



# **CLEAN RIVER KENT CAMPAIGN: A CITIZEN SCIENCE PROJECT**

## **RIVER KENT WATER SAMPLING 2022**

**December 2022**



**Authors: The Clean River Kent Campaign**

## CONTENTS

<b>1.0</b>	<b>Executive Summary</b>	<b>3</b>
<b>2.0</b>	<b>Background</b>	<b>4</b>
<b>3.0</b>	<b>Methodology</b>	<b>7</b>
<b>4.0</b>	<b>Results</b>	
4.1	Our citizen scientists	9
4.2	Analysis of samples	9
4.3	Microbiological results	
4.3.1	Definition of Inland Bathing Water Quality	9
4.3.2	Results from CRKC's samples at six river Kent sites	9
4.3.3	River levels as measured at the four river gauges	14
4.3.4	Further results – Staveley with Ings Parish Council	16
<b>5.0</b>	<b>Discussion &amp; Conclusions</b>	<b>17</b>
<b>6.0</b>	<b>Acknowledgements</b>	<b>18</b>
<b>7.0</b>	<b>Contact details</b>	<b>19</b>

### FIGURES

<b>Figure 1:</b> Maps showing locations (and co-ordinates) of water quality testing sites – river Kent, Cumbria	<b>6</b>
<b>Figure 2:</b> Photo of children playing in the river Kent (summer 2022)	<b>8</b>
<b>Figure 3:</b> Graph showing the 90 <sup>th</sup> percentile for <i>E. coli</i> at each monitoring location	<b>13</b>
<b>Figure 4:</b> Graph showing the 90 <sup>th</sup> percentile for <i>Enterococcus spp</i> at each monitoring location	<b>14</b>
<b>Figure 5:</b> Photo of children paddling in the river Kent (summer 2022)	<b>16</b>
<b>Figure 6:</b> Photo of children enjoying the river Kent, Staveley (summer 2022)	<b>19</b>

### TABLES

<b>Table 1:</b> Inland Bathing Water Quality Standards	<b>9</b>
<b>Table 2:</b> Microbiological analysis of <i>E. coli</i> by location and by date	<b>10</b>
<b>Table 3:</b> Microbiological analysis of <i>Enterococcus spp</i> by location and date	<b>11</b>
<b>Table 4:</b> River Kent water quality assessed by <i>E. coli</i> and <i>Enterococcus spp</i>	<b>12</b>
<b>Table 5:</b> River water levels recorded at the river gauges on the dates which samples were taken compared with usual range (metres)	<b>15</b>
<b>Annex A</b>	
Issues encountered in working for the first time with a microbiology laboratory	<b>20</b>

## 1.0 EXECUTIVE SUMMARY

This paper summarises the results of the Clean River Kent Campaign (CRKC) water quality monitoring study at six locations along the river Kent, Cumbria, from Staveley to Sedgwick. The water samples were taken between February and September 2022 and analysed for the faecal bacteria *Escherichia coli* (*E. coli*) and *Enterococcus spp* in a UKAS accredited laboratory.

**The results show that at all six locations the quality of the river water was assessed as Poor (the worst category) due to high levels of faecal bacteria (both *E. coli* and *Enterococcus spp*). Water quality was worst at Beckmickle Ing, the location immediately downstream of Staveley Wastewater Treatment Works.**

We believe that this is the first time that information on faecal pathogens has been published for the river Kent. This unique study signals risks to human health and serious concerns for ecology and wildlife in a river which is a Site of Special Scientific Interest (SSSI), an international Special Area of Conservation (SAC), and which flows through a UNESCO world heritage site.

The quality of river water should be safeguarded by the water companies and their regulators. We call on these organisations to respond to our results by acting as a matter of urgency to work with us to clean up the river Kent.

## 2.0 BACKGROUND

The Clean River Kent Campaign (CRKC) was established in Autumn 2021 by a coalition of communities living on the 7.5 mile (12km) stretch of upland river from Staveley in the north to Sedgwick, just south of Kendal.

The river Kent is a short river in the county of Cumbria with a catchment size of 550km<sup>2</sup>. It originates in the hills surrounding Kentmere and flows for about 20 miles (32km) into the northern waters of Morecambe Bay. The river Kent is recognised both as a Site of Special Scientific Interest (SSSI) nationally and an international Special Area of Conservation (SAC) which runs through the Lake District National Park – a UNESCO world heritage site.

CRKC aims are to make the river Kent clean for all types of water-based recreation and to protect the ecology and wildlife in the river by campaigning for:

1. A significant reduction in the amount of effluent discharged into the river Kent. We will assess this through regular testing of river water samples for faecal bacteria.
2. Improvements to the Wastewater Treatment Works (WwTWs) on the river Kent:
  - To meet current needs and in addition
  - To meet the needs of new housing development and
  - To meet the additional pressures which will result from climate change.
3. The protection of the river's ecology and wildlife.

During 2022 we have completed two major projects:

First, we applied to DEFRA for bathing water status at Staveley Recreation Ground. We should hear the outcome before the start of the next bathing season in May 2023.<sup>1</sup>

Second, we have designed and completed a study of water quality as measured by the levels of faecal bacteria at 6 different locations (*See **Figure 1** – location of sites*). The Environment Agency (EA) is responsible for monitoring the water quality of inland waters in England, and, together with Ofwat, regulating the water and sewage companies. The systematic weaknesses in this system of regulation of both inland and coastal waters have become all

---

<sup>1</sup> Copy of the bathing status application available here: <https://bit.ly/3is2pp0>

## CRKC Results of River Water Sampling

too apparent and the regulators, Ofwat and the EA, launched an investigation into sewage treatment works in November 2021<sup>2</sup>.

We were concerned that, although the river Kent is well used for water-based leisure activities, including fishing, kayaking, and swimming, there is no requirement on either United Utilities, the local water and sewage company, or the EA to test for faecal bacteria unless the stretch of water has DEFRA bathing water status. So far only two rivers in England have achieved this – the Wharfe at Ilkley and the Thames near Oxford.

This means that there is no information available about the levels of faecal bacteria, or indeed pollution from other sources including septic tanks and agricultural run-off. Therefore, there is no indication as to whether it is safe to be in the river.

Jonathon Harte, an undergraduate student at the University of Cumbria, undertook sampling of the river Kent around Staveley between November 2021 and February 2022 as part of his dissertation research<sup>3</sup>. He took 3 sets of samples: above Staveley; towards the southern end of the village; and to the south of the village below the Staveley Wastewater Treatment Works (WwTW).

He concluded that whilst coliform bacteria, including *E. coli*, numbers were relatively low above Staveley (48 cfu/100ml) and towards the southern end of the village (65 cfu/100ml), they were very much higher in the river Kent directly downstream of Staveley WwWT (1179 cfu/100ml, predominantly *E. coli*).

*E. coli* and *Enterococcus spp* (another group of faecal bacteria) are not only potentially harmful to human health, but their presence also indicates a broader threat to wildlife. Decomposition of organic matter discharged from the WwTW reduces the dissolved oxygen concentration of the receiving waters and adds nutrients (nitrogen and phosphorus) which can lead to issues associated with eutrophication. <sup>4</sup>

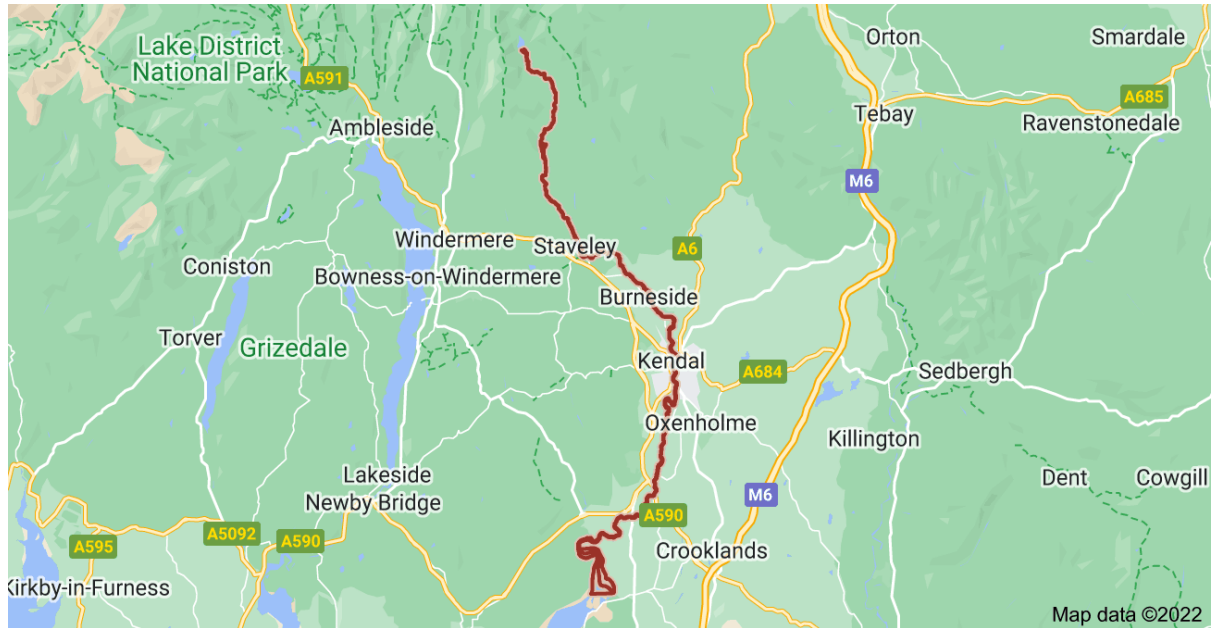
---

<sup>2</sup> [www.ofwat.gov.uk/investigation-into-sewage-treatment-works/](http://www.ofwat.gov.uk/investigation-into-sewage-treatment-works/)

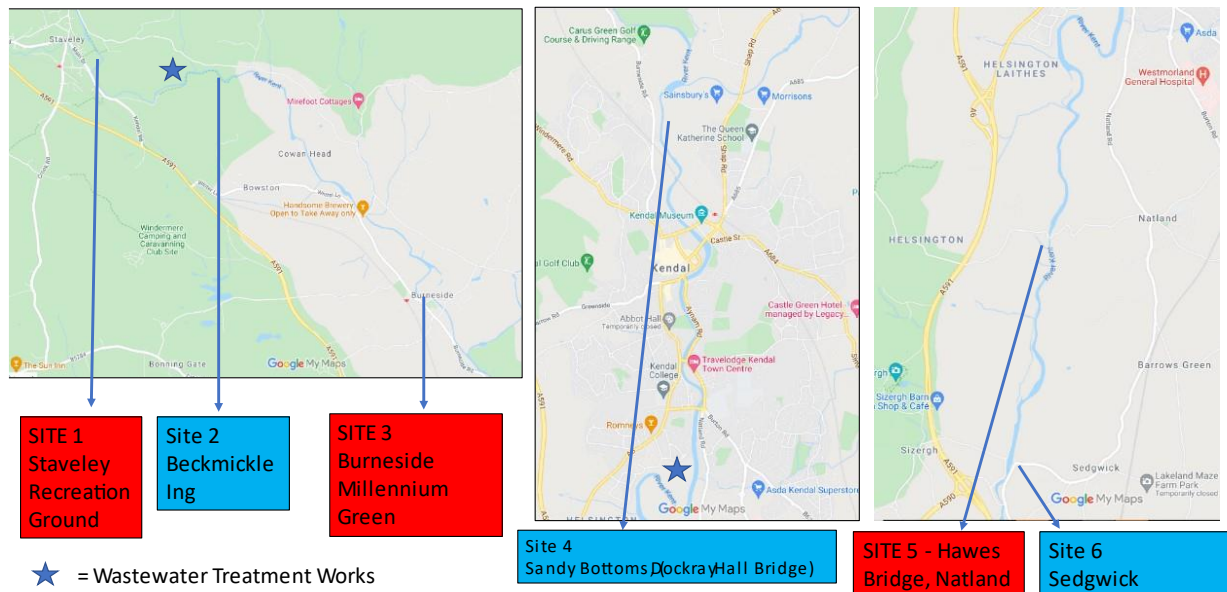
<sup>3</sup> Jonathon Harte dissertation, University of Cumbria, 2022 (available on request)

<sup>4</sup> Leaf, S.S. and Chatterjee, R. (1999) 'Developing a strategy on eutrophication'. *Water Science and Technology*, 39(12), pp.307-314.

# CRKC Results of River Water Sampling



## PILOT MONITORING (February to March 2022)



1. Staveley Recreation Ground 54 22 34.7 N / 2 48 45.5 W
2. Beckmickle Ing 54 22 27.0 N / 2 47 36.4 W
3. Burneside - Millennium Green 54 35 44.0 N / 2 76 11.5 W
4. Sandy Bottoms (Dockray Hall Bridge), Kendal 54 34 22.4 N / 2 74 55.3 W
5. Hawes Bridge, Natland 54 29 6.16 N / 2 74 92.4 W
6. Sedgwick 54 28 23.5 N / 2 75 61.3 W

**Figure 1 - Maps showing locations (and co-ordinates) of water quality testing sites – river Kent, Cumbria**

### 3.0 METHODOLOGY

CRKC designed a citizen science project to analyse river water samples for both *E. coli* and *Enterococcus spp* at the six locations most frequently used for water-based leisure. We took advice from the Ilkley Clean River Group<sup>5</sup> about the design of the project and the protocol for collecting and transporting the river water samples.

We recruited citizen scientist volunteers to collect the river water samples and transport them to the laboratory initially through an Open Event on 5<sup>th</sup> April 2022 and then using CRKC social media and other communication channels.

We identified ALS Laboratories Coventry (ALS) with a collection point in Preston as the most convenient UKAS accredited laboratory. ALS quoted the cost per test as +/- £45.00 i.e., £90.00 per sample to test for both bacteria. We therefore estimated the total costs of river water microbiological analysis as +/- £6,500 which we raised through grant applications and a crowdfunding.

The citizen scientist volunteers were trained either at a Training Day held on 14<sup>th</sup> May 2022 or, for the few who were unable to attend, via online meetings. We worked in small groups when collecting and transporting samples, and new volunteers partnered with those with more experience until they gained confidence. A written summary of the protocol for collecting samples was made available; this emphasised the importance of the samples remaining cool until they reached the laboratory.

The samples were collected in labelled specimen bottles supplied by ALS and transported surrounded by ice packs in cool boxes. At Preston the Chain of Custody Form was completed, and the box of samples labelled and placed in a fridge.

The logistics required the samples to be in the laboratory and plated out within 24 hours of collection, and to be in Preston by 17:45 for collection. ALS would inform us by email the next

---

<sup>5</sup> [www.ilkleycleanriver.uk](http://www.ilkleycleanriver.uk)

## CRKC Results of River Water Sampling

morning that the samples had reached the laboratory and were being tested for both bacteria. We expected to receive the results within 5-10 working days.

We planned to collect river water samples between February and September 2022 across the locations. On each day we logged the weather conditions and a visual assessment of river levels and referred to the four EA river gauges which cover this stretch of the river Kent. When we planned the study, we determined that our first application to DEFRA would be most likely at one of three locations – Staveley Recreation Ground, Burneside Millennium Green or Sandy Bottoms. We therefore planned to collect samples 10 times during the bathing season at these sites, and 5 times at the remaining locations – Beckmickle Ing, Hawes Bridge and Sedgwick.

The collections in February and March were to test the logistics, and, based on this, we decided to collect the May-September samples on Wednesday afternoons starting at 14:00. The exception was the one additional sample for Staveley, the location now selected for the DEFRA application, collected on Tuesday 1<sup>st</sup> August after 24 hours of unusually heavy rainfall.



***Figure 2 – photo of children playing in the river Kent (summer 2022)***



## 4.0 RESULTS

### 4.1 Our citizen scientists

In all 20 citizen scientist volunteers took part in collecting and transporting samples on one or more occasions. In total we collected 73 river water samples at six locations on 14 occasions. The protocol was carefully followed, and all samples reached ALS Coventry via Preston in good condition and within 24 hours.

### 4.2 Analysis of samples

Despite careful planning we encountered a few difficulties with the microbiological analysis. These are summarised in **Annex A**.

### 4.3 Microbiological results

#### 4.3.1 Definition of Inland Bathing Water Quality

River water quality is defined by DEFRA for coastal and for inland waters and is based on the measurement of *E. coli* and *Enterococcus spp*. The Inland Bathing Water Quality Standards for the two bacteria are expressed as percentiles and defined as follows:<sup>6</sup>

Inland Bathing Water Quality Standards			
INLAND BATHING WATERS QUALITY	<i>E. coli</i> Less than or equal to cfu/100ml	<i>Enterococcus spp</i> Less than or equal to cfu/100ml	Percentile
<b>EXCELLENT – Highest/cleanest</b>	500	200	95 <sup>th</sup> percentile
<b>GOOD – Generally good</b>	1000	400	95 <sup>th</sup> percentile
<b>SUFFICIENT – Minimum standard</b>	900	330	90 <sup>th</sup> percentile
<b>POOR – Below minimum standard</b>	<b>Worse than sufficient &gt;900</b>	<b>Worse than sufficient &gt;330</b>	

Note: The standards are calculated as percentiles, and the EA would base this calculation on 20 tests in a single year's sampling. The WHO recommends 100 samples per site.

**Table 1: Inland Bathing Water Quality Standards**

#### 4.3.2 Results from CRKC samples at six river Kent sites

The results from the six sites are shown in **Tables 2 and 3**.

<sup>6</sup> DEFRA Bathing Water Quality - <https://environment.data.gov.uk/bwq/profiles/help-understanding-data.html>

Microbiological analysis of E. coli by location and by date (colony forming units cfu/100 ml)								
Date 2022	Weather	River Flow	Staveley Recreation Ground	Beckmickle Ing	Burneside M Green	Sandy Bottoms (Dockray Hall Bridge)	Hawes Bridge	Sedgwick
11 Feb	Cloudy, cool, damp	Medium	N/A	N/A	N/A	N/A	N/A	N/A
2 Mar	Raining, stopped	Low	24	2500	1100	200	310	350
15 Mar	Sunny, cloud cover	Low/ Medium	12	590	390	140	150	150
18 May	Sunny, breezy	Medium	17		14	6		
25 May	Light clouds	Low/ Medium	>83	700	2500	100	3400	300
9 Jun	Overcast, drizzle	Low	180		>780	600		
30 Jun	Sunny	Low/ Medium	270	2000	1600	2900	800	>2900
13 Jul	Sunny	Low	290		530	450		
27 Jul	Sunny	Low	320	400	140	300	300	200
2 Aug	After 24 hrs rain	High	5600					
10 Aug	Sunny, hot	Low	2100		82	270		
24 Aug	Sunny, cloudy	Medium	410	670	440	290	80	90
7 Sep	Fine, part cloud	Low/ Medium	140		380	480		
14 Sep	Dry, part cloud	Low	310 190*	200	300	800	4900	310

\* Additional sample taken from corner of Staveley Recreation Ground because of a "funny smell"

**Table 2: Microbiological analysis of E. coli by location and by date (colony forming units cfu/100 ml)**

CRKC Results of River Water Sampling

Microbiological analysis of <i>Enterococcus spp</i> by location and by date (colony forming units cfu/100ml)								
Date 2022	Weather	River Flow	Staveley Recreation Ground	Beckmickle Ing	Burneside Millennium Green	Sandy Bottoms (Dockray Hall Bridge)	Hawes Bridge	Sedgwick
11 Feb	Cloudy, cool, damp	Medium	43	450	210	6	190	460
2 Mar	Raining, stopped	Low	15	2900	460	140	150	300
15 Mar	Sunny, cloud cover	Low/ Medium	9	350	170	49	30	30
18 May	Sunny, breezy	Medium	2		1	2		
25 May	Light clouds	Low/ Medium	83	400	300	400	400	100
9 Jun	Overcast, drizzle	Low	130		120	110		
30 Jun	Sunny	Low/ Medium	65	1600	460	700	450	470
13 Jul	Sunny	Low	19		27	62		
27 Jul	Sunny	Low	40	49	30	65	36	48
2 Aug	After 24 hrs rain	High	420					
10 Aug	Sunny, hot	Low	470		16	67		
24 Aug	Sunny, cloudy	Medium	730	470	470	80	6	14
7 Sep	Fine, part cloud	Low/ Medium	140		380	480		
14 Sep	Dry, part cloud	Low	310 190*	200	300	800	4900	70

\* Additional sample taken from corner of Staveley Recreation Ground because of a "funny smell"

**Table 3: Microbiological analysis of *Enterococcus spp* by location and by date (colony forming units cfu/100ml)**

**Table 4** shows that, based on the samples analysed through 2022, the counts for both bacteria exceed the minimum standards (see **Table 1**) at all six locations, indicating that the water quality does not meet the minimum Inland Bathing Water Standard and would be classified as Poor. The worst results were found at Beckmickle Ing. The water quality here is significantly worse than the minimum Inland Bathing Water Quality Standard. This stretch of river is managed by the Woodland Trust and is popular for a range of water-based activities, including swimming, paddling, and kayaking. It is also downstream from Staveley WwTW.

United Utilities did not return a full dataset on the performance of this WwTW in terms of the measurement of spills because of a “sensor failure”, but concerns have been raised over the years about shortcomings in the safe management of sewage at this site.

<b>River Kent water quality assessed by <i>E. coli</i> and <i>Enterococcus spp</i></b>				
	<b><i>E. coli</i></b>		<b><i>Enterococcus spp</i></b>	
	<b>90%</b>	<b>Poor (cfu/100ml)</b>	<b>90%</b>	<b>Poor (cfu/100ml)</b>
<b>Staveley Recreation Ground</b>	1,800 n=13	>900	479 n=14	>330
<b>Beckmickle Ing</b>	2,250 n=7	>900	2,224 n=8	>330
<b>Burneside Millennium Green</b>	2,212 n=12	>900	768 n=13	>330
<b>Sandy Bottoms (Dockray Hall Bridge)</b>	3,979 n=12	>900	487 n=13	>330
<b>Hawes Bridge</b>	1,257 n=7	>900	601 n=8	>330
<b>Sedgwick</b>	1,678 n=7	>900	527 n=8	>330

n = number of samples; cfu = colony forming units

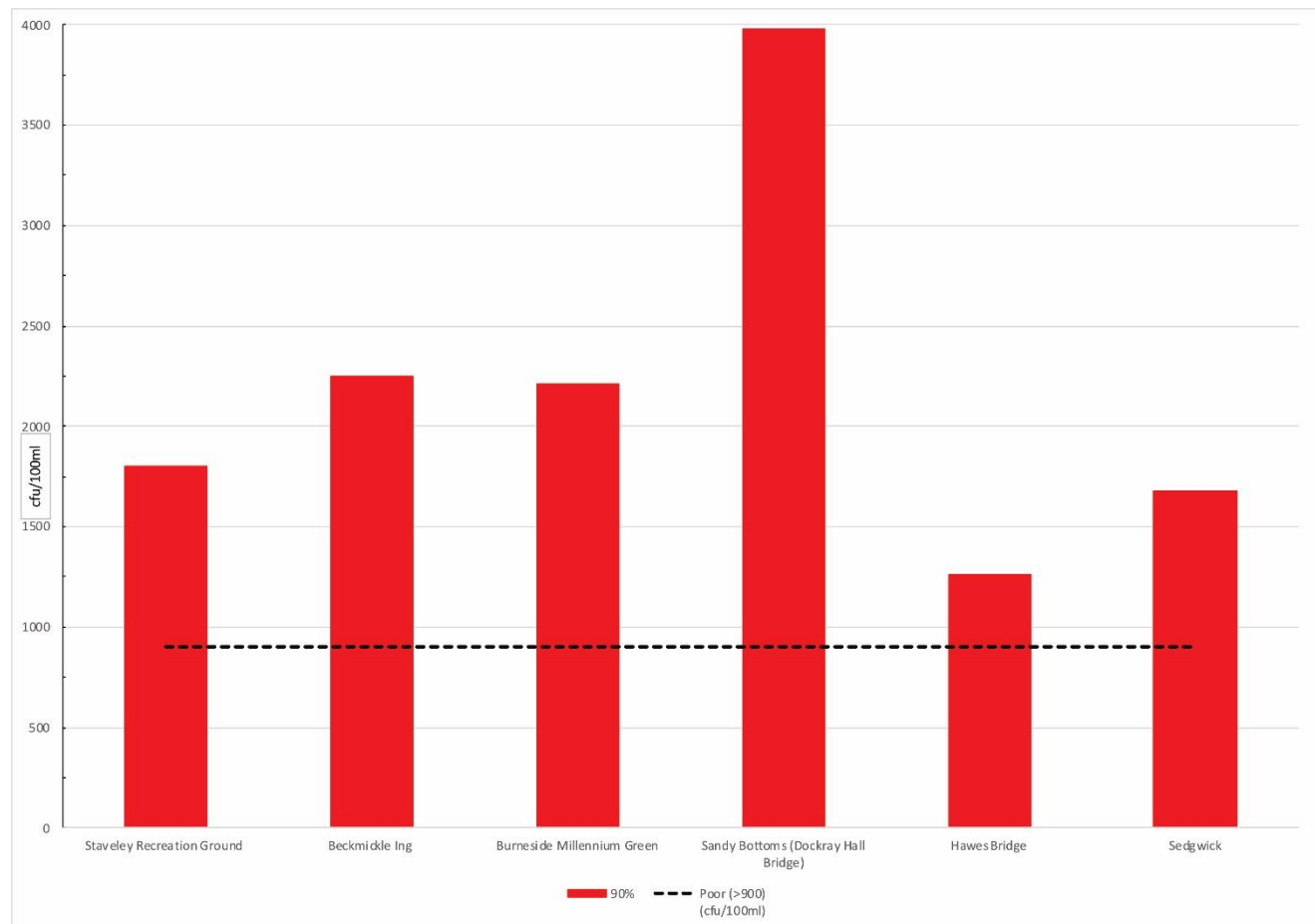
Note: In this study we analysed 7-13 samples per location for *E. coli* and 8-14 samples per location for *Enterococcus spp*. We recognise that the relatively small numbers represent a source of uncertainty, and these results should be confirmed in a larger study.

**Table 4: River Kent water quality assessed by measurement of *E. coli* and *Enterococcus spp***

## CRKC Results of River Water Sampling

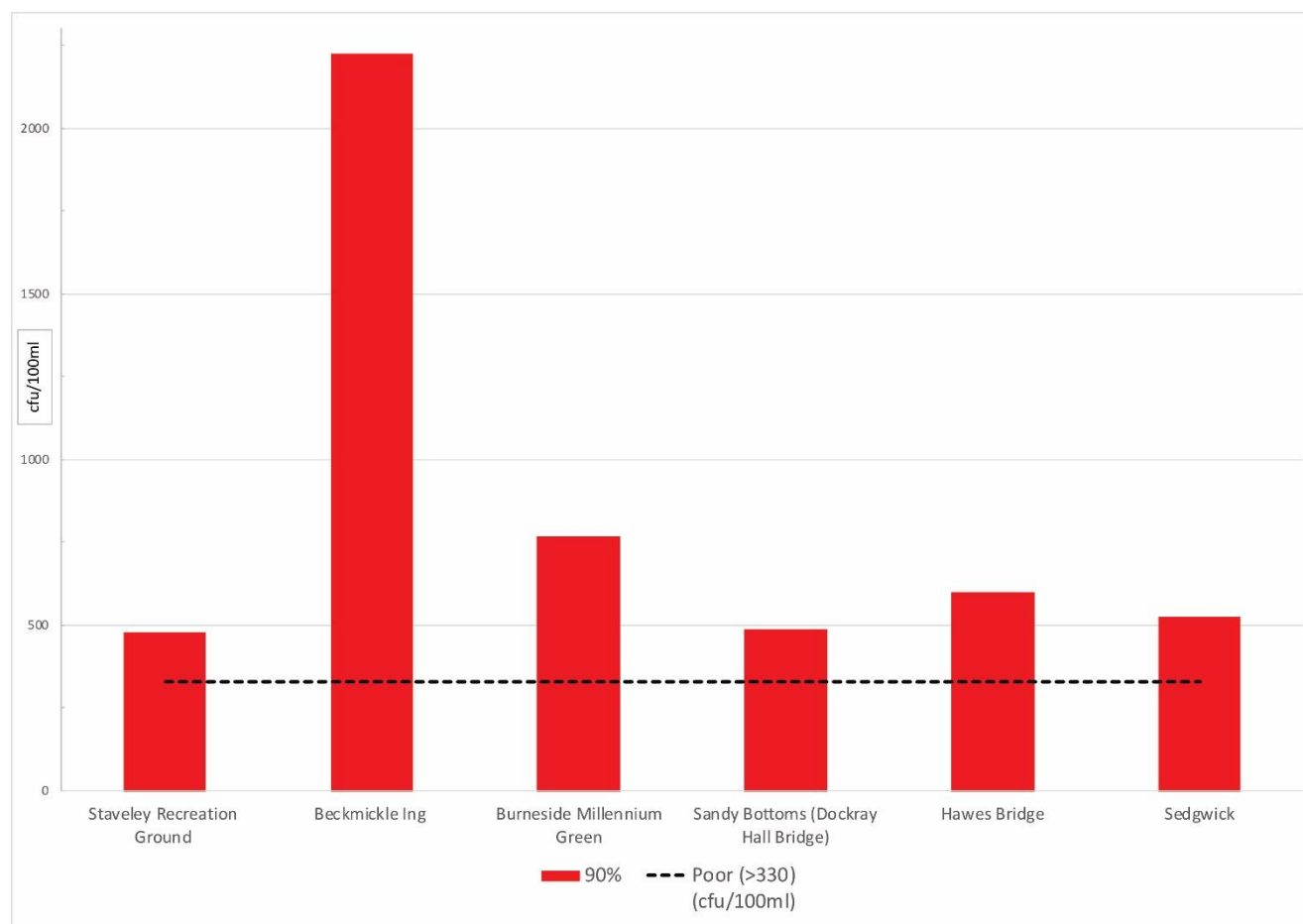
These results are presented graphically in **Figures 3 and 4** showing that the bacterial counts for both *E. coli* and *Enterococcus spp* exceeded the 90<sup>th</sup> percentile at every one of the six locations. In all cases the water quality should be regarded as Poor.

**The 90<sup>th</sup> percentile for *E. coli* at each monitoring location**



**Figure 3 - Graph showing the 90<sup>th</sup> percentile for *E. coli* at each monitoring location**  
(>900 colony forming units cfu/100ml = poor water quality status)

**The 90<sup>th</sup> percentile for *Enterococcus spp* at each monitoring location**



**Figure 4 – Graph showing the 90<sup>th</sup> percentile for *Enterococcus spp* at each monitoring location (>330 colony forming units cfu/100ml = poor water quality status)**

#### 4.3.3 River levels as measured at the four river gauges on this stretch of the river Kent

We noted the weather conditions and made a visual assessment of river flow at every location on the days on which we collected samples. We also recorded the average daily readings from the four river gauges on this stretch of the river – at Staveley, Bowston, Kendal (Victoria Bridge) and Sedgwick – as tabulated by River Levels UK<sup>7</sup> (Table 5).

<sup>7</sup> River Levels UK - <https://riverlevels.uk/>

<b>River water levels recorded at the river gauges on the dates which samples were taken compared with usual range (metres)</b>				
<b>Date 2022</b>	<b>Staveley</b>	<b>Bowston</b>	<b>Victoria Bridge, Kendal</b>	<b>Sedgwick</b>
11 February	0.428	0.3	1.362	0.522
2 March	0.424	0.329	1.361	0.511
15 March	0.399	0.281	1.324	0.463
18 May	0.315	0.22	1.278	0.393
25 May	0.316	0.221	1.279	0.378
9 June	0.389	0.266	1.318	0.454
30 June	0.378	0.267	1.33	0.463
13 July	0.305	0.158	1.223	0.275
27 July	0.297	0.169	1.234	0.298
2 August	0.609	0.715	1.779	0.984
10 August	0.326	0.18	1.248	0.334
24 August	0.300	0.166	1.259	0.337
7 September	0.391	0.199	1.244	0.354
14 September	0.317	0.174	1.247	0.329
“The usual range” ie the readings have been between these levels for 90% of the time since monitoring began	0.26-1.00	0.13-1.20	1.03-2.00	0.19-1.70

**Table 5: River water levels recorded at the river gauges on the dates which samples were taken compared with usual range (metres) - <https://riverlevels.uk/>**

This shows that 2022 was a relatively dry year. All but 3 readings were within the lower quartile of the usual range for each gauge – the readings for Bowston, Kendal (Victoria Bridge) and Sedgwick on 2 August, the date on which an additional collection was taken at Staveley Recreation Ground – but not on any other dates.

There was no clear relationship between bacterial counts and river levels, except for the significant increase at Staveley Recreation Ground on both 2 and 10 August. This probably reflects the generally low levels of rain through the summer, with little variation in river levels.

## CRKC Results of River Water Sampling

When designing the study, we considered whether to test for both *E. coli* and *Enterococcus spp* or only for *E. coli*. The latter would have reduced the laboratory costs by 50%, but, as this was the first study of faecal pathogens in this part of the river Kent, we decided to test for both. Statistical analysis showed that there was no statistically significant correlation between the two bacteria at any location ( $p > 0.05$ ).

### 4.3.4 Further results – Staveley with Ings Parish Council

Another group of Staveley volunteers, organised through Staveley with Ings Parish Council, has been monitoring discharges from Staveley WwTW into the river since 25<sup>th</sup> February 2022. They have collected 138 observations between then and 2<sup>nd</sup> December 2022 <sup>8</sup>:

- The “dump pipe” was recorded as discharging 74/138 times (54%), most frequently when the weather was wet.
- The “treated pipe” was recorded as discharging 113/136 times (85%) through spring and summer (even though the weather was unusually dry) with discharges reducing as those from the dump pipe increased in the autumn. When questioned United Utilities have responded that the treated discharges are always within permit.

This study will be fully reported in due course.



**Figure 5: Photo of children paddling in the river Kent (summer 2022)**

---

<sup>8</sup> Preliminary communication, Cllr Arthur Capstick, 4 December 2022



## 5.0 DISCUSSION AND CONCLUSIONS

This report summarises the results of a citizen science project undertaken by Clean River Kent Campaign volunteers and funded through local grants and crowdfunding in 2022. Our results indicate that the levels of both *E coli* and *Enterococcus spp* failed to meet the minimum standard set by the DEFRA Inland Bathing Water Quality Standards. If the EA had tested the water and obtained similar results, the water would not achieve bathing status and warning notices should indicate the risks of entering the water.

These data on river water quality have been collected by careful project design, a clear protocol for collecting and delivering samples to the laboratory, training and support for volunteers, and access to scientific advice and expertise. We believe, therefore, that the results reliably measure the bacterial counts present at each location on the dates sampled.

The number of samples per site ranges from 7 to 14; the EA would expect to test up to 20 samples in a bathing season. Therefore, our results should not be viewed as conclusive. However, as far as we know, these data collected by CRKC volunteers represent a unique dataset. No organisation (neither polluters nor regulators) has attempted to assess the level of faecal bacterial pollution in the river Kent SSSI before. This seems to be the first time that any systematic attempt has been made to measure the level of faecal contamination in the river water.

The results of additional studies (i) at the University of Cumbria and (ii) through Staveley with Ings Parish Council volunteers are consistent with these results. Definitive conclusions cannot be reached, but as citizen scientists we have a responsibility to raise very serious concerns about the water quality of the river Kent from Staveley to Sedgwick.

The results should also be set in the context of a growing awareness of problems with wastewater and sewage in Staveley, Bowston and Burneside. Staveley with Ings Parish Council has expressed these concerns over several years and their monitoring of Staveley WwTW reflects the degree of their concern.

## CRKC Results of River Water Sampling

All six locations are used regularly for water-based recreation including swimming, kayaking, canoeing, and angling. In the summer families spend time on the banks of the river picnicking, paddling, walking, and jogging. Moreover, the river is an important local amenity with international conservation status. The poor water quality poses not only a human health hazard but also a threat to wildlife.

We hope that these results will catalyse the action required to clean up our river and manage pollution more effectively so that local people can use the Kent without fear of infection, and our unique wildlife and internationally important species and biodiversity can be protected.

We will continue to extend our programme of river water quality monitoring in 2023, alongside on-going campaigning and conservation work. We hope that the organisations in Cumbria with responsibilities for the health and welfare of both humans and our precious environment - including United Utilities, the Environment Agency, local authorities, and the Lake District National Park Authority as well as local conservation groups - will respond to our results. We need to act together and as a matter of urgency to clean up the river Kent to protect biodiversity and keep the river clean for future generations. We look to our potential partners to work with us to take action to achieve this.

## 6.0 ACKNOWLEDGEMENTS

We thank:

- Our Funders including The Lake District Distillery, The Lake District Foundation, Staveley with Ings Parish Council, Burneside Parish Council, Kendal Town Council, Burneside Community Energy, British Canoeing, Tim Farron MP (sponsorship for 10k run), and all those people who donated to the Crowdfunder or directly to CRKC
- The Ilkley Clean River Group and especially Professor Rick Battarbee
- Dr Gill Notman and Jonathon Harte, University of Cumbria
- The team at Greenhouse communications agency
- ALS Coventry and especially Phill Mellor and Isabella Mendes de Oliveira

## CRKC Results of River Water Sampling

- Arthur Capstick, Parish Councillor for Staveley with Ings and Pete Harrison, formerly Parish Councillor for Staveley with Ings
- Our partner organisations including Kent (Westmoreland) Angling Association, Lakeland Canoe Club, the Freshwater Biological Association, and South Cumbria Rivers Trust for their support
- And especially all our Citizen Scientist Volunteers who contributed energy, time, and unlimited enthusiasm even on the wettest days
- We offer particular thanks to the CRKC Core Team; to volunteer Russ, who dedicated his time and expertise to create the graphs and tables in this report; and to volunteer Gwen and her family for permission to use their wonderful photos

### 7.0 CONTACT DETAILS

Any questions or queries about the report should be sent to:

[istoddart@gmail.com](mailto:istoddart@gmail.com) or [sheila.adam1@gmail.com](mailto:sheila.adam1@gmail.com)



**Figure 6: Photo of children enjoying the river Kent, Staveley (summer 2022)**

## ANNEX A

### Issues encountered in working for the first time with a microbiology laboratory

Two difficulties occurred during the pilot phase, and in part reflected the difficulty in working for the first time with a distant laboratory and complex logistics. We planned the February-March pilot anticipating that there might be problems and so were able to adjust our timings for the summer programme.

- On Friday 11<sup>th</sup> February, ALS tested our first set of samples only for *Enterococcus spp*. They sent a confirmatory email to say that testing was underway for *Enterococcus spp* with no reference to *E. coli*. When we received this on Saturday morning, we tried to contact them, but discovered that we could not speak to anyone over the weekend. This resulted in our having one fewer sets of results for *E. coli* than for *Enterococcus spp*. ALS credited our account with the full cost of analysing the 6 samples accepting that the fault was theirs.
- ALS failed to achieve the 24-hour deadline for plating out some of the samples sent on Wednesday 15<sup>th</sup> March. Their explanation, which we were surprised by, was that we had failed to enter the times in all the paperwork, and therefore the samples had not been prioritised in the lab. The samples would have remained cool throughout the delay, and the results are consistent with the general pattern for each location.

There were also delays within ALS through much of the summer.

- ALS encountered problems with increasing workload and difficulties in maintaining staff numbers through the summer. This resulted in delays of up to five weeks before we received results in May-July. ALS advised us to switch to requesting “presumptive” rather than “confirmatory” counts, which they advised would not affect the validity of the results but would reduce the delays. We checked that this advice was sound, and the change was made with effect from the samples collected on 27<sup>th</sup> July.

## CRKC Results of River Water Sampling

- The general delays within the lab extended to specific delays in making the *Enterococcus spp* counts. This affected at least one sample on each occasion apart from 27<sup>th</sup> July. We were concerned about whether this would affect the validity of the results and took advice from ALS, and from UKAS (the UK Accreditation Service), the national accrediting body. We were advised that it would not be possible to predict the effect of any delay on the results, but that if the samples had been kept cool the impact would be to reduce the count i.e., to underestimate rather than overestimate the bacterial count.

We have documented these issues to ensure data transparency. Some of the issues reflected our lack of experience and ALS were always helpful in assisting to resolve them. Our experience highlights the benefits for groups such as ours in being able to draw on the experience and expertise of similar campaigning groups.