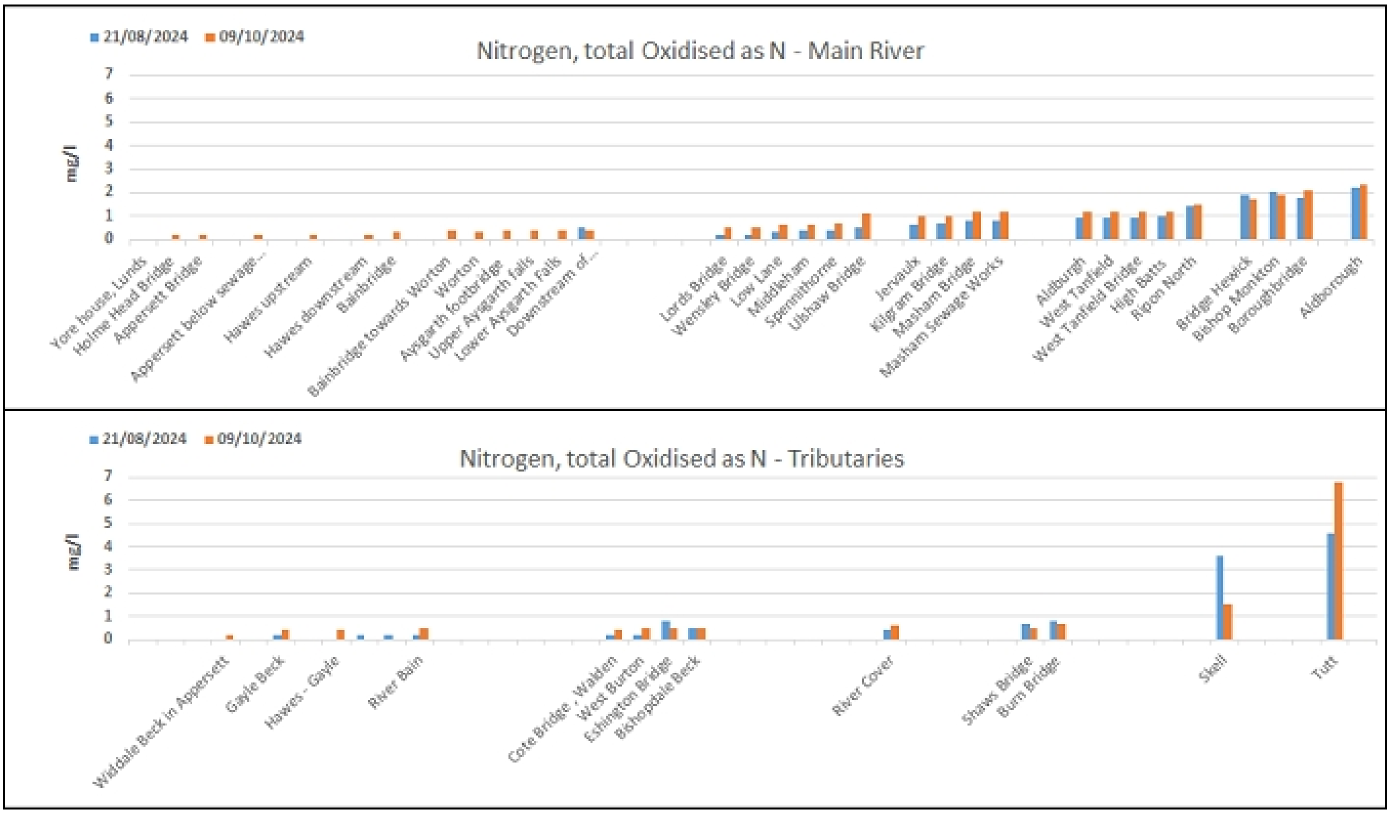


Figure 5 : Measured levels of Nitrogen, total oxidised as N, on the main river and the tributaries

- In August the Total Oxidised Nitrogen levels were below 2 mg/l at all but three sites – the Skell, Aldborough and the Tutt
- Total oxidised Nitrogen levels were higher in October than August – though the only sites showing a level of higher than 2 mg/l were the Skell and the Tutt

Like phosphorus, nitrogen is a naturally occurring element that is essential for life. supporting the growth of aquatic plants and algae, which in turn provide food and habitat for fish and invertebrates that live in water. In freshwater ecosystems the nitrogen cycle involves the transformation of nitrogen between various forms through biological and physical processes including nitrogen fixation, ammonification, nitrification and denitrification. Analysis of water samples for nitrogen include measurements of nitrate, nitrite and ammonia.

For nitrate-N a general guidance is for total nitrogen levels to be below 2mg/l to prevent eutrophication.

On the days of testing the downstream levels are higher than those found upstream. However, the levels found downstream did not reach 2mg/l until the Skell. The contribution from the Skell helped to bring the levels up to 2mg/l showing the potential for eutrophication to occur and algal blooms to develop.
The Tutt had the highest levels of Total Nitrogen at over 4 and 6mg/l in August and October respectively. These higher levels indicate that the Tutt could be seriously suffering from nutrient pollution.

Common sources of nitrate pollution include agricultural runoff, wastewater discharges and industrial processes. In the absence of sewage treatment works on the Tutt, and the lack of discharge from the CSOs on the Tutt at the time of sampling the high levels of nitrate in the river may be caused by diffuse pollution from agricultural runoff. The wet weather conditions on the days prior to sampling in October would have increased runoff from both agricultural land and urban surfaces.

Conductivity

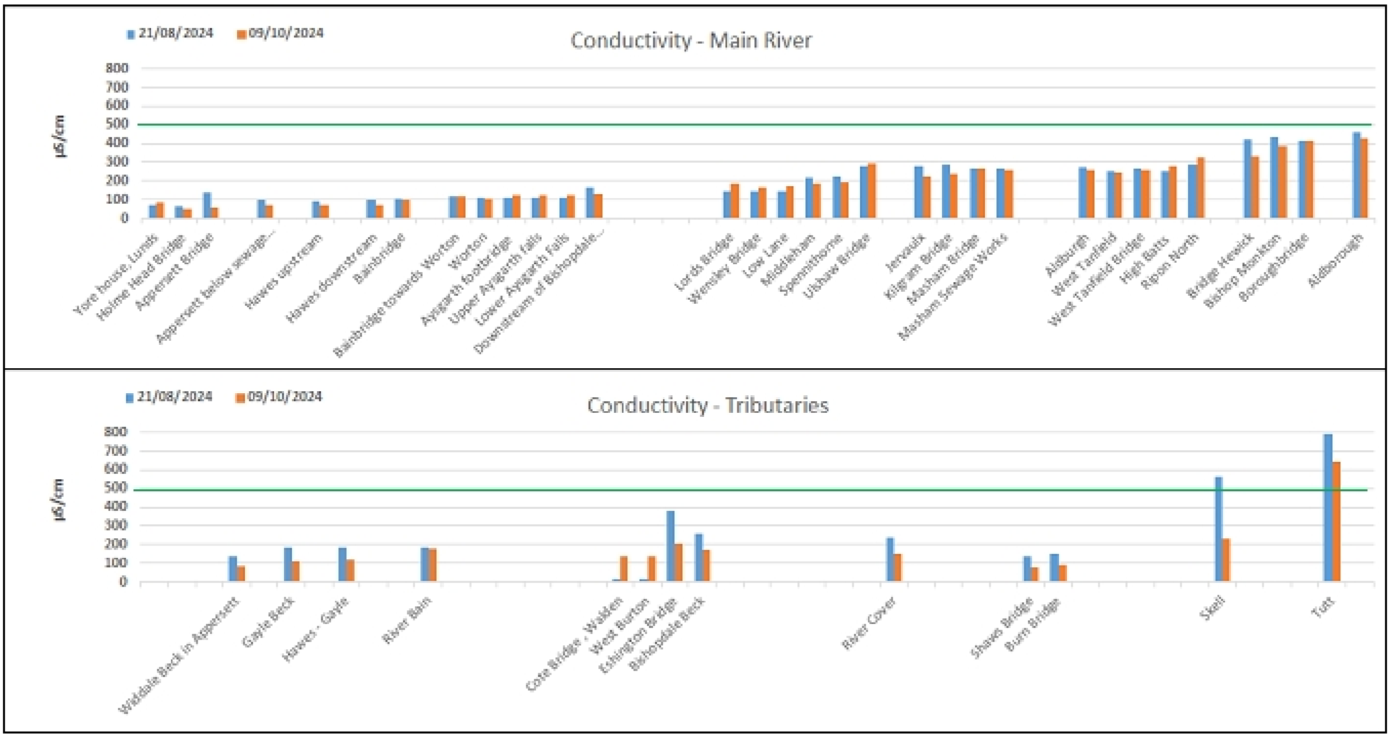


Figure 6 : Measured conductivity levels on the main river and the tributaries

- The Water Framework Directive's Environmental Quality Standard (EQS) for conductivity is 500µS/cm
- In both August and October, the levels of conductivity were low in the Upper catchment with stepped increases seen downstream of Bishopdale, Ulshaw and below Ripon North
- At all but two sites the readings were below 500µS/cm and these were the Skell and the Tutt.

Electrical conductivity is the ability for water to conduct an electrical current and can be used to measure the level of chemical pollutants in a river. Chemical pollutants release charged ions when dissolved in water. Charged ions conduct electrical current, therefore, the higher concentration of chemical pollutants in a river the greater capacity for electrical conduction (and the higher the conductivity reading). However, conductivity is also dependent on the concentration of dissolved salts derived naturally from underlying catchment soils and geology, so the contribution from pollutants to measured conductivity is not easy to identify.

The Environment Agency's EQS for conductivity is 800 µS/cm at 25°C. The electrical conductivity of a river is highly influenced by temperature. The higher the temperature of water the greater ability for it to conduct an electrical charge

At the top end of the catchment the conductivity was below 100 µS/cm in both August and October and although conductivity increased down the river, showing a potential increase in pollution there were only two sites that exceeded 500 µS/cm and may have a pollution issue on the day of testing, and these are the Skell and The Tutt.

Much of the conductivity in natural waters is explained by background soils and geology, but wastewater has a high conductivity, and the correspondence between these values and the P values indicates that these higher values are caused by pollution sources.

The water temperatures observed across the August and October sample days were much cooler by between 10°C and 15°C. Therefore, one would expect to see a conductivity reading much lower of around 480 µS/cm at 16°C in August and 320 µS/cm at 10°C in October (this is assuming a linear relationship between conductivity and temperature). With this in consideration, the aforementioned spikes in conductivity experienced at the Skell and the Tutt are much higher than the Environment Agency's EQS threshold for healthy ecosystem function.

Constant low conductivity readings (below 200 µS/cm) were seen in the upper section of the catchment with 200 µS/cm being first seen at Middleham with levels than slowly increasing up to 300 at Ripon North. The constancy observed between these sites indicates either a lack of significant point-source pollution and/or a result of the dilution effects of the main river

The water temperature was warmer in August than October (by ~5°C), therefore you would expect a higher conductivity reading in August than October if pollutant levels remained constant across both sample days. If readings of conductivity were higher in October than August, regardless of the warmer August water temperatures experienced, one can assume that pollution inputs at that site were significantly higher during the October sampling day. With that understanding, the following sites stand out - Cote Bridge and West Burton

pH

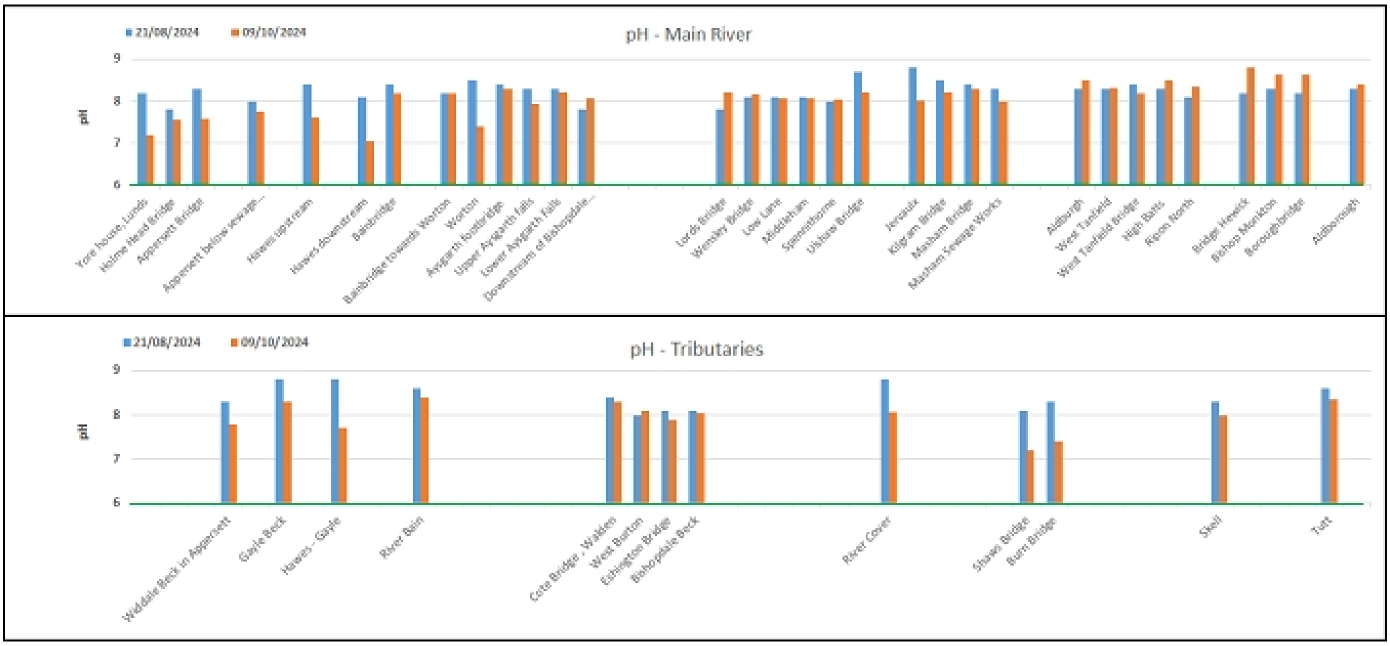


Figure 7 : Measured pH levels on the main river and the tributaries

The samples taken along the Ure sit consistently in the range of 7 – 8.8 pH units across both sampling days.

The Environment Agency's EQS for high and good ecological status for pH in rivers ranges from 6.5 - 9.0 pH units. This range is designed to ensure that the water quality remains within acceptable limits for aquatic life and ecosystem health but with consideration towards natural variation in geology, habitat type, landscape, and river typology.

Natural variation in pH across a catchment is expected. For example, rivers flowing through chalk or limestone landscapes are more alkaline whilst rivers flowing through peatlands and moorlands are more acidic. Overall, the range and fluctuation seen in the samples taken reflects this as the range of pH does not fall below 6.0, the indications are that this river is in good condition in relation to pH. Further understanding of the catchment's geology and landscape is required to interpret these results in more detail than this.

Spikes or extremes of pH may point towards sites with significant pollution issues. Our testing did not show any of these even on the sites which have higher readings for other physico-chemical features.

Temperature

In August the range of temperatures found were from 12-17°C and in October the range was between 10-13 °C. On both sampling days the cooler temperatures were found in the Upper reaches of the catchment and there was a gradual increase in temperature down the catchment.

Water temperature is important as it directly impacts the physical, chemical and biological processes in aquatic environments. In terms of water quality and river health:

- Warmer water holds less dissolved oxygen than cooler water which means less availability for species living in the water such as fish and aquatic invertebrates.
- Organic pollution can lead to severely reduced dissolved oxygen concentrations in rivers threatening the survival especially of salmonid fish species and many aquatic invertebrates such as stoneflies and mayflies

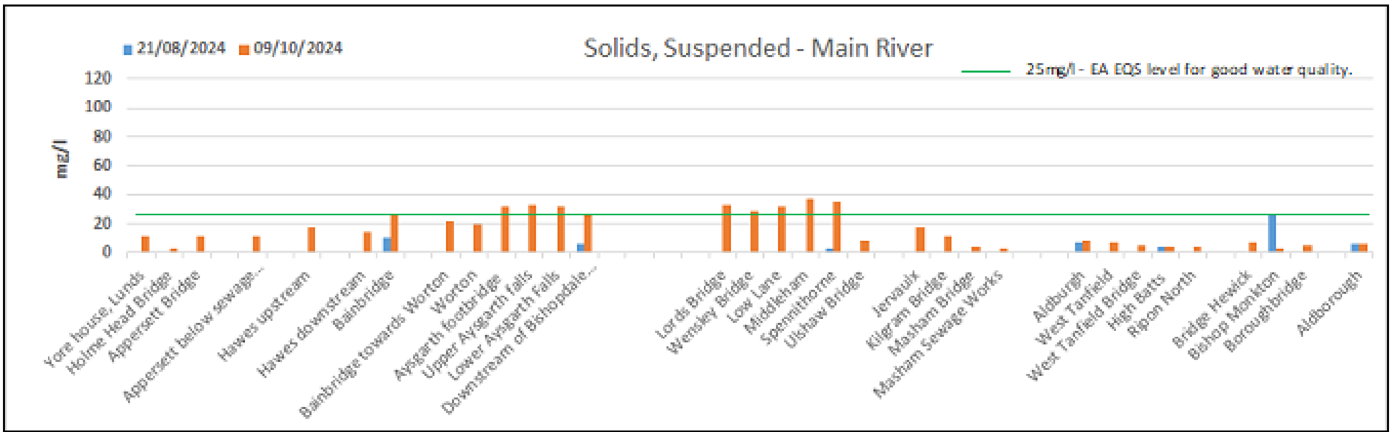
The Ure is classed as a salmonid carrying waterbody, which has specific temperatures linked to the state of the river (which are based on the temperatures required by salmonid species). Measurements are taken across a year and the 98% percentile is used to assess the quality.

Table 5 : EQS standards and typologies for water temperature, taken from WFD 2016 Cycle 2 - River & Canal physico-chemical classifications - Version 1 - Classification Rules & Supporting Information

	Quality				
	High	Good	Moderate	Poor	Bad
98%tile, °C	20	23	28	30	>30

In this project the temperature range seen in August was between 12-17°C and in October the range was between 10-13 °C. For both sampling dates the temperature was below 20°C – indicating good quality at the time of sampling.

Suspended Solids



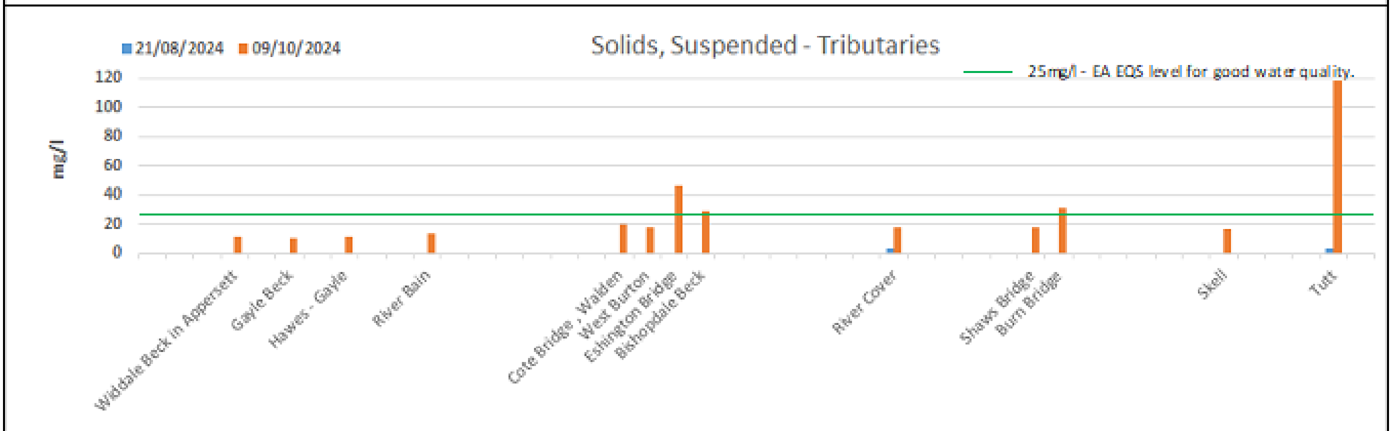


Figure 8: Levels of suspended solids determined by filtering each sample, drying filter to 105oC to a constant weight and then calculating the weight of the residue

- The Environment Agency's EQS for suspended solids is 25mg/l
- In August the levels of suspended solids are low across the catchment – with spikes seen at Bainbridge, downstream of Bishopdale, Spennithorne, Aldbrough, High Batts, Bishop Monkton and Aldborough.
- Of these sites only the level measured at Bishop Monkton was over 25mg/l. With the overall levels across the rest of the river being low at this time, it is thought that this may be due to disturbance of sediments during sampling.
- In October there was an overall increase in suspended solids across the catchment with only one site having a lower level than that seen in August – Bishop Monkton
- In October the level of suspended solids is above 25mg/l from Aysgarth footbridge down to Spennithorne, whilst on the tributaries Eshington Bridge, Bishopdale Beck, Burn Bridge and the Tutt are all above 25mg/l

Suspended solids is a measure of fine sediment levels in a river. Fine sediment can enter our rivers through multiple sources including from adjacent land management, the erosion of riverbanks, as well as wastewater from STWs, and it can be resuspended from the river bed during high flow events after heavy rainfall. Land use including agriculture and urbanisation can lead to excessive run-off of fine silt from surface waters, as well as reducing riverbank stability leading to accelerated rates of soil erosion. These pressures combined can cause excessive silt accumulation leading to the suffocation of river gravel beds (essential fish and invertebrate habitats), depletion of sunlight for photosynthetic organisms, as well as potentially increasing the concentration of pollutants (chemical pollutants easily attach to, and are transported by, sediments).

In October the suspended solid levels are higher for all sites except Bishop Monkton. This is not unexpected as

- Increased flow of water seen on high flow days leads to resuspension of fine sediment from the river bed.
- Surface runoff from fields carries soil particles into the river
- Discharges from CSOs and STWs can occur in high flow events

In the upper end of the catchment where the population levels are low, this increase is most likely to be from runoff. Further down the catchment discharges from CSOs and STWs can add to the levels of suspended solids.

In October the highest levels were seen on the Tutt (118mg/l) which matches with other parameters measured here, indicating that at the time of testing there was a pollution issue. Other sites where over 25mg/l were measured were between Aysgarth Footbridge and Spennithorne and all three possible causes of increased suspended solids will have been in play. However, to put this into context, the levels seen in this area did not go above 37mg/l which can be considered to be low compared to the levels measured on the Tutt.

Total Organic Carbon (TOC)

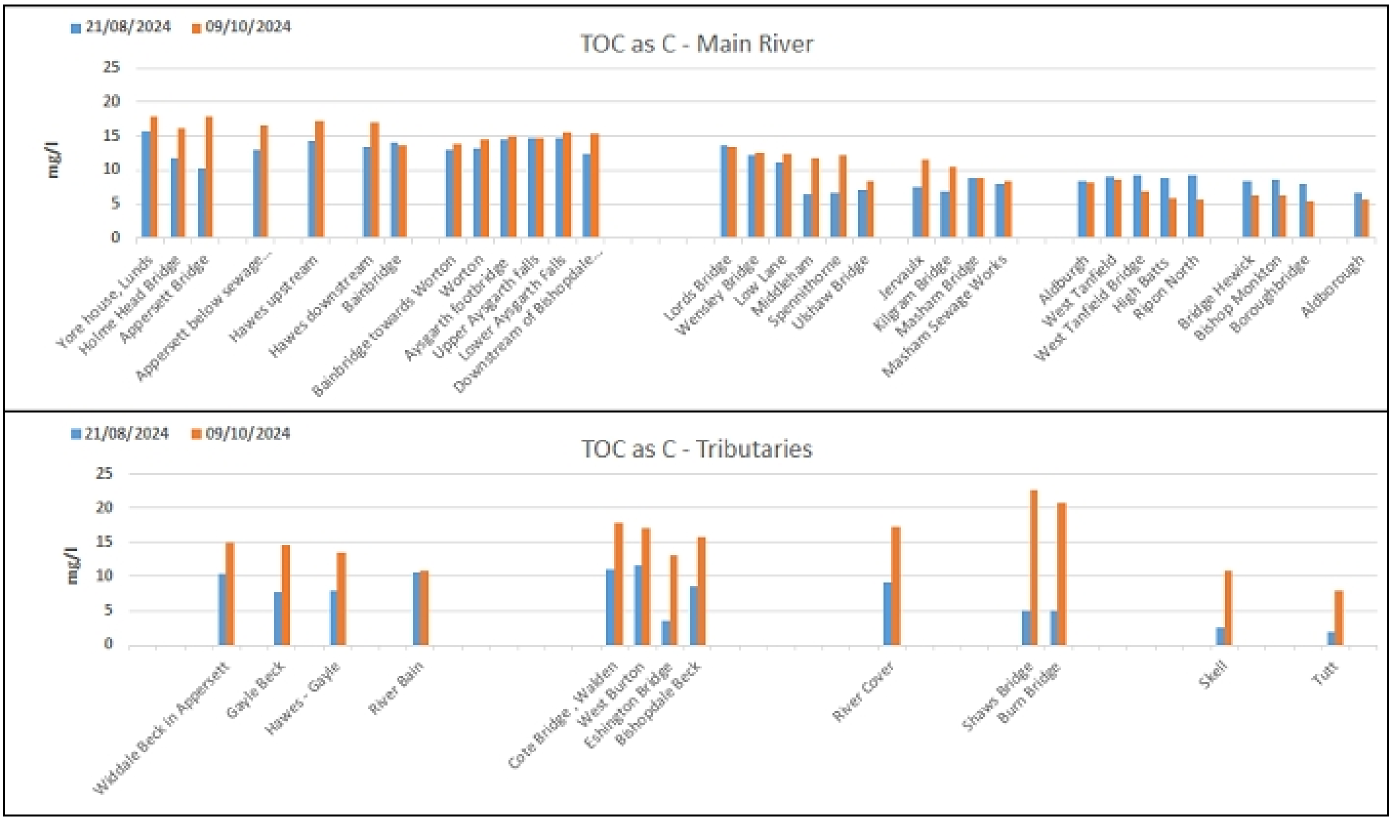


Figure 9: Total Organic Carbon, measured as Carbon

- In both August and October TOC levels on the main river are higher at the top of the catchment and decline downstream
- In October the size of the decline is greater than August
- In each of the tributaries a greater level of TOC is seen in October, with the largest differences seen at Cote Bridge, Eshington Bridge, Bishopdale, River Cover, Shaws Bridge, Burn Bridge and the Tutt.

The levels of TOC are comparable between August and October, with a higher level in October due to the higher flow rate of the river. The higher levels in the headwaters, declining downstream indicate an upland source of TOC, which in this area will be from the peatland at the head of the catchment. Moving downstream tributaries with peatland headwaters also add TOC, but TOC levels drop downstream as the influence from the peat reduces and the TOC concentrations are diluted with water coming in from the lower tributaries, around Masham.

In October the levels of TOC are higher overall and this is due to increased levels of dissolved carbon being washed into the river after rainfall.

b. *E.coli*

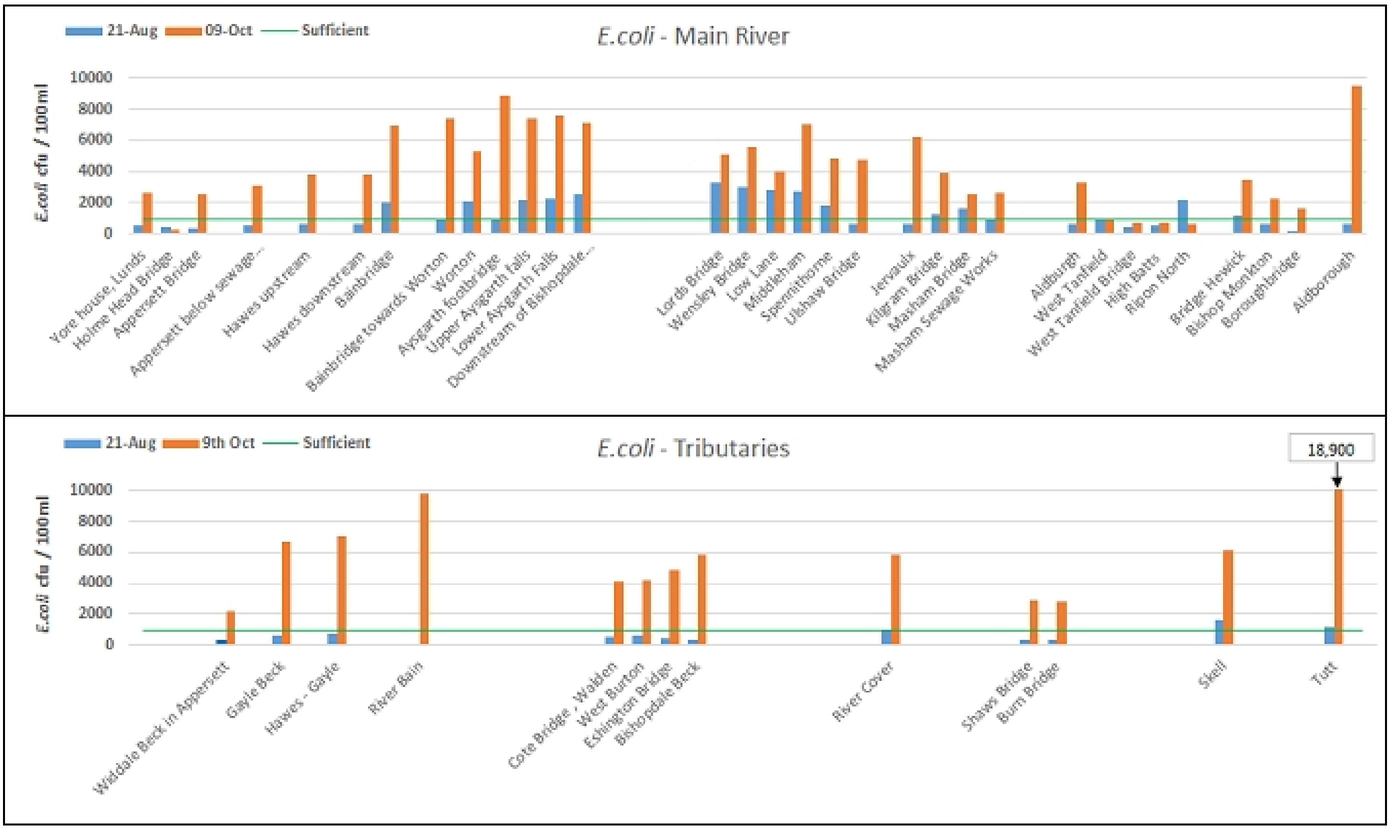


Figure 10: measured E.coli levels compared against the "sufficient" standard for bathing waters

In August it was found that:

- 20 out of 45 sampling sites had *E.coli* concentrations above the levels deemed "sufficient" for inland bathing water, and the remaining 25 sites were below this threshold and therefore deemed "insufficient" for inland bathing.
- *E.coli* concentrations rose at Bainbridge, Worton and between Aysgarth Falls and Lords Bridge; remaining high (over 2000 cfu/100ml) until past Spennithorne.
- Increased *E.coli* concentrations were also noted at Masham Bridge and Ripon North in the lower catchment.
- Potential designated bathing sites at Aysgarth Falls had *E.coli* concentrations above the levels deemed sufficient for inland bathing water.
- *E.coli* concentrations in the tributaries were much lower than in the main river. Three of the tributaries (Cover, Skell and Tutt) would not meet the sufficient level for inland bathing water.

In October it was found that:

- In the majority of the sites, *E.coli* levels were higher in October than August. The only sites that did not follow this were Holme Head Bridge and Ripon North.
- All bar five of the sites had *E.coli* concentrations above the levels deemed sufficient for inland bathing water – these five sites were Holme Head Bridge, West Tanfield, West Tanfield Bridge, High Batts and Ripon North.
- *E.coli* concentrations rose at Bainbridge and between Aysgarth falls and downstream of Bishopdale Beck, which was also seen in August, and gradually decreased to low levels at West Tanfield
- A further increase was seen at Bridge Hewick and Aldborough
- Potential designated bathing sites at Aysgarth Falls had *E.coli* concentrations above the levels deemed sufficient for inland bathing water.
- *E.coli* levels in the Tributaries were higher than seen in August with the highest levels seen at Gayle beck, Hawes – Gayle, the River Bain, the River Cover, the Skell and the Tutt

Faecal bacteria in water can come from a number of sources both directly and indirectly. These include discharges from sewage treatment plants and improperly maintained septic tank systems, animal faeces entering directly into a watercourse or washed off from the banks of watercourses and from surface water runoff.

Sewage Treatment Works (STWs) and Combined Sewage Outfalls (CSOs). - STWs are designed to remove organic matter from wastewater and have tight permits for ammonia, suspended solids and biochemical oxygen demand. STWs do not have a permit requirement to remove bacteria and pathogens. Whilst treated effluent does have considerably lower levels of faecal bacteria than untreated wastewater, final effluent does still contain high concentrations of pathogenic faecal bacteria.

Table 6 – Breakdown of Yorkshire Water wastewater assets on the River Ure

Asset Type	Count
STW (continuous discharge)	37 (24 descriptive, 13 numeric)
Storm Overflow Outfalls	61

Septic Tanks - In the Ure catchment there are approximately 113 permitted discharges that are not part of the Yorkshire Water network, these are made up of septic tanks and private treatment works. There will also be septic tanks that were installed before the permitting system was put in place – it is not possible to estimate how many of these are. Septic tanks are designed to treat wastewater from homes and businesses that are not connected to a waste sewerage system, predominantly in rural areas. They work by allowing solids to settle out of wastewater and then a natural bacterial process breaks down the remaining organic matter. If a septic tank is not properly maintained, or if it is overloaded, it can fail to treat the wastewater adequately, leading to the release of untreated or partially treated wastewater into the environment, which can in turn contaminate groundwater, surface water and watercourses with faecal bacteria.

Agricultural Land - The main sources of *E.coli* in watercourses from agriculture land are faeces from livestock. This can be related to a specific point or be as diffuse pollution carried across the land in surface runoff. Point sources include runoff from areas with animal waste such as farmyards and slurry stores, animal crossing points and places where livestock have direct access to watercourses for drinking water

Urban Run-off - The main sources of *E.coli* in urban areas are animal waste from pets and other animals - including birds - being carried in runoff across hard surfaces and in storm drains during heavy rainfall

E.coli levels are not normally measured within the Water Framework Directive assessment of watercourses. They are however measured at designated bathing water sites. For each bathing site up to 20 water samples are taken across the bathing season and are tested for Faecal Indicator Organisms or FIOs (*E.coli* and intestinal enterococci (IE)). These samples are used to classify the bathing water as:

Excellent – *E.coli*: ≤500 colony forming units (cfu)/100ml; IE:≤ 200 cfu/100ml(95th percentile)
Good - *E.coli*: ≤1000 cfu/100ml; IE:≤400 cfu/100ml(95th percentile)
Sufficient – *E.coli*: ≤900 cfu/100ml; IE:≤330 cfu/100ml(90th percentile)
Poor – means that the values are worse than sufficient

Within our testing on the Ure we measured *E.coli* and Total Coliforms to establish the current baseline water quality at potential bathing water sites. The bathing sites that were of interest to SUP being at Aysgarth Falls and Masham

August
The results indicated that in low flow conditions almost half the sites had *E.coli* levels above those deemed as sufficient for inland bathing water. The highest levels were found in the river between Aysgarth falls and Bainbridge, with a further spike at Ripon North

Of 61 Yorkshire Water owned overflows on the River Ure none were discharging on the day of the low flow sampling. It is likely that the main sources of *E.coli* on this date are from agricultural sources and septic tanks at the top of the catchment with contributions from treated sewage coming into play from Appersett down – Appersett being the highest STW in the catchment.

The results for *E.coli* would suggest that on a low flow day there are certain places that could be considered as sufficient for bathing water, but these are not the two potential sites identified, Aysgarth falls and Masham.

<u>October</u>

The results for *E.coli* in October were higher than found in August. This is linked closely to the fact that this was a high flow day in the catchment. The only site with lower levels of *E.coli* was Ripon North.

On the 9th of October, 18 of the 61 storm overflows on the River Ure discharged wastewater into the River Ure for an average of 4.1 hours per overflow – see Appendix 3. This was impacted by the heavy rainfall the day preceding the river testing, with over 20mm of rain falling on October 8th, the 10th wettest day on the Ure in 2024. The heavy rainfall on October 8th, followed by the 1.8mm on Oct 9th will have increased the volume of wastewater in the network and is therefore a likely cause of the storm discharges. These discharges are a likely contributing source of the higher *E.coli* levels seen in October. Figure 11 shows the location of all the sampling sites, Sewage Treatment Works and Combined Sewer Outfalls.

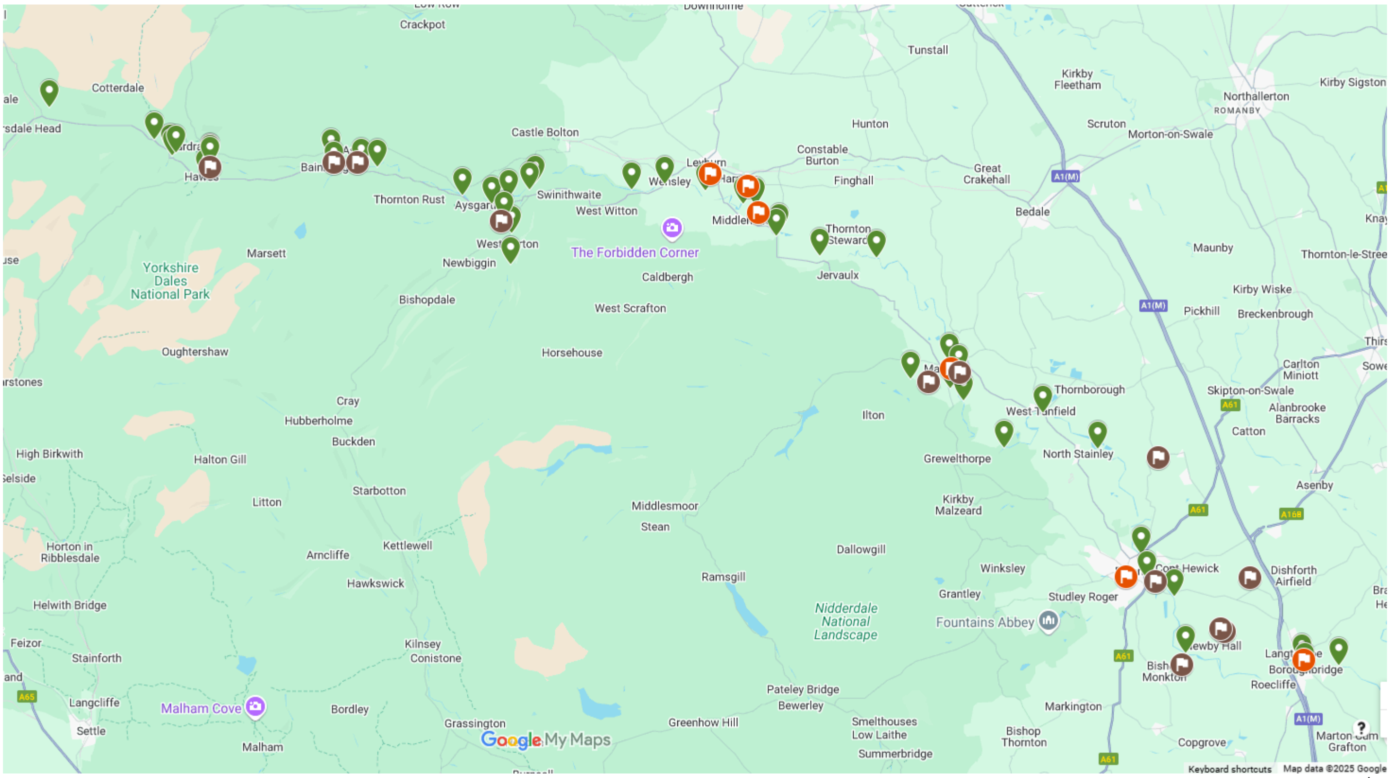


Figure 11: map showing location of sampling sites (green) and the YW discharges of untreated sewage on the 9th October – Source of discharges being Sewage treatment works (brown) and Combined Sewer outfalls (red).

The heavy rainfall in the catchment on the 8th October will also have increased the amount of runoff from agricultural land, bringing faecal matter with it. This is seen most obviously on the tributaries feeding into the Ure which has added to the higher levels already in the main river, as seen where the River Bain joins the Ure.

Over the next asset management period (AMP8) around 17 storm overflows are due for upgrade with eight already upgraded over AMP7 including the asset with the highest discharge counts in 2023 at Marton Le Moor that has since seen a 40% reduction in discharges as a result.

It is not possible from the tests carried out to identify the relative proportions of the main sources of *E.coli* from human or animal sources. To do this further testing would be needed which would specifically identify the sources. This is usually done using microbial source tracing.

The results indicate that higher levels of faecal bacteria are likely to be present in the Ure following rainfall and with this comes an increased risk to the public health of bathers.

Further investigation is needed to check the high levels seen in the Tutt and at Aldborough. Aldborough shows high *E.coli* levels as well as high phosphorus. Aldborough is downstream of the Tutt. Whilst the Tutt itself may be badly polluted it is a small stream in relation to the main river and the influence it has on the river is likely to be small. The influence on the river can be investigated with sampling just downstream of the confluence with the Ure, above and below the Boroughbridge STW alongside sampling on the Tutt. This will help to identify the influence of the Tutt versus the impact of the Boroughbridge STW.

Our results are only a snapshot from two days. Further sampling of bacteria levels will be needed to get a fuller picture of bacterial levels in the Ure and how these vary according to season and weather.

<u>Note on the Tutt tributary</u>
With an October count of 18,900 *E.coli* cfu/100ml this site needs a closer investigation. It might have been an isolated incident around the date of the October sampling, although it was also the highest both in August and October for Nitrogen total Oxidised as N, Conductivity and Suspended Solids.

In relation to *E.coli* further sampling is required to get a fuller picture of the levels here. This will require samples being sent to labs for analysis as the current other methods available to citizen scientists show presence/absence rather than giving exact levels.

In relation to the Physico-chemical results on the Tutt, further investigation could be carried out with a series of consecutive weeks field sampling for determinands that don't require laboratory analysis - i.e. Conductivity, Total Dissolved Solids, pH, and Dissolved Oxygen upstream from the sampling point at 54.094208,-1.396868, might reveal a point source or sources responsible for the contamination. Note that the A168 and A1(M) cross the Tutt ~750m upstream.

9. Conclusions

Our study of the River Ure had four main objectives. Our conclusions in relation to those objectives are as follows.

1. Obtain a baseline for the Physico-chemical profile of the Ure Catchment

In August the results reflected a low flow river with low levels of pollutants. The results from October show higher levels of Phosphate, Total Nitrogen, Total Organic Carbon and Suspended solids, though none is indicating high pollution levels and the levels reflect the higher flow of water and more surface water.

The results are in line with the Physico-chemical status for the waterbodies in the Environment Agency's catchment Data Explorer which divides the catchment into 35 water bodies of which 16 are classed as High status for Physico-chemical parameters, 11 are classed as good, and seven are classed as moderate . The Physico-chemical parameters that are the main reasons for classing of these waterbodies are listed as pH, temperature, phosphate and dissolved oxygen

Table 7: Physico-chemical Status for the waterbodies in the Ure Catchment – 2022 – source Environment Agency Catchment Data Explorer

Operational Catchment	Total No of waterbodies assessed	Bad	Poor	Moderate	Good	High
Ure Upper	18	0	0	2	7	9
Ure Middle and Lower	16	0	0	5	4	7
Whole Catchment	34	0	0	7	11	16

For the majority of the sites tested the results for the physico-chemical elements match the classifications under WFD. The sites where this is not the case on the sampling days are shown below in table 8

Table 8: Physico-chemical Status for the waterbodies in the Ure Catchment against the results found on sampling days

Sampling Site	WFD waterbody	Physico-chemical status under WFD	Physico – chemical indication from our results	Physico-chemical measurement showing a possible lower status
Eshington Bridge	Bishopdale Beck from Source to river Ure	High	Good	*August* Phosphate
Bishop Monkton	Ure from River Skell to River Tutt	High	Moderate	*August* Phosphate
Boroughbridge	Ure from River Skell to River Tutt	High	Moderate	*August* Phosphate
Skell	Skell from River Laver to River Ure	Good (dissolved oxygen)	Moderate	*August* Nitrogen, Conductivity *October* Phosphate
Tutt	Tutt Catchment	High	Poor	*August* Conductivity *October* Phosphate, Nitrogen, Suspended solids
Aldborough	Ure from River Tutt to River Swale	High	Good to moderate	August and October Phosphate Nitrogen

Alongside the results for these individual sites, of note is the stepped increase in conductivity, phosphorus and nitrogen downstream of Ripon, indicating an influence of the conurbation on the river.

The classifications under WFD are determined using samples taken over several years to identify the mean position. The samples will include both higher and lower results for each site. Our results are only a snapshot from two days and this needs to be taken into account.

Table 9 shows the levels of phosphorus measured by the EA at sites that are in the same location as the samples taken in this project

Table 9: Levels of phosphorus measured by the EA at sites in the same location as the samples taken in this project

	YDRT results		EA measurements Between Dec 2000 and Dec 2021		
	August	October			
Location Name	Phosphate, Ortho as P LL	Phosphate, Ortho as P LL	Min	Max	Mean
	mg/l	mg/l	mg/l	mg/l	mg/l
Holme Head Bridge	<0.02	<0.02	0.01	0.02	0.01
Appersett Bridge	<0.02	<0.02	0.01	0.05	0.01
Hawes upstream	<0.02	<0.02	0.01	0.08	0.01
Bainbridge	<0.02	<0.02	0.01	0.03	0.02
River Bain	<0.02	<0.02	0	0.14	0.01
Worton	<0.02	<0.02	0	0.19	0.02
Aysgarth footbridge	<0.02	<0.02	0.01	0.21	0.03
Eshington Bridge	0.03	<0.02	0.01	0.17	0.02
Wensley Bridge	<0.02	<0.02	0	0.18	0.02
River Cover	<0.02	<0.02	0.01	0.12	0.01
Kilgram Bridge	<0.02	<0.02	0.01	0.03	0.01
West Tanfield Bridge	<0.02	<0.02	0.01	0.13	0.02
Bridge Hewick	<0.02	<0.02	0.01	0.21	0.04
Boroughbridge	<0.02	0.05	0.01	0.16	0.03
Tutt	<0.02	0.08	0.01	0.63	0.06

From this we can see that for the majority of the sites our measurements are below the maximum levels found by the EA.

2. Identify reaches of water courses with significantly high or higher concentrations of pollutants, to target further investigation and mitigation.

The reaches of watercourses with relatively high concentrations of nutrients were the Tutt and the Skell tributaries

The sampling for both these watercourses was at the downstream end of each of them and so further investigation is needed to identify the scale of the issue along the tributaries and possible sources of both diffuse and point source pollution. These tributaries both run through the middle of Towns – Ripon and Boroughbridge respectively, and probable sources of nutrient pollution is surface run off and mis-connections

The Tutt did not stand out in the EA data as having any particular issues in 2022, whilst the Skell was classed as moderate in its upper section and good in the lower half. The parameter on the Skell which led to this was Dissolved Oxygen, which is important for fish and other aquatic animals.

Data for the main river show that phosphorus concentrations increase downstream from the confluence with the Skell.

3. Obtain a baseline for the *E.coli* profile of the Ure Catchment

From the water testing days, we have two snapshots of *E.coli* across the catchment. In both August and October, the same overall trend of low levels at the top of the catchment, with a stepped increase at Bainbridge, levels then staying high down to Shaws Bridge.

In October the levels of *E.coli* are higher at all sites. This is due in part to the discharges from the CSOs and STWs – see Appendix 3. The first of these is at Hawes. The River Bain shows a spike of *E.coli* which is due to the CSO at Bainbridge and then to the Ure. The next increase is seen at Aysgarth footbridge which is downstream of Askrigg CSO and upstream of the next CSO that was discharging at West Burton. The high levels of *E.coli* at Aysgarth footbridge and Aysgarth Falls are likely to be from both the CSO discharges, discharges of treated sewage, septic tanks and runoff from agricultural land.

Between Adams Bottom and Leyburn there are no CSOs and so more investigation is needed to explain the higher levels of *E.coli* that are present in both August and October.

In October the spikes in *E.coli* levels from Middleham down to Ulshaw Bridge are due to CSOs discharging at Middleham and Harmby and the input of treated sewage from Leyburn along with surface runoff across agricultural land.

The Tutt shows very high levels of *E. coli* in October (18,900 cfu per 100ml). It is not clear what the source of this is. The sample was taken just upstream from the confluence with the River Ure and at the time of sampling the CSOs in the area were not discharging – as with the physico-chemical parameters, this needs to be further looked into.

Very high levels of *E. coli* at the Aldborough site are probably caused by discharges of treated effluent from the Boroughbridge STW upstream

4. Establish the water quality at potential bathing water sites on the testing dates

At the start of this project concerns were raised about the safety of bathing at Aysgarth, in relation to public health. On the days that we tested, bathing at Aysgarth falls would not have been recommended as the levels of *E.coli* were above that considered to be sufficient for safe bathing. The same was also found at Masham.

On the day that we tested in August there were sites on the Ure where the *E.coli* levels could be considered to be sufficiently low for safe bathing such as between Yore House and Hawes, the tributaries that come into this section and then around Jervaulx.

However in October the only sites that would be considered sufficient were between West Tanfield and Ripon.

These data however only represent a snapshot taken on two days. More regular sampling is needed to fully see the trends in *E.coli* levels in relation to all weather and flow conditions.

10.Recommendations:

Further investigations on the Skell and the Tutt are a priority. Initial investigation could be carried relatively quickly and at a low cost with a series of walkovers and field sampling for determinands that don't require laboratory analysis - i.e. Conductivity, Total Dissolved Solids, pH, and Dissolved Oxygen. If funds allow, more detailed laboratory testing on these tributaries for nutrients, Biological work – diatoms, fish surveys and invertebrates, nutrients – phosphate and nitrates would be beneficial

Septic tank effluent contains a wide variety of pollutants including bacteria, nutrients, organic matter, suspended solids, pharmaceuticals, and household detergents/chemicals. Having better data on septic tank numbers and their connection to the drainage network would help in understanding possible additional sources of nutrient and bacterial pollution. From data on septic tank locations a targeted campaign around the upkeep of them and how to spot issues can be delivered.

Designated Bathing Water Status (DBWS) for a site on the Ure would mean that faecal bacteria indicative of harm to human health (i.e. *E. coli* and Intestinal Enterococci) would be monitored weekly during the bathing season (and possibly all year – depending on the outcome of the Consultation on Reform of the Bathing Water Regulations) by the Environmental Agency, and information on the water quality displayed publicly. This would allow river users to make informed decisions about the health risks of swimming in the river. Moreover, bathing water status would oblige responsible parties to reduce sewage and agricultural pollution in accordance with the Government Storm overflows discharge reduction plan which prioritises protecting designated bathing waters. A community group such as SUP would be best placed to pursue this. Guidelines on making an application to Defra can be found here.

Microbial source tracing (MST) investigations could be targeted on those watercourses with high concentrations of bacteria, to determine their likely source; distinctions can be made between human and livestock faecal bacteria and help determine whether it is septic tanks/wastewater or farming that is causing the high levels of bacteria seen. Effective MST investigations are very expensive (potentially running into 10s if not 100s of thousands of pounds) so potential funding for this would only be viable in conjunction with DBWS.

Determining the site-specific standards for phosphorus would be highly useful in order to properly interpret impacts of the phosphate concentrations seen at the lower Ure and tributaries. A 'river phosphate calculator' exists that enables the classification of sites into 'poor', 'moderate', 'good' and 'high' in relation to phosphorus concentration and is determined by other factors not measured for in this study specifically mean alkalinity (calcium carbonate concentration, $CaCO_3$ mg/l). It is recommended that these parameters are measured in future studies.

Previous research carried out on the Wharfe (Battarbee et al, iWharfe Eco Ashlands Report 2023) found that there is an impact on the ecology of a river caused by the discharge of nutrient-rich treated effluent. Nutrient pollution leads to eutrophication. The discharges of treated effluent had more impact on the ecology of the river than the discharge of untreated sewage from storm overflows. The impact of the discharges from the STWs along the river can be looked into by investigating the composition of diatom algae growing on the stones at points along the river, along with Riverfly monitoring.

Investigations into concentrations of other pollutants such as pharmaceuticals, heavy metals and petroleum hydrocarbons, are needed to identify any issues and possible sources of these items.

Yorkshire Dales Rivers Trust to continue its work in the area in the Ure Catchment in line with the Catchment Plans. Including:

- Reducing diffuse pollution as part of the Ousewem (Ouse Water Environment Management) project funded by Defra and supported by the City of York Council. The project aims to reduce flooding through nature-based solutions which slows the flow of water. Slowing the flow of water also has the benefit of reducing diffuse pollution (including animal waste and pesticides) from agricultural land. Focus areas for the project include Appersett, Gayle, Hawes, Masham and Bishop Monkton
- Working with schools and communities to educate and inspire the public to care for our rivers, including promoting Sustainable Urban Drainage Systems to reduce urban runoff.
- Working with volunteers to remove Invasive Non-Native Species, monitor water quality through Riverfly sampling, and reduce diffuse pollution through tree and hedge planting

- Working with partners, including the Yorkshire Dales National Park and Yorkshire Partnership, to identify opportunities to improve river health.
  And to seek funding to further its work in the catchment including:
- Advising landowners, famers and farming groups on ways to improve agricultural practices and farm infrastructure to reduce chemical usage, improve soil health and prevent animal waste from entering the Ure.
- Developing a whole catchment approach to identify and remediate the pressures on the Ure
- Expanding Riverfly monitoring across the catchment

Yorkshire Water

Yorkshire Water Upgrades

Yorkshire Water are embarking on their biggest environmental programme to improve the health of our rivers. This includes spending £1.5 billion to reduce storm discharges into our environment by nearly 50% over the next 5 years (based off 2023 baseline). They are also investing in their wastewater treatment works to achieve the Environment Act's target of an 80% cut in total phosphorus in final effluent by 2038 (based off 2021 baseline).

Along the River Ure, this includes upgrading 17 storm overflows over the next 5 years (April 2025-2030). In addition, they are adding a phosphorus removal scheme to Leyburn WWTW, reducing the phosphorus loading into the River Ure and decreasing the risk of eutrophication.

Storm Overflow Upgrades in Asset Management Plan (AMP) 08

- BISHOP MONKTON/NO 2 STW
- CHURCH WOOD/CSO
- BLOSSOMGATE/CSO
- HARMBY/CSO
- STONEBRIDGEGTE FR STN/CSO
- PARK VIEW/CSO
- WATH RIPON/STW/3XDWF OVERFLOW
- BORRAGE BRIDGE/CSO
- MARKINGTON/STW
- KIRKBY MALZEARD/STW
- THORALBY/STW
- HAWES/STW
- WEST BURTON/STW
- SKELTON/STW
- SWINTON MASHAM/NO 2 STW

Appendices

Appendix 1: Stop Ure Pollution – History, aims and objectives

Stop Ure Pollution began with an editorial in the Upper Wensleydale Newsletter in March 2024 which asked: 'What do the Wharfe, the Nidd and the Swale have that our Ure doesn't? The first three have groups of volunteers who are monitoring those rivers with the aim of reducing pollution. Surely it is time we also had such a group?'

There was such a large response that on April 30 2024 the Association of Rural Communities sponsored a meeting at Leyburn Methodist Church Hall – and 120 people came. An interim committee prepared the way for the meeting on June 25 at which Stop Ure Pollution was officially inaugurated with Prof Richard Loukota as its chairman.

Following that over 50 people volunteered to be citizen scientists working with Stop Ure Pollution and the Yorkshire Dales River Trust in August and October to test the water of the River Ure and some of its tributaries.

The aim of Stop Ure Pollution is to protect the River Ure and its tributaries for recreation and wildlife.

This will be achieved by:

• Stopping the discharges of raw sewage when storm conditions are not occurring, upgrading water treatment facilities, and identifying pollution caused by run-off from farms.

• Setting up and managing an ongoing Citizen Science project and training members to test and report on water quality at various agreed points along the River Ure.

• Obtaining Designated Bathing Water Status (DBWS) for at least one section of the River Ure.

Appendix 2 – Protocol for sampling

Testing for the levels of Faecal bacteria and nutrient chemicals in the River Ure with the aims of

- finding out just how bad (or good) the quality of the whole length of our river's water is,
- establishing the key sources of wastewater pollution in the Ure, and the locations of greatest concern to human and ecological health, and
- encouraging all stakeholders to play their part in improving the river Ure

Background:
The purpose of the testing is to get a snapshot of the health of the River Ure by measuring a series of elements. Sampling at multiple sites along the Ure and its tributaries will enable us to understand the chemical and biological profile of the river, and to help us gauge the relative importance of different pollution sources – on the same day with the same weather and river conditions.
The samples taken will be tested for nitrates, phosphates, faecal bacterial levels, suspended solids, pH and total organic carbon. Measurements will be taken at each sample point for water temperature, conductivity and turbidity. This snapshot will show the relative health of the river along with identifying areas of diffuse and point source pollution.
Nitrates and Phosphates are needed at normal levels for plant growth. An excess of them can cause explosive growth of aquatic plants and algae, leading to a variety of water-quality problems, including low dissolved oxygen concentrations, which can cause fish kills and harm other aquatic life.
The main sources of Pathogenic faecal bacteria, such as E. coli, are human or animal waste. Human waste enters streams and rivers via sewage works (treated and untreated), combined sewer overflows (CSOs) and septic tanks, whilst animal waste is mainly from farm livestock, especially cows, via slurry spills and surface water runoff.
As pollution flows downstream in a river, any pollution in a river will show at the source or sources of the pollution and further downstream.
Sampling:
We will be collecting water samples from 45 selected locations along the river Ure, from near its source to where it meets the river Swale.
The water samples obtained will be analysed in an accredited laboratory. This is to improve the reliability, accuracy and acceptability of regulating authorities and the water company. To ensure the veracity of the results, the details of the sampling days, the sites and exact location will only be known to YDRT and SUP. Yorkshire Water are paying for the laboratory work but they will not be involved in the testing, informed of the exact day of testing nor the sample locations until the results have been received back from the lab and processed by YDRT and SUP.
On the day we will have 10 teams of volunteers. Each team will sample 4 or 5 sites. The sampling will start at 11am and take roughly 2-3 hours. The samples will then be collected at 3 sites (Leyburn, Masham & Boroughbridge) before being driven down to the lab in Wakefield.

Sampling Kits

The sampling kit complies with the guidelines produced by CAStCo for water testing – previously used on the River Nidd as part of the project to gain designated bathing water status for the Lido on the river Nidd. Each sampling team will be given a kit containing all that is needed to collect samples in a safe and standardised way
Each kit is made up of

- Cool bag
- Sterile sample bottles, supplied by the laboratories testing the samples. Each bottle will be marked with site code. The time of sampling needs to be added using a permanent marker pen.
- Sampling device - a stainless-steel cup attached to a rope with a lead weight that can be dropped from a bridge parapet or swung into the water from the bank side. The lead weight needs to be heavy enough to hold the neck of the sample cup underwater.
- A small white pot – to use for conductivity, temperature and pH testing
- Ice Packs – store in freezer until 21st
- Groups 4,6,8 & 10 – small cool bags & spare icepack for sites over 10 minutes' walk away

- Tissues for wiping sampler down before using sterile wipes
- Sterile wipes for cleaning the steel beaker between sampling sites
- Water container – fill with water on the morning of the 21st August
- Small items – Gloves, marker pen, black bin bags
- First aid kit
- Boot brushes for clean boots
- High vis jackets
- Water conductivity and temperature tester
- pH tester
- Recording forms - a recording sheet has been prepared for each site with the shaded areas to be completed by volunteers
- Leaflets to hand passersby if they ask what you are doing
- Flier for your car window
- White laminated sheet to use as photo background for bottles

All items are the property of Yorkshire Dales Rivers Trust. Please treat with care and return at the end of the sampling day.

Sampling Guidance

Before 21st August

- Visit your sites – familiarise yourself with the area and check parking and access arrangements
- Review the risk assessment, note any specific hazards for your sites and implement additional control measures where required.
- Review sampling kit
- Freeze your ice packs
- Contact [redacted] with any queries or concerns

On 21st August

- Fill water container with water
- Please keep your emergency contact details on your person or accessible on your phone (ICE). In case of emergency dial 999.
- In the event of any problems with your kit or sites please contact Richard Loukota 07894 697707 (Groups 1-5) or Mary Boyd 07818 532650 (Groups 6-10)
- After 11am, conduct sampling in line with 'how to sample' instructions below.
- Complete information on record sheets for each site
- Complete information on sample bottles for each site
- Observe biosecurity protocol between sites
- Share photos by email (mary.boyd@ydrt.co.uk), WhatsApp (07818 532650), or upload to shared google photo drive (details sent by email)
- Return sample bottles and kits to:
  Group 1 to 5 – Leyburn Arts and Community Centre Car Park (next to Catholic Church) DL8 5DL Pip Pointon will be collecting

  Groups 6,7,8 –Masham Riverside Carpark. ///goodnight.submerge.gratitude 54.224302,-1.654508. [redacted]

  Groups 9,10 – Boroughbridge Waterside Carpark. ///stolen.invite.strike 54.098278,-1.396868 [redacted]

How to sample

Do not start sampling in your assigned zone (1 to 10) before 11am on August 21st. Sample your assigned locations **from upstream to downstream** (i.e. in increasing number order).

Read and review the risk assessment for the site, make team aware of any changes brought in due to the conditions on the day.

1. Have ready the large sterile sample bottle and smaller bottles already marked up for the site – double check they are the correct bottles from the bottle code/site name.

2. Put on gloves

3. Make sure the collection cup is **absolutely clean by wiping down with Clinell wipes**. Check that the cup and weight on the rope is in the right position and firmly attached. Do not touch the inside of the cup after this point

4. Use the cup device to collect water from a riverbank or bridge.
   Start by **Taking and discarding 3 samples, downstream or onto the bank, to rinse the collection cup and remove any residual contaminants.**
   - *From a bridge*, lower over the downstream parapet of the bridge until the weight drags the neck of the cup below the water surface. Fill and haul up. Transfer the contents to the sample bottle. Repeat if insufficient sample has been collected first time.
   - *From the bank*, ensure you have firm footing. Coil up the rope in one hand (holding firmly), swing and cast the collection cup as far as possible into the river. The weight should submerge the cup. Allow to fill and haul back to the bank. Transfer the contents to the sample bottle as above.
   - If you are sampling from a beck with scarcely any water in it, not deep enough to submerge the collection cup, put disposable gloves on and wade into the beck (from downstream, avoiding disturbing the area you are sampling from) until you can reach down and get a full sample into the collection cup. Transfer the contents to the sample bottle as above.

5. Take repeat samples until all three bottles are full. White topped bottles should be filled to the top. The red topped bottle filled to the shoulder. Screw the tops tightly

6. Add the collection time and your initials to each bottle.

7. Take three photographs to record:

   1. Filled sample bottles against white background
   2. Upstream of the sampling point
   3. Downstream of the sampling point

8. Place samples in the cool bag/box with ice packs.

9. **Conductivity and Temperature Testing (white meter)**. Take another sample and fill the white container pot to around 4cm. Remove the cap of the meter and turn on using the ON/OFF switch. Immerse the end part of the meter into the water. Stir lightly to dislodge any air bubbles and wait until the display stabilises. Once the reading stabilises (approx. 10 seconds) press the HOLD button to view the reading out of the water. Note down the reading (NB if the meter displays a flashing x10 symbol, multiply the reading by 10). Place the meter back in the water sample and press the TEMP button to take the temperature in °C. Turn off the device. Rinse probe with clean water, shake off any excess water and replace cap.

10. **pH Testing (yellow meter)**. Remove the cap of the meter and turn on using the ON/OFF switch. Immerse the end part of the meter into the water sample. Stir lightly to dislodge any air bubbles, release the meter and wait until the display stabilises (approx. 30 seconds). Note down the reading. Turn off the device. Rinse probe with clean water, shake off any excess water and replace cap. pH strips are available in case there are any issues with the probe.

Do not insert the conductivity or pH meters directly into your metal sampling cup – always use the white container pot for conductivity, temperature and pH testing.

11. Empty the white container pot and rinse with water.

12. Fill in the report form
13. Before leaving the site observe biosecurity guidelines: **check, clean and dry.** Use boot brushes provided to clean boots if required.

14. Leave the site clean, pick up any litter, especially plastic in the water, use a black sack.

Keep samples cool and dark, by putting them in the bag with the cool packs in it and deliver to the collection point (listed on the record sheet) as soon as you have finished sampling all your sites.

Appendix 3 Discharge Data from Yorkshire Water assets along the River Ure for the 9th of October 2024. (Source: Yorkshire Water) and nearest downstream sampling point

Site Name	Discharge Duration (Hours)	Nearest Downstream Sampling Point
Hawes/STW	0.9	-
Bainbridge/STW	0.8	-
Askrigg/STW	0.4	Bainbridge towards Worton
West Burton/STW	7.5	Eshington Bridge
Park View/CSO	3.2	Low Lane
Harmby/CSO	2.2	Spennithorne
Middleham/CSO	1.0	Ulshaw Bridge
Millgate Masham/CSO	3.0	Masham STW
Masham/STW	0.6	Masham STW
Swinton Masham/No 2 STW	8.7	Burn Bridge
Wath Ripon/STW/3xDWFOverflow	1.2	Ripon
Park Street/CSO	0.3	Skell
Ripon/STW	5.7	Bridge Hewick, Aldborough
Bishop Monkton/No 2 STW/6xDWF Overflow	3.0	-
Marton Le Moor/STW	6.6	-
Skelton/Stw/3xDWF Overflow	18.4	-
Skelton/Stw/6xDWFOverflow	7.8	-
Langthorpe/CSO	3.2	Aldborough

Key:
STW – Sewage Treatment Works
CSOs - Combined Sewer Outfall
3xDWF – - Storm Tank Overflow that kicks in at 3 x Dry weather flow.
6xDWF – Inlet Storm Overflow that kicks in at 6 x Dry weather flow

Appendix 4: References

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