Investigating freshwater metal pollution in Corby

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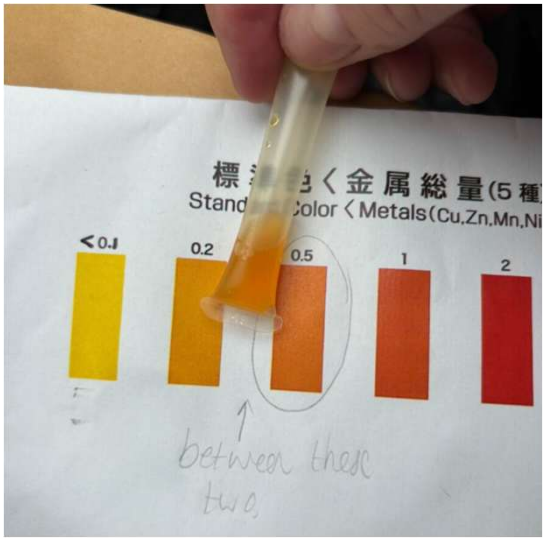
Background

- In 1980, The British Steel Corporation demolished Corby steelworks and waste was moved to **Deene Quarry**, spreading contaminated dust
- **Cadmium, chromium** and **nickel** were identified on the former steel site, and a medical expert linked them to birth defects in animals.
- In August 2025, Corby community leaders approached Earthwatch Europe – an **independent** and internationally trusted organisation - to investigate metal contamination in Corby's waterways.
- In November 2025, **35 volunteers** assessed **59 freshwater sites** across Corby for metal pollution using simple testing kits and collecting samples for laboratory analysis by Artemis Analytical.
- This was **the first ever** citizen science investigation into freshwater metal pollution in the UK.



Metals tested

59 sites across Corby were tested for **33 elements**

- 29 metals and metalloids
- 4 reactive non-metals.

At every site, at least one metal was detected at concentrations higher than its predicted no effect concentration (PNEC)

At concentrations higher than the PNEC, substances pose risk to aquatic life

Element (symbol)	Type	DWI limit (ug/l)3	PNEC freshwater (ug/l)4
Aluminium (Al)	Post-transition metal	200	-
Arsenic (As)	Metalloid	10	0.5
Boron (B)	Metalloid	1000	2000
Barium (Ba)	Alkaline earth metal	Not tested	19
Beryllium (Be)	Alkaline earth metal	Not tested	-
Bismuth (Bi)	Post-transition metal	Not tested	-
Cadmium (Cd)	Transition metal	5	0.25
Caesium (Cs)	Alkali metal	Not tested	-
Calcium (Ca)	Alkaline earth metal	Not tested	-
Chromium (Cr)	Transition metal	50	3.4
Cobalt (Co)	Transition metal	Not tested	0.28
Copper (Cu)	Transition metal	2000	1.0
Gallium (Ga)	Post-transition metal	Not tested	-
Indium (In)	Post-transition metal	Not tested	-
Iron (Fe)	Transition metal	200	1000
Lead (Pb)	Post-transition metal	10	1.3
Lithium (Li)	Alkali metal	Not tested	-
Manganese (Mn)	Transition metal	50	123
Magnesium (Mg)	Alkaline earth metal	Not tested	-
Nickel (Ni)	Transition metal	20	2
Phosphorous (P)	Reactive non-metal	Not tested	-
Potassium (K)	Alkali metal	Not tested	-
Rubidium (Rb)	Alkali metal	Not tested	-
Selenium (Se)	Reactive non-metal	10	0.1
Silicon (si)	Metalloid	Not tested	-
Silver (Ag)	Transition metal	No limit	-
Sodium (Na)	Alkali metal	200,000	-
Strontium (Sr)	Alkaline earth metal	Not tested	-
Sulphur (S)	Reactive non-metal	Not tested	-
Tellurium (Te)	Reactive non-metal	Not tested	-
Thallium (Tl)	Post-transition metal	Not tested	0.013
Vanadium (V)	Transition metal	Not tested	4.1
Zinc (Zn)	Transition metal	None specified	7.8

Metals tested

The most frequently occurring metals and metalloids at concentrations higher than their PNEC were:

- **Copper**
- **Arsenic**
- **Barium**
- **Cobalt**

Element (symbol)	PNEC freshwater (ug/l)[4]	Number of sites detected (above LoQ)	Number of sites higher than PNEC	% of sites higher than PNEC
Arsenic (As)	0.5	59	58	98
Boron (B)	2000	59	0	0
Barium (Ba)	19	59	37	63
Cadmium (Cd)	0.25	30	0	0
Chromium (Cr)	3.4	59	0	0
Cobalt (Co)	0.28	59	33	56
Copper	1.0	59	59	100
Iron (Fe)	1000	59	0	0
Lead (Pb)	1.2	28	1	2
Manganese (Mn)	123	59	1	2
Nickel (Ni)	2	48	30	51
Selenium (Se)	0.1	22	22	37
Thallium (Tl)	0.013	0	0	0
Vanadium (V)	4.1	59	2	3
Zinc (Zn)	7.8	36	28	47

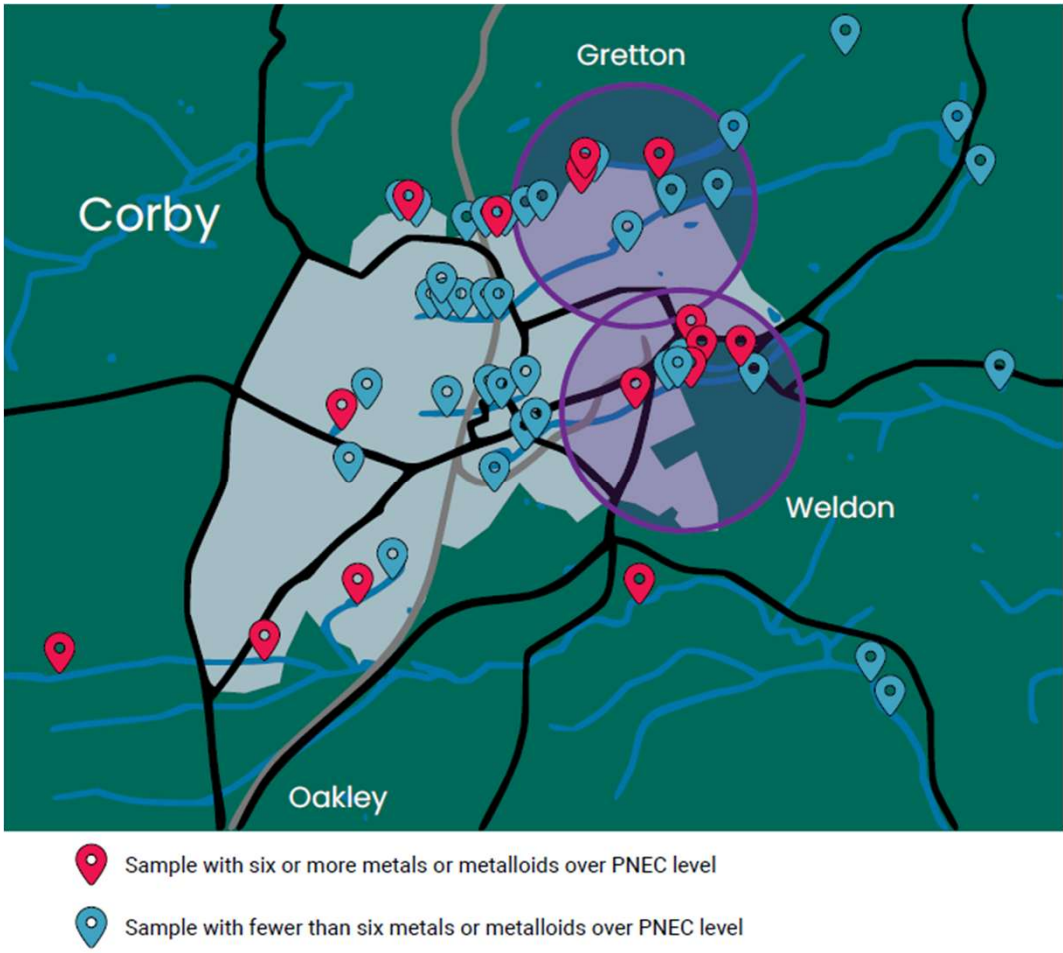
Metal distribution

The distribution of metals across Corby was not uniform, with different sites polluted by a variety of different elements

Focusing on sites with **six or more elements** present at concentrations higher than their PNEC **indicates two pollution** hotspots:

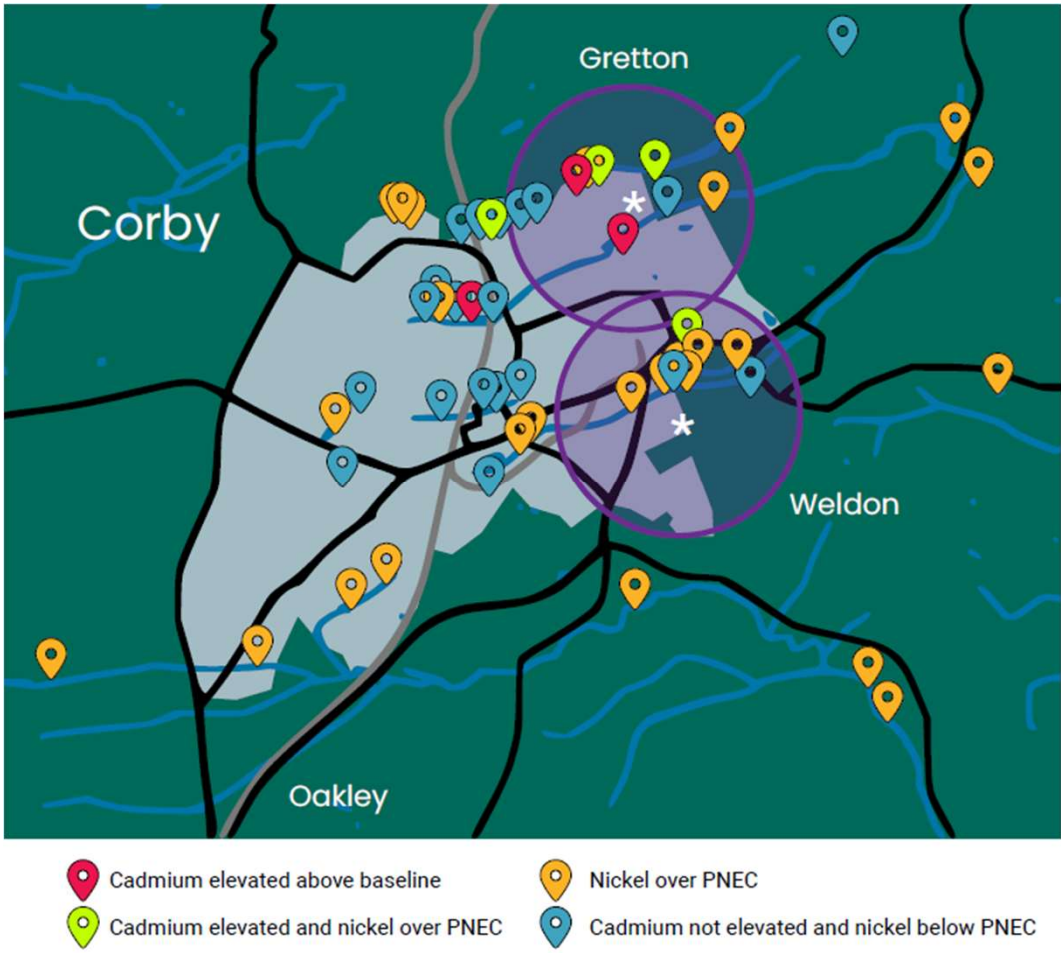
- one in Gretton
- one in Weldon

Five metals (cadmium, caesium, gallium, rubidium and vanadium) are found at significantly higher concentrations **within 1 mile from the pollution hotspots** compared to other sites across Corby (*p=<0.01, Mann-Whitney tests*)



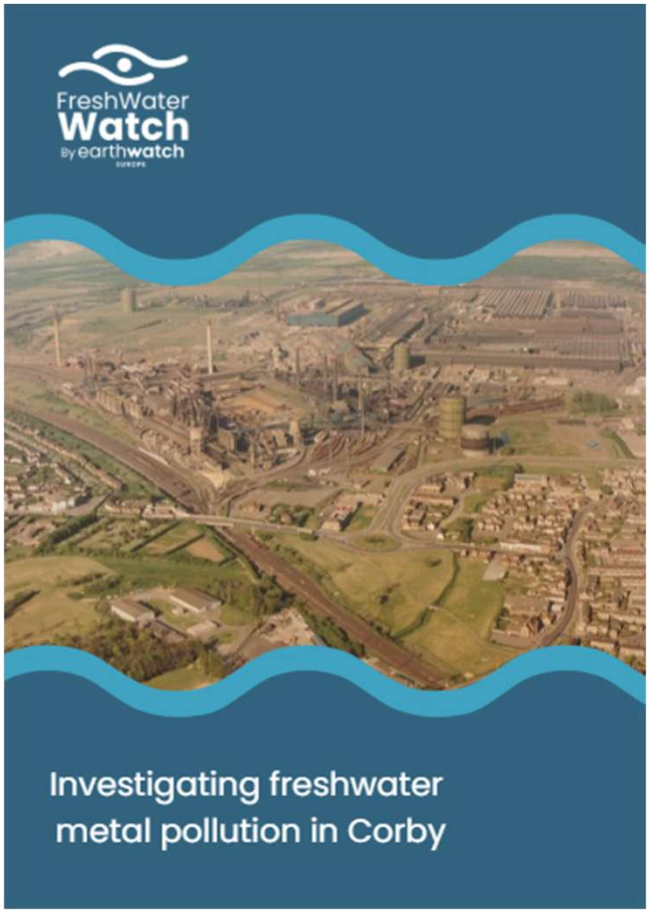
Cadmium, chromium, nickel

- Chromium was not detected at elevated concentrations or above its PNEC
- **Nickel was detected at 30 sites** at concentrations higher than its PNEC
- **Cadmium was detected at 7 sites** at elevated concentrations.
- The sites where cadmium and nickel were elevated were found in two pollution hotspots:
  - **Deene Quarry** – a site where waste was dumped in the 1980s and 90s
  - A **former slag heap in Weldon**



Summary

- High concentrations of cobalt, copper and nickel in sites upstream of potential pollution hotspots suggests general **metal pollution could be a widespread issue**
- **Cadmium** and **nickel** were present at elevated concentrations freshwater sites surrounding **Deene Quarry** and **a former slag heap in Weldon** indicating that these sites are sources of metal pollution
- **Further testing** of the freshwater sites in these pollution hotspots would build a more complete picture; whether metals entered from road runoff, or through groundwater, and whether they were also present in the soil
- **Thank you to the community of Corby**



Questions and Answers

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Did this study investigate drinking water?

- No, this study only tested freshwater, not drinking water
- Drinking water is taken up from rivers and reservoirs, filtered and disinfected at **water treatment works**, then delivered to homes
- Metals are removed through reverse osmosis, ion exchange, and chemical precipitation
- After we use water it enters the sewer system, where it is treated at **sewage treatment works** before being released back into rivers
- Once in the environment, water continues through the natural water cycle, re-filling rivers and reservoirs.
- Freshwater in Corby is **not** abstracted for drinking water

Are metals naturally present in water?

- Yes, metals are **naturally present** in freshwater ecosystems, and many are essential to the health and survival of living organisms in low concentrations, such as **iron**.
- Higher concentrations of metals (above their PNECs) can pose risk to aquatic life.
- Human activities can increase the concentration of metals in freshwater.
- For example, cadmium has been historically used in steelworks to cover steel and protect it from corrosion.

Did this study investigate human health?

- **No, this study focused on environmental health only**
- Further investigations with **health-focused research organisations** would be necessary to look at any relationship between the metals we have analysed in freshwater and the health of people in Corby

What is PNEC?

A Predicted No Effect Concentration, or PNEC, is the level of a substance - such as a metal - below which it is not expected to harm plants, animals, or ecosystems, even if exposure continues over a long time. It relates specifically to environmental health and does not describe effects on human health.

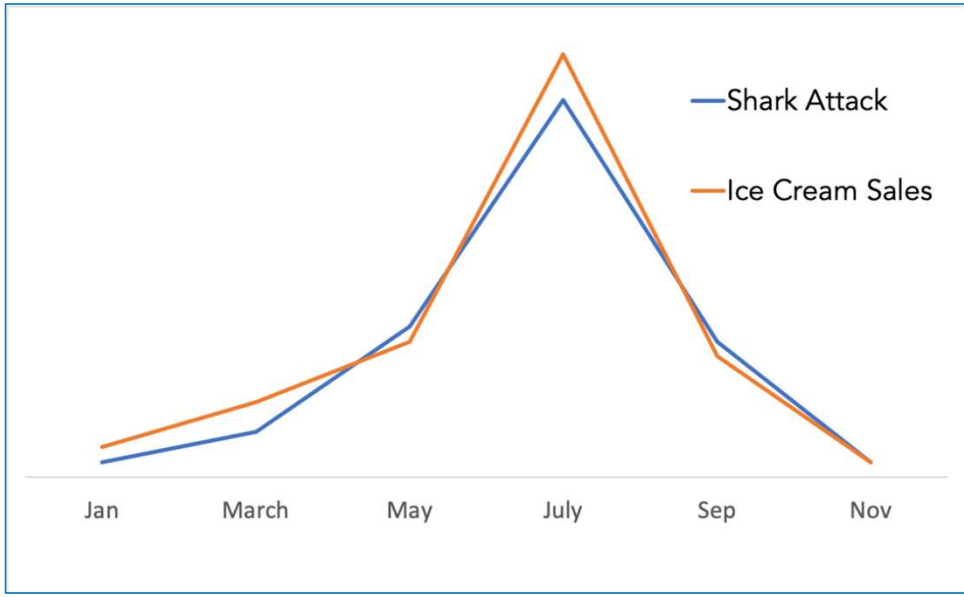
How might a health-focused research organisation investigate human health?

- **Correlation** does not equal **causation**

- To determine **causation**, an epidemiology study might include an analysis of Corby and a "control" location for:
  - Metal concentration in freshwater, and
  - Population distribution of health issues, and
  - Patient blood and urine samples for metals

- **This study only investigated metal concentration in Corby freshwaters**

- Investigating the relationship between water quality and human health is **outside of Earthwatch's expertise** and would require a health-focused research organisation.



What methods did we use?

Citizen science

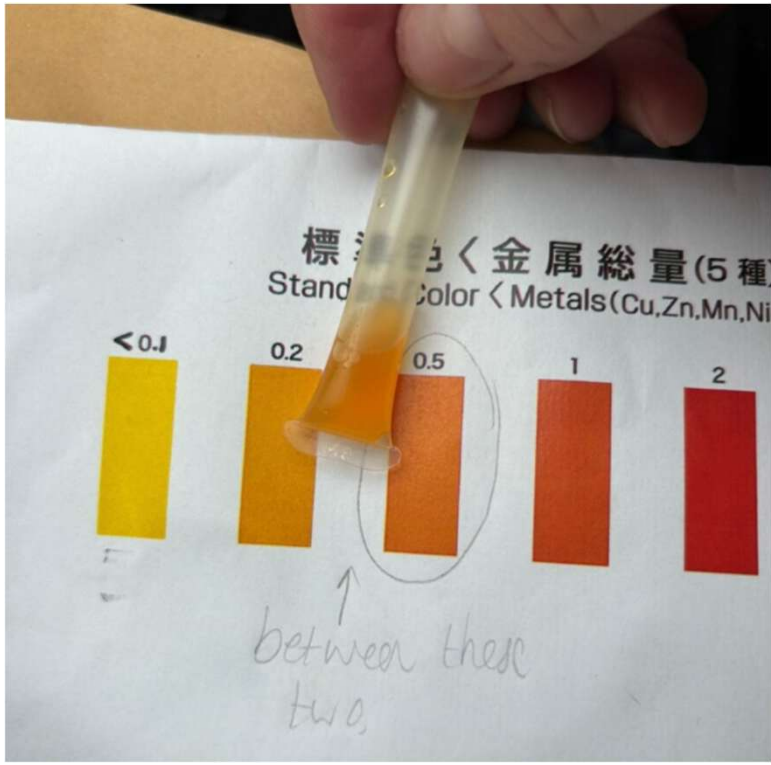
- The testing kit measured five metals in dissolved state – cadmium, copper, manganese, nickel and zinc
- The sum of the dissolved metals produced a colour change based on a reaction between these metals and 1-(2-Pyridylazo)-2-naphthol (PAN)

Lab analysis

- Artemis Analytical used Tandem Quadrupole Inductively Coupled Plasma Mass Spectrometry (ICP-MS/MS)
  - High temperature plasma ionises samples – i.e. converts a sample into ions, typically by removing one or more electrons.
  - Mass spectrometry measures the mass-to-charge ratio of ions

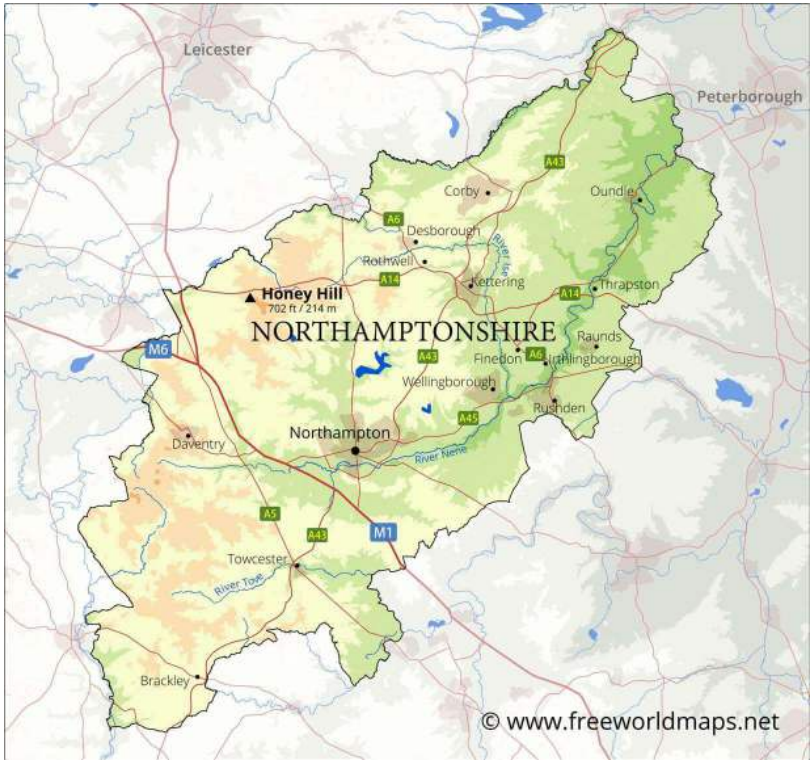
How does the kit data compare to lab data?

- Where the citizen scientists measured high concentrations of metals, high concentrations were also detected using laboratory analysis.
- However, at lower concentrations of metals, both the detection limit of the method and the presence of multiple interfering compounds in the river (phosphate, carbonate, chloride) did not allow for reliable estimates using the citizen science testing kits, **with the kits over-estimating concentrations**.
- Only lab data has been used to draw the conclusions in this report



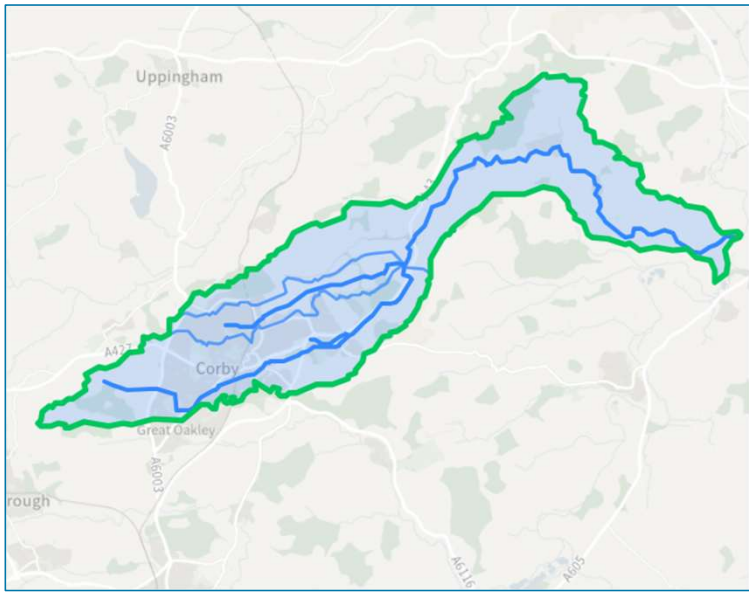
How does Corby compare to other locations?

- **This is difficult to answer** because sites are rarely assessed at the same time under the same weather conditions
- A single sample at various locations only shows conditions at that **exact time**.
- Water quality is highly **variable**, changing daily due to rainfall and pollution events (like sewage overflows), so one sample can't capture the overall picture.
- **Multiple samples**, taken over several years may be needed to identify long-term water quality problems and guide long-term improvements.



How does this data compare to Environment Agency data?

- Corby is located in the Willow Brook catchment of the River Nene.
- The Environment Agency have classified all three waterbodies in this catchment as having **moderate ecological status.**
- Data from 2019 and 2022 indicates that waterbodies in the catchment are considered “Good” in terms of their cadmium and nickel levels, based on **Environmental Quality Standards** rather than PNEC.
- Environment Agency data from 2025 recorded cadmium concentrations as **<0.10ug/l**.
- Citizen scientists recorded concentrations of up to **0.23ug/l**
- **Multiple samples** may be needed to identify long-term water quality problems and guide long-term improvements



What have the Environment Agency said about our data?

A spokesperson for the Environment Agency said:

“We welcome the initiative and work that has been carried out by Earthwatch Europe. Citizen science is a **valuable contribution** to the evidence base on water and **helps to identify and prioritise action**.

“We will study the findings of the final report so we can **support and advise** North Northamptonshire Council and Earthwatch Europe on their next steps.”

What now?

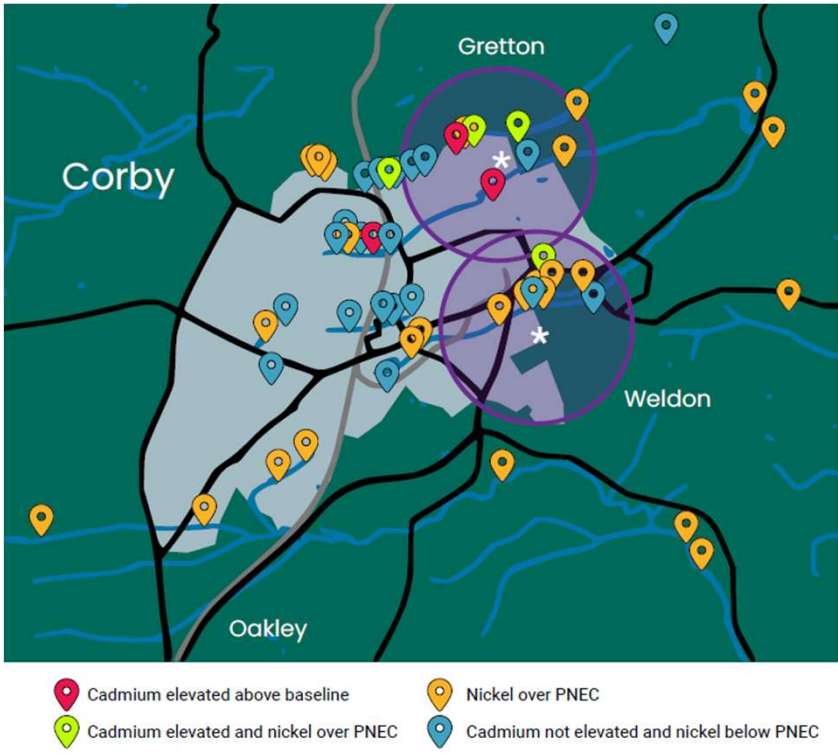
The Environment Agency told us:

“In the last 12 months we carried out a **pollution prevention day of action**, visiting 36 of the highest risk businesses around Gretton Brook Road. We provided advice on pollution prevention, including chemical storage, disposal of wash waters, drainage plans, and waste disposal. However, we did not identify any pollution source from these sites.”

“The permit [for Deene Quarry] is currently held by North Northamptonshire Council, and the Environment Agency regulates this. **Monitoring is currently conducted annually** and a report is produced.”

A final word

- This study is a single powerful snapshot of metal pollution across Corby, indicating that there may be sources of cadmium and nickel in **Gretton and Weldon**
- **Further testing** – especially in summer – would give a better indication of the specific sources (runoff or groundwater)
- **Multiple samples** may be needed to identify long-term water quality problems and guide long-term improvements
- Further investigations with **health-focused research organisations** would be necessary to look at any relationship between the metals we have analysed in freshwater and the health of people in Corby
- **Thank you to the community of Corby**



Thank you

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