



**Date Range:**  
**Reported by:**  
**Report Date:**  
**Last Edited:**

September 2023 - December 2024  
Friends of Gledhow Valley Woods  
June 2025  
18 June 2025



# Gledhow Beck and Lake

A Citizen Science Report on  
Water Quality in the Gledhow Valley

## Contents

Report Summary	3	3.1. Water Chemistry Results	12	5. Future Plans	22
1. Introduction	4	3.2. E. Coli Results	14	6. Conclusions	23
2. Our History	5	3.3. Kick Sampling Results	16	7. Thanks	23
3. Water Quality Monitoring	7	3.4. Pharmaceutical Contamination Results	17	8. Contact	23
		4. What we have done so far	20	9. References	24
				10. Appendix	25

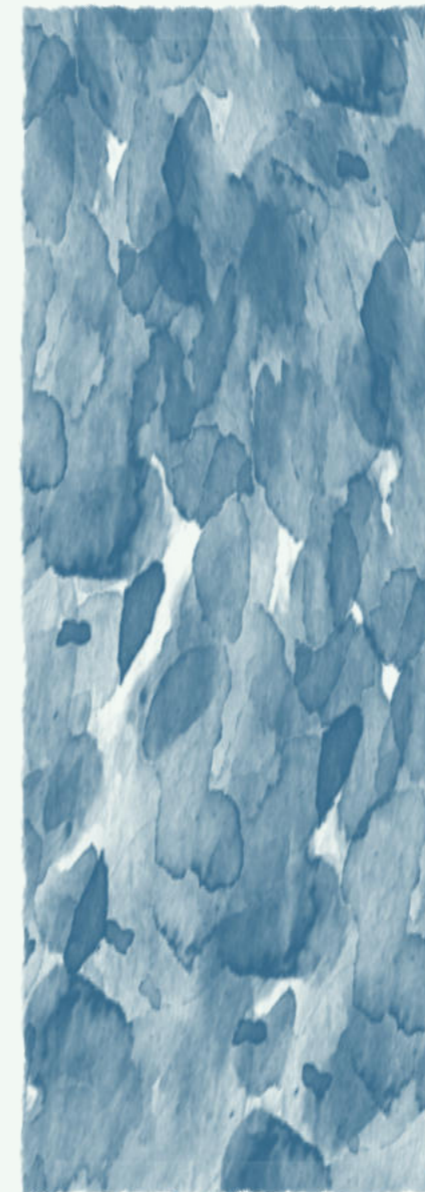
## List of Figures

Figure 1	Articles from the Yorkshire Evening Post.	5	Figure 11	Mean ARMI Score Comparison between North Leeds Becks.	16
Figure 2	Overall map of the testing sites.	6	Figure 12	Testing sites for pharmaceutical contamination in Gledhow Beck and Lake.	17
Figure 3	Location of Combined Sewer overflow sites in the Gledhow Valley.	10	Figure 13	Gledhow Valley Woods.	19
Figure 4	Sewer debris in the Beck.	10	Figure 14	New pond in Beck Pasture Gledhow Valley Woods.	20
Figure 5	Combined Sewer Overflow Sites in Gledhow Valley.	10	Figure 15	Removal of a small number of saplings and planting enhances an existing wetland in Gledhow Valley Woods.	20
Figure 6	A surface water outfall on Gledhow Valley Road discharges directly into Gledhow Beck. Black sludge flowing from the pipe is the result of Leeds City Councils road gully cleaning.	11	Figure 16	New wetland side of Gledhow Valley Road - off grid from Gledhow Beck.	20
Figure 7	Pollution from Misconnected plumbing in the Gledhow Valley.	11	Figure 17	Participants on the Aire Rivers Trust outfall safari training.	21
Figure 8	E. coli levels recorded in Gledhow Lake between September 2023 and April 2024. A further breakdown of results is shown in Appendix A.2.	14	Figure 18	A visualisation of the de-culverted Beck created by James McKay, University of Leeds.	22
Figure 9	Citizen Scientists Conducting Kick Sampling.	16	Figure 19	Native White - Clawed crayfish being introduced into Gledhow Beck.	22
Figure 10	Kick Sampling Locations in Gledhow Beck.	16			

## List of Tables

Table 1	Summary of Data Collection Methods.	7	Table 5	Inland Bathing Water Classifications, used here as a proxy.	14
Table 2	Water Quality Indicators and What They Tell Us.	8	Table 6	Identity of pharmaceuticals found in Gledhow Beck and Lake.	17
Table 3	Yorkshire Water Storm Overflow Data for the Gledhow Valley.	9	Table 7	Ranking of pharmaceuticals found in Gledhow Lake and Beck compared to other sites in Yorkshire.	18
Table 4	Average Water Chemistry Results at Eight Monitoring Sites (2024).	13			

# Report Summary



**This report presents the findings from the first year of a community-led Citizen Science project, monitoring water quality in Gledhow Beck and Gledhow Lake.** It outlines the sources of pollution, the ecological impact, and the urgent need for action. Gledhow Beck and Lake are in poor environmental health following decades of neglect by governments, water companies, and regulators.

## Identified Pollution Sources

- 1. Sewage Overflows** Four combined sewer overflows (CSOs) discharged untreated sewage into Gledhow Beck for over **408** hours in 2023 (1).
- 2. Misconnected Plumbing** Wastewater from homes wrongly enters surface drains and flows untreated into the Beck and Lake via incorrectly plumbed appliances. At least **three misconnection sites** have been confirmed.
- 3. Road Runoff** Rainwater washes oil, heavy metals, tyre particles, and microplastics from roads into the Beck and Lake through unmonitored outfalls.

## Key Findings

Citizen Scientists conducted monthly water chemistry sampling, kick testing, and bacterial assessments. Accompanied by data collected from academics on pharmaceuticals and sediment contamination.

The results suggest serious concerns:

- **Nitrate concentrations** are elevated at several sites, which can promote algal growth, which can reduce oxygen levels and biodiversity.
- **Aquatic invertebrate diversity** is lower than in other North Leeds Becks and the Lower Aire catchment as a whole, with very **few clean-water indicator species**, suggesting poor water quality.
- **E. coli levels** in Gledhow Lake regularly exceed **bathing water safety standards**.
- **High conductivity levels** may indicate an excess of dissolved substances, which can stress aquatic life.
- **Pharmaceutical contamination**, including the **'forever chemical'** perfluorooctanoic acid, was found in both the Beck and the Lake.
- In addition, a previous study of Gledhow Lake in 2018 reported **high concentrations of metals and nutrients**, along with **low oxygen levels**, suggesting a **vulnerable ecological condition**.

## Call to Action

The Friends of Gledhow Valley Woods urge immediate and sustained action from Yorkshire Water, regulators, elected representatives, and the local community. Without intervention, the pollution will continue to undo the environmental progress achieved through years of volunteer-led conservation work.

If you'd like to get involved or support our efforts, please contact us.



www.fgvw.co.uk  
 infofgvwcitizenscience@gmail.com

# 1. Introduction

The Friends of Gledhow Valley Woods have long campaigned to improve the environmental state of Gledhow Beck and Lake. Pollution from combined sewer overflows, plumbing misconnections, and road runoff continues to damage biodiversity and undermine the value of this much-loved green space.

In September 2023, the Friends of Gledhow Valley Woods decided to establish a citizen science project to monitor, record and report concerns on the state of water quality in Gledhow Beck and Lake. We have recruited and trained **32 local residents as citizen scientists** to undertake this regular monitoring.

Our work is supported by collaborations with water@Leeds, the University of York's Department of Environment and Geography and Water Rangers.

## Our aims

- 1. Harness local knowledge** by drawing on community concern and expertise to improve freshwater quality in the Gledhow Valley.
- 2. Create a healthier environment** for both **wildlife** and **people** through long-term improvements in water quality.
- 3. Use citizen-collected data to drive engagement** with politicians, regulators, water companies, media, and the wider public.
- 4. Collaborate across sectors** with other citizen science groups, the University of Leeds, the University of York, and interested partners to maximise expertise and impact.
- 5. Engage schools and young people** in water quality monitoring and **build awareness** and care for the local natural environment.

This report documents our first year of citizen science monitoring. It aims to support calls for immediate investment in water quality improvements and shares our findings with decision-makers and residents alike.



Figure 1, Articles from the Yorkshire Evening Post from:

- Top Left: 03.09.1992
- Top right: 20.04.1999
- Bottom left: 29.07.1976
- Bottom right: 19.10.2000

# 2. Our History

Local residents and the Friends of Gledhow Valley Woods have been campaigning against water pollution in the valley since at least **1976** (Figure 1).

While this pressure led to some limited changes in 2003, including the enlargement of four CSO settling tanks and the installation of debris screens, these were purely 'aesthetic only' works. Raw sewage continues to flow into Gledhow Beck unabated.

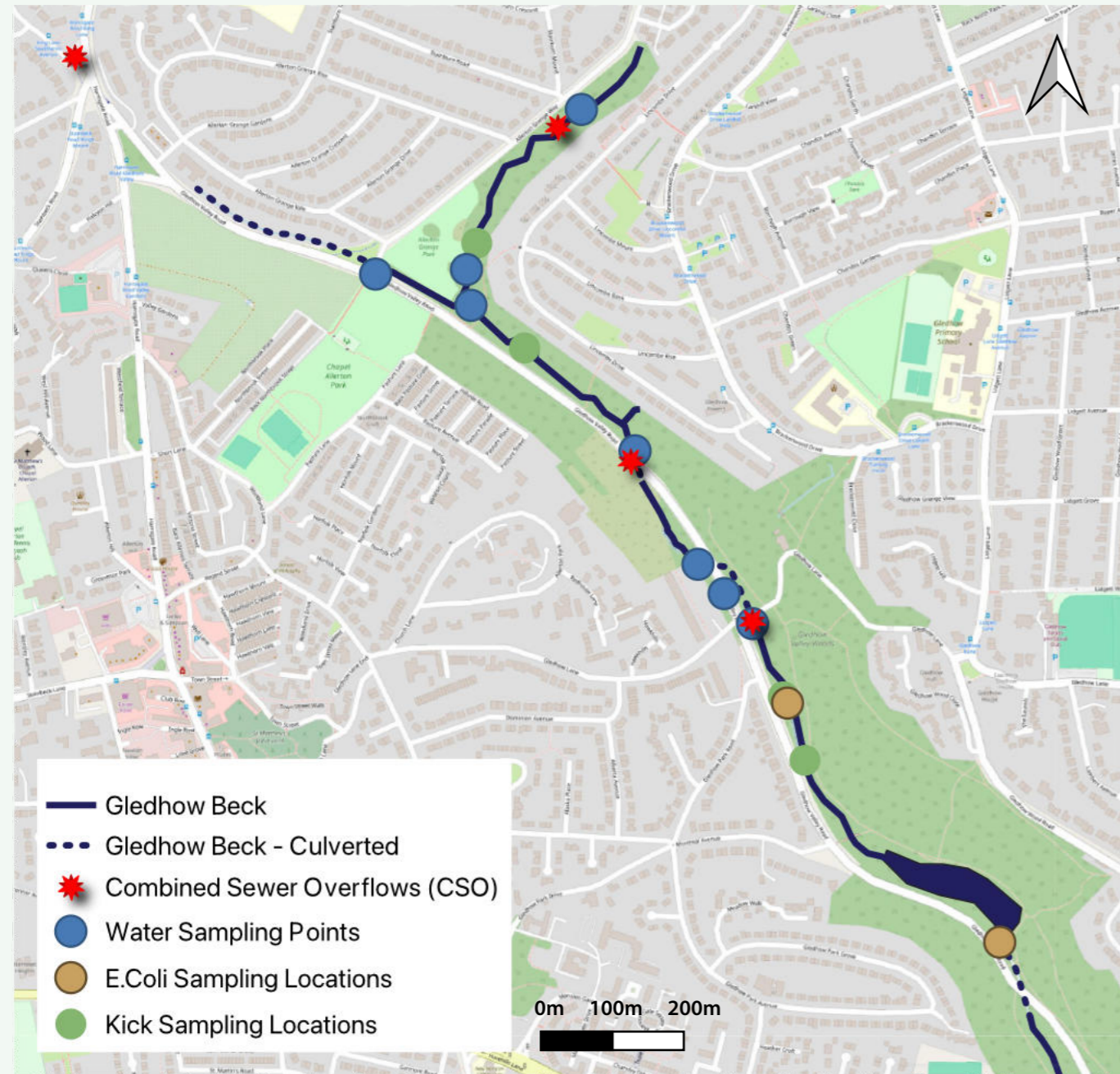


Figure 2, Overall map of the testing sites

### 3. Water Quality Monitoring: 2023–2024

This section shares the results from our 2023–2024 monitoring of Gledhow Beck and Lake. The aim is to better understand the extent and nature of pollution in the valley, identify trends over time, and provide evidence to support urgent calls for intervention.

This section begins with an introduction to our water sampling approach, followed by a summary of key water quality indicators and the valley’s three main pollution sources. It then presents the results of our fieldwork, including monthly water chemistry sampling, E. coli testing, kick sampling and pharmaceutical analysis.

#### Our Water Sampling Approach

We collected a **range of data** to assess the health of Gledhow Beck and Lake. Table 1 provides an overview of the different data types collected, including the sampling method, frequency and locations. The results for each dataset are presented in the following sections.

Table 1, Summary of Data Collection Methods.

Section	Data Collected	Date Range	Method	Sampling Frequency	Number of sampling locations (Ref the map here)
3.1	Water Chemistry	24/09/23 - 30/12/24	Water Rangers Field Equipment	Monthly	8
3.2	E. coli	25/09/23 - 25/04/24	Socotec Laboratory Analysis	Monthly	1
3.3	Kick Sampling	22/09/23 - 28/07/24	AMRI*	Every 8 weeks	4
3.4	Pharmaceutical	3/24	University of York Laboratory Analysis	One off	4
3.5	Sediment Contamination	15/07/19	ALS Life Sciences. Laboratory Analysis	One off	7

\*The Angler Riverfly Monitoring Initiative (ARMI) procedure was followed, although official accreditation is pending.

Explanations of individual water quality metrics and what they indicate for ecosystem health are shown in Table 2 (next page).

Table 2, Water Quality Indicators and What They Tell Us.

What?		Why?
Water Chemistry	Temperature	Raised temperatures affect aquatic metabolic rates and reduce oxygen levels, increasing stress and fatalities.
	pH	Variations outside the typical range can harm or kill aquatic organisms. pH also influences metal solubility and nutrient cycling.
	Dissolved Oxygen	Crucial for aquatic life. Low levels can lead to hypoxia (low oxygen) or anoxia (absence of oxygen), causing fish kills. Levels drop with high temperature or nutrient overload.
	Electrical Conductivity	Conductivity indicates the amount of dissolved ions. High readings suggest pollution from road runoff, nutrients, or industrial inputs.
	Nutrients	Nutrients are elements essential for aquatic organisms' survival and growth. Natural sources include rock weathering and decomposition. Rises can indicate pollution from manure, fertilisers, wastewater from sewage treatment works, septic tanks and CSOs. Excessive levels of phosphorus and nitrogen cause eutrophication and health issues.
E. coli	Indicates recent faecal contamination, commonly from sewage or agriculture. High levels pose health risks for recreational users.	
Kick Sampling	Measures aquatic invertebrate diversity. The absence of sensitive species indicates pollution; presence suggests good ecological health.	
Pharmaceuticals	Detects traces of human medications and industrial compounds. Their presence reflects sewage contamination and chemical persistence in the environment.	

## Pollution Sources

There are three main sources of pollution in the Gledhow Valley (2):

### 1. Combined Sewer Overflows

Combined sewer overflows are designed to release untreated sewage into rivers or streams during heavy rainfall to prevent flooding of homes and streets. Although legal, frequent discharges damage water quality and harm wildlife.

In 2023, raw sewage was discharged into Gledhow Beck for a total of 408 hours from four combined sewer overflow sites in the valley (Table 3). While figures in this table reflect recorded discharges, not all monitors were operational 100% of the time. Any discharges during offline periods would have gone unrecorded, meaning the actual duration may be higher than reported below.

Table 3, Yorkshire Water Storm Overflow Data for the Gledhow Valley (2020- 2023).

Combined Sewer Overflow	2020	2021	2022	2023
<b>Gledhow Lane</b>				
No. Of Spills	64	55	39	62
Duration (hrs)	44.7	97	25.5	120.25
Operational for Reporting	100%	100%	99%	99%
<b>Harrogate Road</b>				
No. Of Spills	81	69	62	64
Duration (hrs)	147.8	181.3	115.75	181
Operational for Reporting	100%	100%	100%	96%
<b>Allerton Park</b>				
No. Of Spills	22	0	43	53
Duration (hrs)	24.5	0	58	83.92
Operational for Reporting	29.5%	0%	100%	100%
<b>Allerton Grange</b>				
No. Of Spills	34	31	19	29
Duration (hrs)	35.4	26.5	12.25	23.25
Operational for Reporting	96%	90%	82%	98%

Analysis of the data (Table 3) reveals several key concerns:

- There was a **104% increase in discharge** duration across all Gledhow Valley CSOs in 2023 compared to 2022.
- These figures show **frequency and duration only**; there is no data on the volume of untreated sewage discharged.

- In 2023, only Allerton Park CSO was monitored for 100% of the year; other sites had **brief periods of non-reporting**, suggesting recorded totals may underestimate actual discharges.

The **locations of these four CSOs** are shown on the following page and photographs of each outfall are included to support field verification and public awareness.

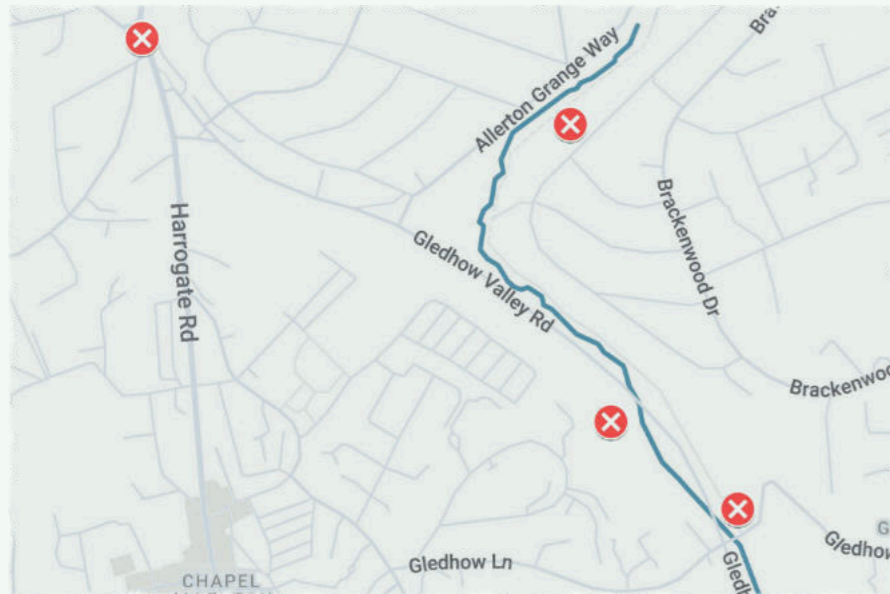


Figure 3, Location of Combined Sewer Outlets (CSOs) in the Gledhow Valley.



(1) Harrogate Road CSO-above ground control cabinet



(2) Gledhow Lane CSO



(3) Allerton Park CSO



(4) Allerton Grange CSO

Figure 5, Combined Sewer overflow sites in the Gledhow Valley.



Figure 4, Sewer debris in the Beck.

As well as the impact on nature of the discharge of untreated sewage into Gledhow Beck and Lake, discharges also have a negative impact on people's enjoyment of Gledhow Valley Woods. Sewer debris can be seen along the full length of Gledhow Beck (see Figure 4 above). The strong smell of sewage is also evident during wet weather when the CSOs are discharging. The Gledhow Lane CSO emits a strong smell of sewage even in dry conditions.

## 2. Road Runoff

Surface water outflows from Gledhow Valley Road and the surrounding road network **discharge directly into Gledhow Beck and Lake** at several points. Despite carrying a toxic mix of heavy metals, microplastics, tyre particles, fuel, vehicle fluids and sediment, these outfalls are **unmonitored** and largely unmanaged (3).

An Environmental Information Regulations request submitted by The Friends of Gledhow Valley Woods to Leeds City Council (May 2025) shows that the Council has carried out no assessment of the environmental impact of the practice of flushing the contents of road gullies into Gledhow Beck and no chemical analysis of the water/sediment mixture has been carried out.

These pollutants pose serious risks to both wildlife and public health. The Environment Agency recognises road runoff as a **'serious issue'** and the **third most damaging** source of water pollution after agriculture and sewage (4).

## 3. Misconnections

Most homes are connected to two sewers: one for foul water (toilets, showers, washing machines), which is treated, and one for surface water (rainwater from gutters), which flows into streams. A misconnection happens when **household waste is wrongly plumbed** into the surface water system.

Identified misconnections include the Brackenwood estate, Allerton Grange Way and the Gledhow Lake land drain. Misconnected appliances and toilets are directly discharging foul water into the Beck and Lake (Figure 7). These pipes pose serious risks to wildlife, public health and water quality if left unresolved.



Figure 6, A surface water outfall on Gledhow Valley Road discharges directly into Gledhow Beck. Black sludge flowing from the pipe is the result of Leeds City Council's road gully cleaning.



Figure 7, Pollution from misconnected plumbing in the Gledhow Valley

**Top left:** Surface scum from a misconnection near Allerton Grange Way/Croft.  
**Top right:** Pollution from misconnected pipes on the Brackenwood estate (February 2025).  
**Bottom left:** Toilet paper entering Gledhow Lake via a land drain (March 2025).  
**Bottom right:** Yorkshire Water's attempted repair at the Brackenwood site (2019).

# 3.1. Water Chemistry Results

Since **September 2023**, we've been collecting **monthly water samples at eight sites** along Gledhow Beck using Water Rangers test kits (5). These simple kits allow us to monitor the chemical health of the Beck and spot any signs of pollution.

We measured several key indicators of water quality: **nitrates, conductivity, pH, chlorine, phosphates, hardness, and alkalinity**. Table 2 explains why each of these metrics matters for the health of rivers and the organisms that live in them.

The summary opposite (Table 4) shows the average results from each site.

Further data from each sampling date and site are available in the appendix (A.1), showing monthly variation for future comparison.

## Key Findings

- **Nitrate levels** ranged from **moderate to poor**, with some readings exceeding **10 mg/L**, the level known to have a negative impact on aquatic ecosystems.

Water Rangers Field Guide. April 2023 [waterrangers.ca/united-kingdom](http://waterrangers.ca/united-kingdom)

- **Conductivity**, which indicates the amount of dissolved material in the water, was **consistently high** along the Beck. High conductivity suggests chemical contamination.

Water Rangers Field Guide. April 2023 [waterrangers.ca/united-kingdom](http://waterrangers.ca/united-kingdom)

- pH levels were within a normal range (6–8), which is suitable for most aquatic life.
- Chlorine levels were consistently low at all sites, indicating no direct chlorine contamination.
- Phosphate levels were low overall. High phosphate can lead to harmful algal blooms, but this was not a concern in our samples.
- Water hardness was measured as moderately hard to hard, due to dissolved calcium and magnesium. This is not harmful to the area and is not harmful to most aquatic life.
- Alkalinity ranged from low to moderate, which helps buffer pH levels and prevent the water from becoming too acidic.

We did not observe a clear worsening of water quality immediately downstream of combined sewer overflows (CSOs). However, future monitoring will include targeted sampling during rainfall to better capture the impact of these Combined Sewer Overflows (CSOs).

Table 4, Average Water Chemistry Results at Eight Monitoring Sites (2024)

Site ID	Conductivity us/cm Average	pH Average	Chlorine mg/l Average	Hardness mg/l Average	Alkalinity mg/l Average	Nitrates ppm Average	Phosphates ug/l Average	Water Temp C Average	Air Temp C Average
Gledhow Lane CSO below	516	7.2	0.06	198	94	1.53	0.35	10.3	13.4
Gledhow Lane CSO above	522	7.2	0	185	91	1.5	0.01	10.3	11
Allerton Park CSO below	534	7.4	0	154	103	1.66	0.01	11.1	12.9
Allerton Park CSO above	546	7.4	0	167	100	2.1	0.01	11.1	12.2
Allerton Grange CSO below	594	7.2	0	189	113	11.8	0.02	10.3	12.5
Allerton Grange CSO above	581	7.2	0	194	108	10.5	0.01	10.6	12.4
Harrogate Road CSO below	591	7.1	0	153	80	22.5	1.3	11.1	12.1
Confluences of both Harrogate Road and Allerton Grange CSOs below	574	7.1	0	158	92	15.3	0.01	10.1	12.5

Poor	Moderate	Pass	Good
------	----------	------	------

# 3.2. E. Coli Results

E. coli was measured **monthly**, with samples sent to and analysed at the **Socotec Laboratories** within 24 hours of collection.

There are currently no national standards for E. coli levels in becks and lakes in relation to ecological health. To provide a useful comparison, we use the inland bathing water classifications as a proxy (Table 5).

Bathing water classifications under UK regulations require a minimum of 20 samples per season to formally assign a classification. These assessments use percentile thresholds, not individual samples. For example, to achieve a "Good" rating, 95% of samples must fall below 900 CFU/100mL of E. coli. Our results do not meet the sampling volume or duration for formal classification, but the thresholds still offer a useful indication of relative risk.

Table 5, Inland Bathing Water Classifications, used here as a proxy.

Standard	Meaning	E. coli (cfu/100ml)
<b>Excellent</b>	Cleanest water – safe for regular contact	≤ 500
<b>Good</b>	Generally clean, low health risk	≤ 1,000
<b>Sufficient</b>	Meets the minimum standard	≤ 900
<b>Poor</b>	Fails to meet the minimum standard – high risk	> 900

## Key Findings

While our sample size is still small, **half of the samples taken from Gledhow Lake exceeded the 'poor' threshold**, indicating high contamination at times (Figure 8).

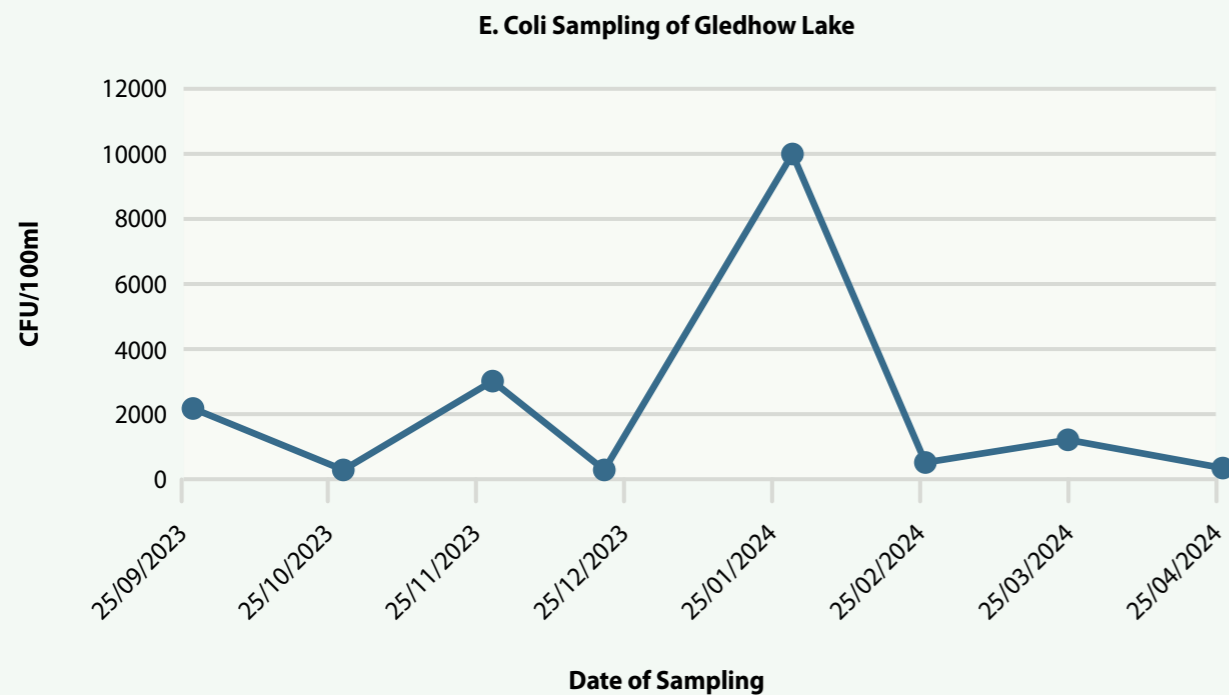


Figure 8, E. coli levels recorded in Gledhow Lake between September 2023 and April 2024. A further breakdown of results are show in Appendix (A.2)

E. coli is used as an **indicator species**. When present at high levels, especially after rainfall, it can signal **sewage contamination**, which may also carry pharmaceuticals, harmful bacteria, and pathogens.

As part of the AQUA project, we plan to expand our monitoring using home testing kits to test more frequently and at additional sites along the Gledhow Valley. This will give a clearer picture of when and where contamination is occurring.

## The Impact of Rainfall

Rainfall can significantly affect water quality, both by **worsening pollution** and by masking it. Heavy rain can trigger **combined sewer overflows (CSOs)** and wash pollutants from roads, drains, and land into the Beck and Lake. This increases the likelihood of contamination from substances such as nutrients, oils, chemicals, and faecal matter. At the same time, rainfall can dilute pollutants, causing some water quality indicators to appear better than they truly are under normal/dry conditions.

By comparing data collected in both **wet and dry conditions**, we can begin to **trace the likely sources of pollution**, noting whether they're persistent (like misconnected domestic plumbing) or appear rain-related (like road run-off or sewage overflow inputs). Future sampling will prioritise capturing this variation to help build a clearer picture of what's entering the Beck and when.



# 3.3. Kick Sampling Results



Figure 9, Citizen Scientists Conducting Kick Sampling in Gledhow Beck.

Kick sampling is a widely used method for checking the health of rivers by looking at which **small aquatic animals** (invertebrates) are living there. We use nets held downstream while gently disturbing the riverbed to dislodge organisms, which are then collected in trays, identified, counted, and returned safely to the water (Figure 9). The types and numbers of species we find can tell us a lot about water quality.

Our citizen science team carries out kick sampling **every eight weeks at four sites** (Figure 10) along Gledhow Beck.

We want to acknowledge the input of Sam Riley-Gunn from the Aire River Trust in this section of the report.

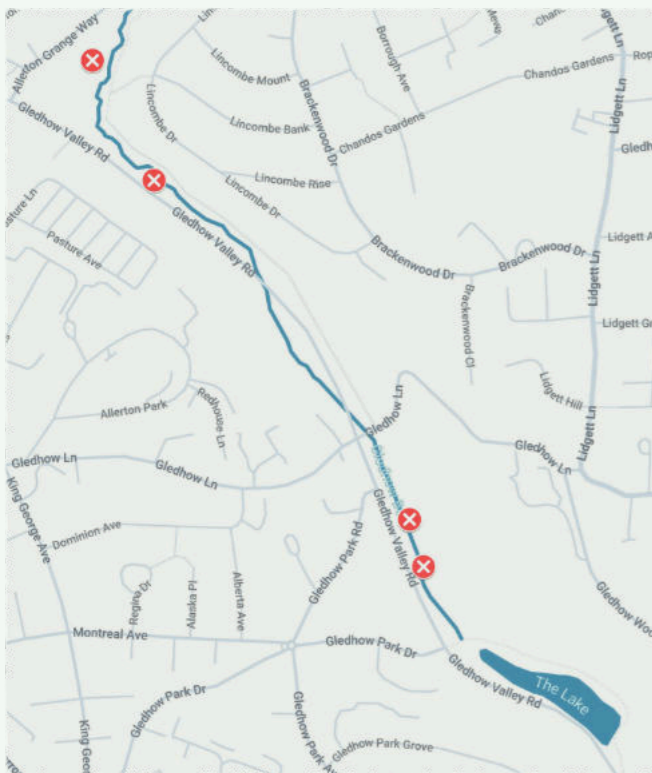


Figure 10, Kick Sampling Locations in Gledhow Beck.

## Key Findings

We use the Anglers' Riverfly Monitoring Initiative (ARMI) scoring system, developed by the Riverfly Partnership, to assess our findings. This method focuses on eight groups of freshwater invertebrates that are sensitive to pollution.

- Gledhow Beck recorded a mean ARMI score of 3.1.
- In comparison, Meanwood and Wyke Becks scored 7.7, and the Lower Aire catchment average was 7.2.

This suggests that Gledhow Beck supports fewer clean-water indicator species than nearby rivers and is in poorer ecological health (Figure 11).

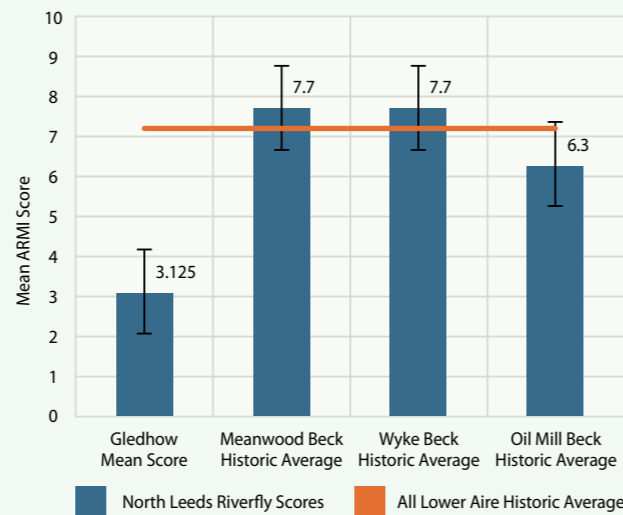


Figure 11, Mean ARMI Score Comparison Between North Leeds Becks.

- Clean-water indicator species such as Cased Caddisflies, Burrowing Mayflies, Blue Winged Olives, and Flat-bodied Stone Crawlers were absent from all samples, suggesting poor ecological conditions.
- Pollution-tolerant species, including leeches and water hog lice, were present. Although not in high numbers, their presence, alongside the absence of sensitive species, indicates an ecosystem under stress.

The full ARMI kick sampling species count for each sampling day is provided in appendix (A.3) for transparency and further analysis.

Although our team has not yet completed the accredited Riverfly training, it is led by a retired biology teacher with many years of experience in Kick sampling. We hope to complete our formal training in 2025.

# 3.4. Pharmaceutical Contamination Results

## Key Findings

As part of early work for a Yorkshire-wide citizen science project, **pharmaceutical testing was carried out at four sites along Gledhow Beck and Gledhow Lake** (Figure 12). The University of York led the sampling, and we're very grateful to Harriet Sleight for her support with this work.

Pharmaceuticals **enter rivers primarily through wastewater** and can affect aquatic ecosystems even at low concentrations. While much is still unknown, research has shown that these substances can:

- **Disrupt reproduction**  
Hormones from contraceptives can feminise male fish, reducing fertility and affecting populations.
  - **Alter behaviour**  
Antidepressants can change feeding and shoaling behaviours.
  - **Promote antimicrobial resistance**  
Constant, low-level antibiotic exposure fosters the development of resistant bacteria.
  - **Hinder plant growth**  
Some antibiotics inhibit photosynthesis in algae and aquatic plants.
- Monitoring pharmaceutical presence helps us understand emerging pollution risks and builds evidence for better river protection.



Figure 12, Testing sites for pharmaceutical contamination in Gledhow Beck and Lake.

The testing aimed to detect common pharmaceutical compounds that may enter rivers through wastewater, particularly combined sewer overflows (CSOs).

- Across the four sites, a **range of pharmaceuticals were detected**, including medications for epilepsy, diabetes, blood pressure, and allergies.
- All the substances found are commonly used by people and are likely to have entered the Beck and Lake via untreated sewage discharges.

A full list of the drugs detected and their uses is shown in Table 6.

Rankings compared to other sites in Yorkshire are given on the following page in Table 7.

Concentration results for the Gledhow Beck and Lake sites are shown in Appendix A4 (pages 34-35).

- This predicted no-effect concentration (PNEC) is the level below which no harmful effects are expected.
- None of the measured concentrations exceeded their PNEC
- Although not all compounds currently have PNECs established.

**PNECs are best estimates and may change as research advances.** We also don't fully understand the combined effects of a "cocktail" of pharmaceuticals in water. Dr John Wilkinson and his research group colleagues at the University of York are currently conducting some of the earliest research on pharmaceutical mixtures in rivers.

Table 6, Identity of pharmaceuticals found in Gledhow Beck and Lake .

Compound	Common Use
<b>Carbamazepine</b>	Epilepsy medication
<b>Caffeine</b>	Stimulant (commonly consumed)
<b>Cetirizine</b>	Antihistamine medication
<b>Fexofenadine</b>	Hay fever medication
<b>Gabapentin</b>	Epilepsy medication
<b>Metformin</b>	Diabetes medication
<b>Perfluorooctanoic Acid</b>	Industrial surfactant (cleaning/dyeing)
<b>Cotinine</b>	Attention deficit disorder medication
<b>Furosemide</b>	Blood pressure medication
<b>Irbesartan</b>	Blood pressure medication
<b>Lorsartan</b>	Blood pressure medication
<b>Nicotine</b>	Stimulant (tobacco-related)
<b>Temazepam</b>	Sleep medication

**Regional Comparison**

Pharmaceutical concentrations from Gledhow Beck were compared with results from 40 sites across Yorkshire.

A lower rank indicates higher pollution. For example, a site ranked 1 had the **highest number** or **highest concentration** of pharmaceuticals among all sampled locations.

Each site was ranked in two ways:

- By number of different pharmaceuticals detected (out of 33 ranked sites)
- By overall concentration of pharmaceuticals found (out of 40 sites)

- **Gledhow Lake** ranked **10th** for the **number of pharmaceuticals detected**, placing it among the more chemically contaminated sites in Yorkshire.
- While its **total concentration ranked 38th**, suggesting that while many drugs were present, most were found in lower amounts.

Table 7 below shows the full ranking of pharmaceuticals detected and the cumulative concentration for each site.

Table 7, Ranking of pharmaceuticals found in Gledhow Lake and Beck compared to other sites in Yorkshire

Site	Rank (Number of pharmaceuticals detected)	Rank (Cumulative concentration)
Site 1: Gledhow Beck opposite Gledhow Park Drive	20	31
Site 2: Gledhow Lake	10	38
Site 3: Fork in Gledhow Beck	23	23
Site 4: Gledhow Beck by Gledhow Valley Road	18	18

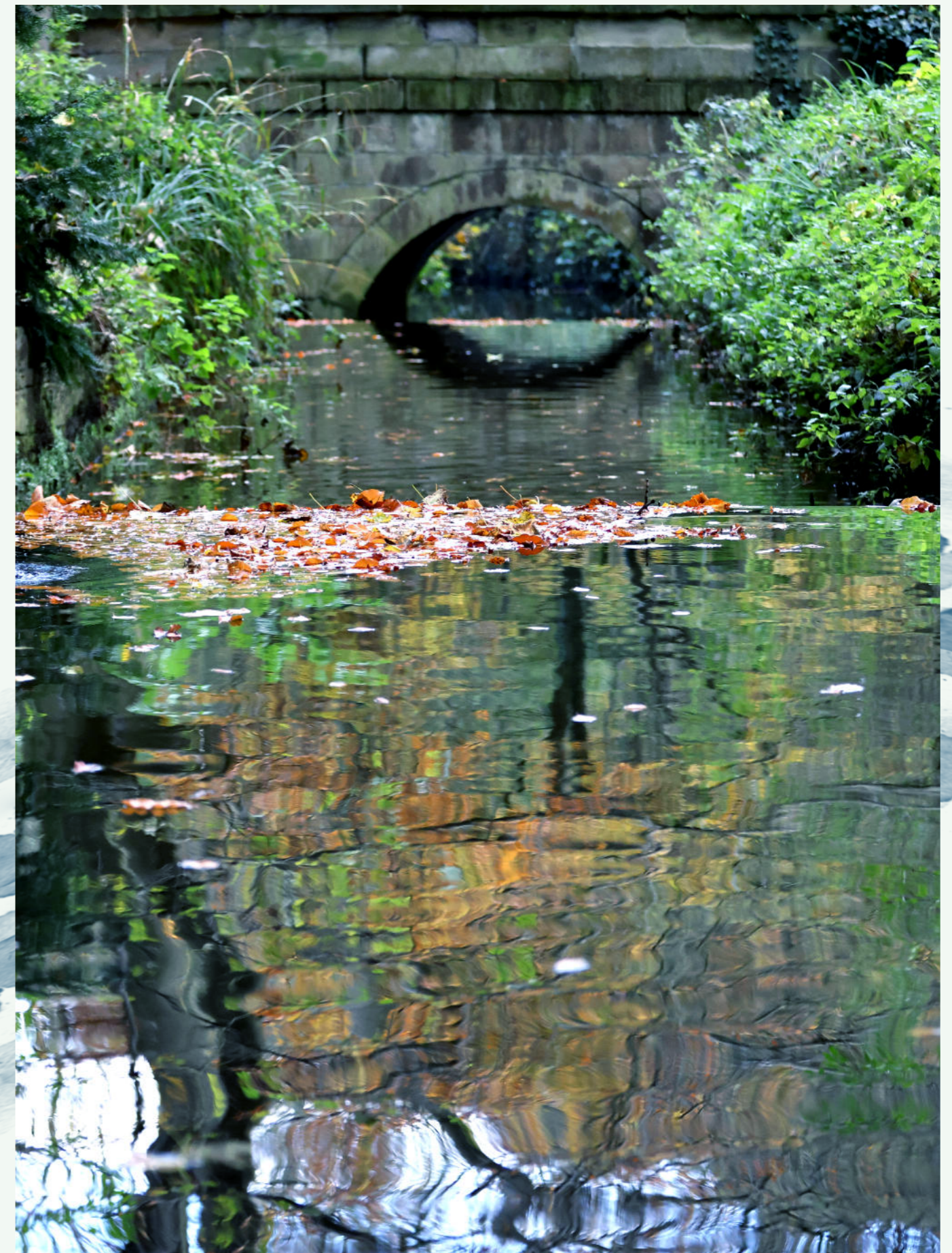


Figure 13, Gledhow Valley Woods



Figure 14, New pond in Beck Pasture.



Figure 15, Removal of a small number of saplings and additional planting enhances an existing wetland in Gledhow Valley Woods.



Figure 16, New wetland side of Gledhow Valley Road - off-grid from Gledhow Beck

## 4. What We Have Done So Far

### NERC Funding and the AQUA Project

We are proud to be part of the **Yorkshire-wide AQUA Citizen Science project**, led by the Universities of York and Leeds. The project has received **£1 million** in funding from the Natural Environment Research Council (NERC) to **support community-led water monitoring** across the region.

Over the next four years, this partnership will provide (6):

- Access to **high-quality monitoring kits**,
- Quarterly **blitz-style sampling days** and **outfall safaris** in the Gledhow Valley,
- Support for **new testing approaches**,
- An annual **Yorkshire aquatic environment meeting**, bringing together researchers, agencies and citizen scientists.

### Nature-Based Improvements in the Valley

This year, we've continued our work to improve Gledhow Valley Woods using **nature-based solutions** that benefit both wildlife and water quality. These efforts help to reconnect habitats, reduce flood risk, and build resilience to climate change.

Our achievements include:

- Creating a **new pond and stream channel** in Beck Pasture, the FGW-owned pasture (Figure 14),
- Planting several **wetland scrapes** with marsh and marginal plants (Figure 15),
- Completing a large new **wetland area** (Figure 16),
- Being **shortlisted for the national Ashden Award** for Nature-Based Solutions in the UK (7).

### Holding Polluters to Account – EIR Requests

We submitted multiple **Environmental Information Regulation (EIR)** requests (8) to **Yorkshire Water** and **Leeds City Council** regarding pollution entering Gledhow Beck from the **Brackenwoods land drain**. This pollution is linked to misconnected household plumbing.

From the EIR requests we have discovered that there are 3 households with misconnections contributing to this pollution. This information has been passed to Leeds City Council by Yorkshire Water for further action to be taken. Leeds City Council have refused to release information on what action it has taken, arguing that it would breach the confidentiality of a third party. They have, however, confirmed that no legal action has been taken against any property by the council.

### Clearing the Gledhow Lake outfall

Two of our volunteers have monitored and reported blockages, prompting **Leeds City Council** to carry out a much-needed clean-up.

### Community outreach - Gledhow Valley Road Green Fair

At the Gledhow Valley Green Fair on the 14th July 2024 we shared information on pollution from the Beck's CSOs and asked visitors what changes they would like to see in the valley. Of the 135 visitors surveyed, **82% identified water quality as their top concern** (9).

### Collaboration with other Citizen Science Groups

We are actively working with citizen science teams in Roundhay and Meanwood, coordinated by Maddy Wright (PhD student University of Leeds), to share learning and strengthen local monitoring.

### Engagement with Yorkshire Water

We meet regularly with the **Yorkshire Water Rivers Health Team** to raise concerns and explore solutions to improve water quality in the Gledhow Valley.

### Outfall Safari Training

We have undertaken **Outfall Safari training** delivered by the **Aire Rivers Trust**, helping us identify and map pollution from outfalls across the Gledhow Valley. These safaris have already uncovered **new pollution sources**, which we are now monitoring and reporting to Yorkshire Water and the Environment Agency for action.

This work forms part of a wider initiative to regularly monitor all North Leeds becks.



Figure 17, Participants on the Aire Rivers Trust outfall safari training



Figure 18, A visualisation of the de-culverted Beck, created by James McKay, University of Leeds.

## 5. Future Plans

In 2025, we plan to expand and strengthen our work in the Gledhow Valley to better understand and address water quality issues.

Our key priorities are:

- **Widening our monitoring** – We will widen our testing of **flow, ammonia, E. coli, dissolved oxygen, and heavy metals**. This will help us build a more detailed and accurate picture of conditions in both Gledhow Beck and Lake.
- **Mapping and sampling all water inputs** – We aim to fully map and test all springs, ponds, land drains, and outfall pipes within Gledhow Valley Woods to improve understanding of how and where pollution enters the catchment.
- **Increasing campaigning and engagement** – We will continue to raise awareness and push for change through **community engagement and advocacy**, working in partnership with other local groups and residents.



Figure 19, Native Crayfish being introduced into Gledhow Beck.

- **Working with schools** – We hope to involve local schools in our monitoring through outdoor learning activities such as water sampling and pollution safaris, **helping young people connect with and protect their local environment**.
- **Contributing to Research** – Through our partnership with the **NERC-funded AQUA Citizen Science project**, we'll collaborate with other North Leeds groups, statutory agencies, and university researchers to share learning and strengthen our advocacy.
- **Expanding nature-based work** – We will explore new opportunities to create **ponds, wetlands, and other habitat enhancements** that can reduce pollution, improve biodiversity, and build climate resilience.
- **Explore the potential for de-culverting** – This proposal is at the very early stages of being explored and visualised (Figure 18).
- **Training our volunteers** – We plan to offer **formal Riverfly monitoring training** to our Kick Sampling team to improve the rigour and recognition of our invertebrate surveys.
- **Supporting native species** – We will continue to **monitor the progress of the Ark site** we've established in partnership with the Environment Agency to support **native white-clawed crayfish** (Figure 19).

## 6. Conclusions

Our monitoring work along Gledhow Beck and Lake suggests that **there are persistent water quality issues with notable pressures on local ecosystems and signs of pollution impacting the community**. Residents have reported unpleasant sewage odours, visible debris and water discolouration, indications that the Beck and Lake are under strain.

### Key Findings

- **E. coli levels** in Gledhow Lake regularly **exceed bathing water safety standards**.
- **Aquatic invertebrate diversity** is lower than in other North Leeds Becks and the Lower Aire catchment as a whole, with very **few clean-water indicator species**, suggesting poor water quality.
- **High conductivity levels** may indicate an excess of dissolved substances, which can stress aquatic life.
- **Nitrate concentrations** are **elevated** at several sites, which can promote algal growth, which can reduce oxygen levels and biodiversity.
- **Pharmaceutical contamination**, including the '**forever chemical**' perfluorooctanoic acid, was found in both the Beck and the Lake.
- In addition, a previous study of Gledhow Lake in 2018 reported **high concentrations of metals and nutrients**, along with **low oxygen levels**, suggesting a **vulnerable ecological condition**.

Taken together, these findings **raise concerns about the long-term health of Gledhow Beck and Lake**. We hope this report will support renewed action from Yorkshire Water, the Environment Agency, local councillors, and the wider community to address the issues identified.

Without sustained attention, there is a risk that the **ecological and community benefits of our recent restoration work could be severely undermined**.

## 7. Thanks

**None of our work would be possible without the support of the following individuals and Organisations:**

Our amazing Citizen Science Team

Dr Gabriela Lopez Gonzalez, Madison Wright, Professor Paul Kay and Dr Paul Hutchings - water@leeds

Kat Kavanagh, Executive Director, Water Rangers

Dr John Wilkinson & Harriet Sleight, University of York

Geoff Roberts, Sam Riley-Gunn and Robert Hellawell, Aire Rivers Trust

Yorkshire Water Rivers Health Team and Dr Ben Aston, Principal Ecologist Yorkshire Water

Leeds ACTS! (Academic collaboration with the Third Sector)

James McKay, University of Leeds

Leeds Philosophical and Literary Society

Balbir Singh Dance Company

## 8. Contact

If you would like to learn more about our citizen Science project please get in touch:



www.fgvw.co.uk  
infofgvwcitizenscience@gmail.com

# 9. References

1. Yorkshire Water (2023). *Event Duration Monitoring – Storm Overflows*. [Online]. Available at: <https://www.yorkshirewater.com/environment/storm-overflows/event-duration-monitoring/> [Accessed May 2024].
2. Moore, R. (2018). *Environmental Water Consultancy MSc Report*. University of Leeds.
3. The Guardian (2023). *UK pollution and water quality coverage*. October 2023.
4. BBC News (2024). *Raw sewage discharges rise across England and Wales*. 2 February 2024.
5. Water Rangers (n.d.). *United Kingdom Citizen Science Programme*. [Online]. Available at: <https://waterrangers.com/united-kingdom> [Accessed May 2024].
6. University of York (2024). *Citizen science helping to clean up UK waterways*. [Online]. Available at: <https://www.york.ac.uk/news-and-events/news/2024/research/citizen-science-waterways/> [Accessed May 2024].
7. Ashden (2024). *Ashden Award Winners*. [Online]. Available at: <https://ashden.org/awards/2024-ashden-award-winners/> [Accessed May 2024].
8. Information Commissioner's Office (n.d.). *Guide to the Environmental Information Regulations*. [Online]. Available at: <https://ico.org.uk/for-organisations/eir-and-access-to-information/guide-to-the-environmental-information-regulations/what-are-the-eir/> [Accessed May 2024].
9. Friends of Gledhow Valley Woods (2024). *Gledhow Valley Road Green Fair Survey Report*. July 2023.

# 10. Appendix

## A.1 Monthly water chemistry results

Gledhow Beck Gledhow Lane CSO Below												
Observation Date	Observers	testers	pH	Nitrates	Phosphates	Chlorine	conductivity	Alkalinity	Hardness	Water Temperature	Air Temperature	
24/09/2023 14.30pm	David Miles	Jon,Tim,Adrian	7.7	3	0.02	0	534	120	300	14.2	16	
29/10/2023 14.00pm	David Miles	Adrian, Tim	7.8	4	0.03	0.5	523	80	600	11.9	12	
26/11/2023 15.00pm	Simon Conyers	Adrian,Jon	7.5	0.7	0	0	577	90	150	6.1	5	
31/12/2023 10.20am	Simon Conyers	Adrian,Tim	7.2	0.02	4	0	530	100	180	7.4	5	
28/01/2024 15.30pm	Smon Conyers	Adrian,Jon	7.3	0.6	0	0	551	100	150	7.5	9	
25/02/2024 10.00am	Simon Conyers	Adrian,Tim	7	3	0.02	0	582	100	180	6.2	5	
31/03/2024 10.00am	Simon Conyers	Adrian,Tim	6.8	1.5	0.02	0.2	595	80	120	8.6		
28/04/2024 10.00am	Simon Conyers	Adrian	6.6	0.5	0.03	0	212	20	50	8.4	7	
24/05/2024 17.25pm	Simon Conyers	Adrian,Tim	7.2	2.5	0	0	554	120	200	12.1	13	
30/06/2024 12.00pm	Simon Conyers	Adrian,Jon	7.2	0.5	0	0	542	100	150	12.9	15	
26/07/2024 10.20am	Simon Conyers	Adrian	7.2	1	0	0	549	120	150	15	17	
24/08/2024 10.00am	Simon Conyers	Adrian,Tim	6.8	1	0.05	0	446	100	150	13.5	15	

Gledhow Beck Gledhow Lane CSO Above												
Observation Date	Observers	Testers	pH	Nitrates	Phosphates	Chlorine	Conductivity	Alkalinity	Hardness	Water Temperature	Air Temperature	
24/09/2023 15.00pm	David Miles	Jon,Tim,Adrian	7.8	2	0.02	0	548	120	300	14	17	
29/10/2023 14.15pm	Simon Conyers	Adrian,Tim	7.8	1.5	0.02	0	531	80	400	12.1	12	
26/11/2023 14.45pm	Simon Conyers	Jane, Mike, Adrian	7.5	3	0	0	574	90	150	6.1	7	
31/12/2023 10.00am	Simon Conyers	Adrian,Tim	7	3	0.02	0	525	80	200	8	5	
01/02/2024 08.46am	Simon Conyers	Adrian,Jon	7.3	0.8	0	0	554	100	150	7.1	8	
25/02/2024 10.20am	Simon Conyers	Jon,Tim,Adrian	7	2	0.02	0	602	100	175	5.9	7	
31/03/2024 10.20am	Simon Conyers	Adrian,Tim	7	1.5	0.02	0	605	100	150	8.6	12	
28/04/2024 10.30am	Simon Conyers	Adrian	6.6	0.5	0	0	235	30	50	7.8	6	
24/05/2024 17.00pm	Simon Conyers	Adrian,Tim	7.2	2	0	0	557	100	200	12.2	13	
30/06/2024 12.20pm	Simon Conyers	Adrian,Jon	7	0.5	0	0	537	90	150	12.8	14	
26/07/2024 10.40am	Simon Conyers	Adrian	7.2	0.75	0	0	555	100	150	15.1	17	
24/08/2024 09.30am	Simon Conyers	Adrian,Tim	7	0.5	0.05	0	446	100	150	13.5	13	

Gledhow Beck Allerton Park CSO above												
Observation Date	Observers	Testers	pH	Nitrates	Phosphates	Chlorine	Conductivity	Alkalinity	Hardness	Water Temperature	Air Temperature	
24/09/2023 15.20pm	David Miles	Jon,Tim,Adrian	7.8	2	0.02	0	532	120	200	14.6	17	
30/10/2023 13.15pm	Simon Conyers	Jane, Mike, Adrian	7.6	1.5	0	0	505	120	150	11.2	10	
26/11/2023 14.30pm	Simon Conyers	Jane, Mike, Adrian	7.5	4	0	0	564	100	150	6.9	7	
01/01/2024 10.30am	Simon Conyers	Adrian	7.6	0.7	0.02	0	516	100	150	8.1	7	
27/01/2024 14.20pm	Simon Conyers	Adrian,Jon	7.5	1	0	0	557	90	150	7.5	9	
25/02/2024 15.00pm	Simon Conyers	Mike,Jane,Adrian	7.2	3.5	0	0	594	90	150	7.9	9	
01/04/2024 16.20pm	Simon Conyers	Mike,Jane,Adrian	7.3	3.5	0	0	492	90	100	9.8	10	
29/04/2024 12.30pm	Simon Conyers	Mike,Adrian	7.2	3.5	0	0	585	100	250	10.2	13	
24/05/2024 16.00pm	Simon Conyers	Adrian	7.3	1	0	0	651	100	200	12.5	14	
30/06/2024 10.30am	Simon Conyers	Adrian	7.2	1	0.02	0	491	80	150	13.2	14	
29/07/2024 16.35pm	Simon Conyers	JF,MP	7.5	2.5	0.03	0	545	110	200	17.4	22	
24/08/2024 09.05am	Simon Conyers	Adrian	7	0.5	0.02	0	521	100	150	13.4	14	

Gledhow Beck Allerton park CSO below												
Observation Date	Observers	Testers	pH	Nitrates	Phosphates	Chlorine	Conductivity	Alkalinity	Hardness	Water Temperature	Air Temperature	
24/09/2023	15:10:00	David Miles	Jon,Tim,Adrian	7.8	2	0.02	0	550	120	200	14.2	17
30/10/2023	12:58:00	Simon Conyers	Jane, Mike, Adrian	7.8	3	0	0	504	120	150	11.7	10.5
26/11/2023	14:00:00	Simon Conyers	Jane, Mike, Adrian	7.5	1.5	0	0	555	100	160	7.4	8
01/01/2024	10:00:00	Simon Conyers	Adrian	7.6	3	0.02	0	513	80	120	8.7	8
27/01/2024	14:00:00	Simon Conyers	Adrian, Jane	7.2	3	0.02	0	557	100	100	7.1	11.1
25/02/2024	14:50:00	Simon Conyers	Jane, Mike, Adrian	7.2	2	0	0	590	110	150	7.8	9
01/04/2024	16:00:00	Simon Conyers	Jane, Mike, Adrian	7.3	0.75	0.02	0	485	100	150	9.8	12
29/04/2024	12:00:00	Simon Conyers	Mike, Adrian	7.4	0.7	0	0	568	100	120	10.3	13
24/05/2024	16:30:00	Simon Conyers	Adrian	7.2	1	0	0	559	120	150	12.1	13
30/06/2024	11:45:00	Simon Conyers	Adrian	7.2	0.5	0.02	0	546	80	150	13.3	15
29/07/2024	16:15:00	Simon Conyers	JF, MP	7.3	2	0.03	0	542	100	250	17.1	24
24/08/2024	08:45:00	Simon Conyers	Adrian	7	0.5	0.02	0	435	100	150	14.1	14

Gledhow Beck allerton Grange CSO above												
Observation Date	Observers	Testers	pH	Nitrates	Phosphates	Chlorine	Conductivity	Alkalinity	Hardness	Water Temperature	Air Temperature	
25/09/2023	14:10pm	David Miles	David, Susan, Mike, Brigitte, Rachel, Simon	7.8	7	0	0	605	150	200	14.1	20
30/10/2023	13:45pm	Simon Conyers	Rachel, Susan, Simon	7.8	4	0	0	430	130	200	12.2	10.1
27/11/2023	14:08pm	Simon Conyers	David, Rachel, Simon, Susan	7.5	3	0	0	442	120	100	8.6	8
29/12/2023	10:40am	Simon Conyers	David, Mike, Simon	6.8	6	0	0	569	100	200	8.3	9.8
26/01/2024	14:00pm	Simon Conyers	David, Brigitte, Susan, Rachel	6.8	10	0.05	0	675	80	200	7.3	9
25/02/2024	10:30am	Simon Conyers	David, Rachel, Susan, Simon	7	6	0	0	640	100	180	7.4	9
29/03/2024	10:35am	Simon Conyers	David, Brigitte, Rachel, Simon	6.6	20	0	0	650	120	150	9.2	10
27/04/2024	10:34am	Susan Marcus	Mike, Susan, Brigitte, Simon	7.2	20	0	0	635	120	200	8.8	10
24/05/2024	09:35am	Simon Conyers	David, Susan, Brigitte, Simon	7.2	20	0	0	604	120	200	12.3	14
29/06/2024	09:35am	Simon Conyers	David, Mike, Susan, Simon	7.2	10	0	0	588	80	200	12.8	14
27/07/2024	09:30am	Simon Conyers	David, Brigitte, Susan	6.8	10	0	0	579	100	300	13.9	20
31/08/2024	09:45am	Simon Conyers	David, Brigitte, Rachel, Susan	7.5	10	0.05	0	559	80	200	12.5	15

Gledhow Beck Allerton Grange CSO Below												
Observation Date	Observers	Testers	pH	Nitrates	Phosphates	Chlorine	Conductivity	Alkalinity	Hardness	Water Temperature	Air Temperature	
29/09/2023	14:10pm	David Miles	David, Susan, Mike, Brigitte, Rachel, Simon	8	4	0.05	0	602	120	250	14.7	20
30/10/2023	14:00pm	Simon Conyers	Rachel, Susan, Simon	7.2	7.5	0	0	517	150	300	11.9	9.8
27/11/2023	14:15pm	Simon Conyers	David, Rachel, Simon, Susan	7.2	7	0	0	419	120	100	8.1	8
29/12/2023	10:50am	Simon Conyers	David, Mike, Simon	7.2	20	0	0	577	120	200	8.1	9.8
26/01/2024	14:10pm	Simon Conyers	David, Brigitte, Susan, Rachel	6.8	6	0.05	0	678	100	120	6.9	9
25/02/2024	10:40am	Simon Conyers	David, Rachel, Susan, Simon	7.2	40	0	0	656	100	200	6.8	8
29/03/2024	10:40am	Simon Conyers	David, Brigitte, Rachel, Simon	7.2	2	0	0	650	120	150	8.6	13
27/04/2024	10:45am	Brigitte Meile	Mike, Susan, Brigitte, David	7.2	10	0.05	0	655	120	200	7	10
24/05/2024	09:45am	Simon Conyers	David, Susan, Brigitte, Simon	7.2	20	0	0	611	130	200	12.3	14
29/06/2024	09:45am	Simon Conyers	David, Mike, Susan, Simon	6.8	20	0	0	609	80	200	12.7	15
27/07/2024	09:45am	Simon Conyers	David, Brigitte, Susan	7.5	5	0	0	587	80	150	14.2	19
31/08/2024	10:00am	Simon Conyers	David, Brigitte, Rachel, Susan	7.2	0.75	0.05	0	573	120	200	11.7	14

Gledhow Beck Harrogate Road CSO below												
Observation Date	Observers	Testers	pH	Nitrates	Phosphates	Chlorine	Conductivity	Alkalinity	Hardness	Water Temperature	Air Temperature	
25/09/2023	13:20pm	David Miles	David, Susan, Mike, Brigitte, Rachel, Simon	7.8	20	0	0	566	80	150	14.9	19.8
30/10/2023	13:00pm	Simon Conyers	Rachel, Susan, Simon	7.3	30	0	0	544	100	100	11.4	11
26/11/2023	13:30pm	Simon Conyers	David, Rachel, Simon, Susan	7.2	5	0	0	612	100	150	8.4	8
29/12/2023	10:05am	Simon Conyers	David, Mike, Simon	7.2	30	0	0	563	100	200	10.1	9.8
26/01/2024	13:30pm	Simon Conyers	Brigitte, Susan, David, Rachel	6.8	10	0.05	0	659	60	150	8.5	9
25/02/2024	10:05am	Simon Conyers	David, Rachel, Simon, Susan	6.4	25	0	0	626	80	100	8.7	8
29/03/2024	10:00am	Simon Conyers	David, Brigitte, Rachel, Simon	7	20	0	0	629	40	150	9.5	10
27/04/2024	10:00am	Susan Marcus	Mike, Susan, Brigitte, David	7	20	0.5	0	643	80	200	9.2	9
24/05/2024	09:00am	Simon Conyers	David, Susan, Brigitte, Simon	7	30	0	0	561	100	180	13.3	11
29/06/2024	09:05am	Simon Conyers	David, Mike, Susan, Simon	7.2	45	0	0	555	80	150	13.7	15
27/07/2024	09:00am	Simon Conyers	David, Brigitte, Susan	6.8	0	15	0	560	80	200	13.8	20
31/08/2024	09:00am	Simon Conyers	Brigitte, David, Rachel, Susan	7.2	35	0.1	0	570	60	100	12.2	15

Gledhow Beck Confluences of both water sources below both Harrogate Road and Allerton Grange CSOs												
Observation date	Observers	Testers	pH	Nitrates	Phosphates	Chlorine	Conductivity	Alkalinity	Hardness	Water Temperature	Air Temperature	
25/09/2023	14:35pm	David Miles	David, Susan, Mike, Brigitte, Rachel, Simon	7.7	10	0	0	583	100	200	14.1	18.5
30/10/2023	13:50pm	Simon Conyers	Rachel, Susan, Simon	7.5	20	0	0	302	100	140	11.6	10.1
27/12/2023	12:26pm	Simon Conyers	David, Rachel, Susan, Simon	7.2	7	0	0	461	100	100	8	8
29/12/2023	12:50pm	Simon Conyers	David, Mike, Simon	7	11	0	0	580	80	150	8.3	9.8
26/01/2024	14:20pm	Simon Conyers	David, Brigitte, Rachel, Susan	6.8	5	0.05	0	680	80	150	6.7	8
25/02/2024	10:50am	Simon Conyers	David, Rachel, Susan, Simon	7	20	0	0	636	100	150	7.6	9
29/03/2024	10:50am	Simon Conyers	David, Brigitte, Rachel, Simon	7.2	30	0	0	647	100	200	8.5	11
27/04/2024	10:50am	Brigitte Meile	Mike, Susan, Brigitte, David	6.8	10	0.05	0	645	80	150	7	10
24/05/2024	9:51am	Simon Conyers	David, Susan, Brigitte, Simon	7.2	20	0	0	597	100	150	11.9	14
29/06/2024	09:45am	Simon Conyers	David, Mike, Simon, Susan	7.2	20	0	0	602	80	200	12.1	16
27/07/2024	09:45am	Simon Conyers	David, Brigitte, Susan	6.8	20	0	0	580	100	150	13.8	20
31/08/2024	10:00am	Simon Conyers	David, Brigitte, Susan, Rachel	6.5	10	0.05	0	572	80	150	11.9	15

## A.2 Monthly E. coli results

Date	Time	Result- cfu/100ml
25/09/2023	10:15	2300
29/10/2023	12:28	100
27/11/2023	12:30	4800
18/12/2023	11:18	67
30/01/2024	13:10	10000
26/02/2024	11:44	400
25/03/2024	11:41	1000
29/04/2024	08:45	11

## A.3 Kick Sampling results - Gledhow Beck

ARMI Riverfly Scoring System

Abundance of Organisms in Estimated Count Number	ARMI Score	Estimated Number*
1-9	1	Quick Count
10-99	2	Nearest 10
100-999	3	Nearest 100
Over 1000	4	Nearest 1000

22/09/2023									
		Location 1		Location 2		Location 3		Location 4	
		EST. Number*	ARMI Score	EST. Number*	ARMI Score	EST. Number*	ARMI Score	EST. Number*	ARMI Score
Caddisflies	Cased caddisflies			1	1				
	Caseless caddisflies								
Up-wing flies	Mayfly (Ephemeroidea)								
	Blue-winged olive (Ephemeroidea)								
	Flat-bodied stone clinger (Heptageniidae)								
	Olives (Baetidae)					1	1		
Stoneflies	Stoneflies (Plecoptera)			1	1				
Shrimp	Freshwater shrimp (Gammaridae)	20	2	2	1	11	2	16	2
ARMI Total Score			2	3		3		2	
Pollution Indicating Species	Leach								
	Water Hogg Lice	2		4					
	Blackfly Lava								
	Worms			1					

26/11/2023									
		Location 1		Location 2		Location 3		Location 4	
		EST. Number*	ARMI Score	EST. Number*	ARMI Score	EST. Number*	ARMI Score	EST. Number*	ARMI Score
Caddisflies	Cased caddisflies								
	Caseless caddisflies								
Up-wing flies	Mayfly (Ephemeroidea)								
	Blue-winged olive (Ephemeroidea)								
	Flat-bodied stone clinger (Heptageniidae)	1	1						
	Olives (Baetidae)	13	2	5	1	30	2	20	2
Stoneflies	Stoneflies (Plecoptera)								
Shrimp	Freshwater shrimp (Gammaridae)	20	2	5	1	14	2	6	1
ARMI Total Score			5	2		4		3	
Pollution Indicating Species	Leach	1							
	Water Hogg Lice	2							
	Blackfly Lava								
	Worms								

28/01/2024									
		Location 1		Location 2		Location 3		Location 4	
		EST. Number*	ARMI Score	EST. Number*	ARMI Score	EST. Number*	ARMI Score	EST. Number*	ARMI Score
Caddisflies	Cased caddisflies								
	Caseless caddisflies								
Up-wing flies	Mayfly (Ephemeroidea)								
	Blue-winged olive (Ephemeroidea)								
	Flat-bodied stone clinger (Heptageniidae)								
	Olives (Baetidae)	6	1	20	2	44	2	61	2
Stoneflies	Stoneflies (Plecoptera)							2	
Shrimp	Freshwater shrimp (Gammaridae)	11	2	10	2	12	2	21	2
ARMI Total Score			3		4		4		4
Pollution Indicating Species	Leach	3				1		2	
	Water Hogg Lice			3		4		2	
	Blackfly Lava					5		1	
	Worms			1		2			

23/03/2024									
		Location 1		Location 2		Location 3		Location 4	
		EST. Number*	ARMI Score	EST. Number*	ARMI Score	EST. Number*	ARMI Score	EST. Number*	ARMI Score
Caddisflies	Cased caddisflies								
	Caseless caddisflies	1	1						
Up-wing flies	Mayfly (Ephemeroidea)								
	Blue-winged olive (Ephemeroidea)								
	Flat-bodied stone clinger (Heptageniidae)								
	Olives (Baetidae)	6	1	30	2	9	1	25	2
Stoneflies	Stoneflies (Plecoptera)								
Shrimp	Freshwater shrimp (Gammaridae)	10	2	2	1	3	1	1	1
ARMI Total Score			4		3		2		3
Pollution Indicating Species	Leach	3		6		7		1	
	Water Hogg Lice	3		1				2	
	Blackfly Lava							1	
	Worms	1		1		3			

02/06/2024									
		Location 1		Location 2		Location 3		Location 4	
		EST. Number*	ARMI Score	EST. Number*	ARMI Score	EST. Number*	ARMI Score	EST. Number*	ARMI Score
Caddisflies	Cased caddisflies								
	Caseless caddisflies								
Up-wing flies	Mayfly (Ephemeroidea)								
	Blue-winged olive (Ephemeroidea)								
	Flat-bodied stone clinger (Heptageniidae)								
	Olives (Baetidae)	3	1	18	2	31	2	26	2
Stoneflies	Stoneflies (Plecoptera)								
Shrimp	Freshwater shrimp (Gammaridae)	23	2	14	2	5	1	12	2
ARMI Total Score			3	4		3		4	
Pollution Indicating Species	Leach	1		1				1	
	Water Hogg Lice	2		1					
	Blackfly Lava								
	Worms	1				4		3	

28/07/2024									
		Location 1		Location 2		Location 3		Location 4	
		EST. Number*	ARMI Score	EST. Number*	ARMI Score	EST. Number*	ARMI Score	EST. Number*	ARMI Score
Caddisflies	Cased caddisflies								
	Caseless caddisflies								
Up-wing flies	Mayfly (Ephemeroidea)								
	Blue-winged olive (Ephemeroidea)								
	Flat-bodied stone clinger (Heptageniidae)								
	Olives (Baetidae)					2	1	2	1
Stoneflies	Stoneflies (Plecoptera)								
Shrimp	Freshwater shrimp (Gammaridae)	40	2	20	2	20	2	16	2
ARMI Total Score			2	2		3		3	
Pollution Indicating Species	Leach	1		3		1		1	
	Water Hogg Lice	4		1		9		1	
	Blackfly Lava	1							
	Worms			1		1		2	

North Leeds Riverfly Scores	Date of Sample	Gledhow Mean Monthly ARMI Score	All Lower Aire ARMI Historic Average
	22/09/2023	2.5	
	26/11/2023	3.5	
	28/01/2024	3.75	
	23/03/2024	3	
	02/06/2024	3.5	
	28/07/2024	2.5	
	<b>Gledhow Mean Score</b>	<b>3.125</b>	<b>7.2</b>
	Meanwood Beck Historic Average	7.7	7.2
	Wyke Beck Historic Average	7.7	7.2
	Oil Mill Beck Historic Average	6.3	7.2
	All Lower Aire Historic Average	7.2	7.2
	<b>Difference (Mean Gledhow Beck-Lower Aire Average)</b>	<b>-4.075</b>	

Site 2: Gledhow Lake		
Compound	Concentration (ng/L)	Predicted No Effect Concentration (ng/L)
Carbamazepine	17.90	2500
Caffeine	905.71	12000
Cetirizine	4.97	376000
Cotinine	11.94	64500
Fexofenadine	50.58	1000000
Furosemide	236.49	-
Irbesartan	5.55	-
Lorsartan	16.52	-
Metformin	777.53	100000
Nicotine	37.07	1390
Perfluorooctanoic Acid	17.35	-
Temazepam	12.84	2280

Site 3: Fork in Gledhow Beck		
Compound	Concentration (ng/L)	Predicted No Effect Concentration (ng/L)
Carbamazepine	17.39	2500
Caffeine	108.08	12000
Cetirizine	2.71	376000
Fexofenadine	18.11	1000000
Metformin	5424.47	100000
Perfluorooctanoic Acid	10.62	-

Site 4: Gledhow Beck by Gledhow Valley Road		
Compound	Concentration (ng/L)	Predicted No Effect Concentration (ng/L)
Carbamazepine	14.69	2500
Caffeine	1429.1	12000
Cetirizine	3.72	376000
Cotinine	13.49	64500
Fexofenadine	15.33	1000000
Metformin	5137.42	100000
Perfluorooctanoic Acid	34.28	-
Temazepam	2.9	2280

## A.4 Pharmaceutical Concentration Results

Site 1: Gledhow Beck opposite Gledhow Park Drive		
Compound	Concentration (ng/L)	Predicted No Effect Concentration (ng/L)
Carbamazepine	16.49	2500
Caffeine	1606.48	12000
Cetirizine	4.29	376000
Fexofenadine	16.10	1000000
Gabapentin	133.60	100000
Metformin	2160.05	100000
Perfluorooctanoic Acid	27.01	-



**Contact Details:**

[infofgvvcitizenscience@gmail.com](mailto:infofgvvcitizenscience@gmail.com)

**Disclaimer:**

This report has been produced by Friends of Gledhow Valley Woods. All data has been collected and interpreted by local citizen scientists, with support and guidance from academic and technical experts.

While every effort has been made to ensure accuracy, this is a community-led initiative, and the findings reflect the best available understanding at the time of writing. For any questions, corrections, or suggested amendments, please contact: David Miles

[infofgvvcitizenscience@gmail.com](mailto:infofgvvcitizenscience@gmail.com)

**BalbirSingh  
dancecompany**

Document design by  
Balbir Singh Dance Company