



# Angling Trust Water Quality Monitoring Network: River Sampling Process



## Order of Testing

### 1. Sensor Measurements

- Electrical Conductivity (EC)
- Temperature

### 2. Nutrient Tests

- Phosphate
- Nitrate
- Ammonia (*selected sites*)

## Sensor Measurements – HM Digital EC-3 Meter

Step	Instruction
<b>Remove</b>	Remove the protective cap from the device → Check the device is clean and dry
<b>Turn on</b>	Turn the meter on (ON/OFF Button) and lower the probe into the water sample → Take care to only submerge to the max submersion level
<b>Stir</b>	Gently stir the meter in the sample and wait for the reading to stabilise. This could take some time
<b>Press</b>	Press the HOLD Button to fix the reading so that you can view it out of the water
<b>Record</b>	Record the EC value displayed (in $\mu\text{S}/\text{cm}$ ) → If X10 is displayed, multiply the value displayed by 10
<b>Release</b>	Press the HOLD Button again to release the fixed reading
<b>Temp</b>	Press the TEMP Button and lower the probe into the water sample a second time → Take care to only submerge to the max submersion level
<b>Wait</b>	Wait for the temperature reading to stabilise and press the HOLD Button again
<b>Record</b>	Record the temperature value displayed (in $^{\circ}\text{C}$ ) → Press the TEMP Button twice to switch back to EC
<b>Dry</b>	Gently shake excess water off, use a lint cloth or soft paper towel to ensure the sensor is dry and clean before replacing the cap for storage

## Nutrient Test 1 – Hanna Phosphate Checker

Step	Instruction
<b>Rinse</b>	Rinse the cuvette, and syringe if using, with river water at the sample site
<b>Fill</b>	Fill the cuvette from your sampling vessel to the 10ml mark and replace the cap. Ensure it's exactly on the mark to get an accurate test.
<b>Wipe</b>	Wipe the outside of the cuvette to remove any water, dirt marks or fingerprints with a lint-free cloth or soft tissue → This is cuvette 1 (C1, aka your blank sample) prepared
<b>Power On</b>	Press the ON/OFF Button to turn the checker on → 'Add C1' will appear with the word 'Press' blinking
<b>Insert C1</b>	Insert the cuvette (C1) into the checker and close the cap → Hold the top of the cuvette to avoid smearing the glass sides
<b>Zero</b>	Press the ON/OFF Button again → 'Add C2' will appear with the word 'Press' blinking → The device is now zeroed
<b>Remove C1</b>	Remove the cuvette from the checker
<b>Open</b>	Carefully open the powder reagent packet by tapping the powder to one corner, cutting the opposite corner, and pinching the packet to open it
<b>Add</b>	Unscrew the cap of the cuvette and carefully tip in the entire contents of the packet
<b>Mix</b>	Replace the cap and shake gently for two minutes until the powder is completely dissolved
<b>Wipe</b>	Wipe down the outside of the cuvette again → This is cuvette 2 (C2, aka your reacted sample) prepared
<b>Insert C2</b>	Insert the cuvette (C2) into the checker and close the cap
<b>Start Timer</b>	Press and <b>HOLD</b> the ON/OFF Button until the three-minute counter begins
<b>Record</b>	Record the reading that displays immediately after the timer ends (in ppm) → The device will turn off automatically after two minutes

### Readings & Unit Conversions

- **Phosphate Checker Range:** 0.00 – 2.5 ppm
  - 0.00 ppm means between 0.00 and 0.04 ppm
  - 2.5 ppm means in excess of 2.5 ppm
- **Conversions:**
  - 1 ppm = 1 mg/L = 1000 ppb
  - 1 mg/L = 1000 µg/L

## Nutrient Test 2 – Simplex Health Nitrate Strips

Step	Instruction
<b>Remove</b>	Remove the test strip from the bottle and immediately replace the bottle cap
<b>Dip</b>	Dip the test strip into your sample for 2 seconds without motion. Do not shake off excess water.
<b>Wait</b>	Hold the strip horizontally with the pad facing up for 1 minute.
<b>Compare</b>	Match the end pad to the top colour chart on the bottle (labelled NO <sub>3</sub> -N)
<b>Record</b>	Record the value on Epicollect
<b>Compare</b>	Match the pad nearest handle (NO <sub>2</sub> -N) to the bottom colour chart
<b>Record</b>	Records the value on Epicollect

## Nutrient Test 2 – Hach Nitrate Strips

### Using the Hach Nitrate Test Strips

Step	Instruction
<b>Remove</b>	Remove the test strip from the bottle and immediately replace the bottle cap
<b>Dip</b>	Dip the strip into your sample for one second → Do not shake off excess water
<b>Wait</b>	Hold the strip horizontally with the pad facing up for 30 seconds
<b>Compare</b>	Compare the colour of the top pad with the top colour chart (labelled Nitrate Nitrogen ppm) on the bottle
<b>Record</b>	Select the matching colour and record the associated nitrate concentration

## Interpreting the 2 kits:

The Hach Nitrate strips have now been discontinued in the UK, so as of October 2025, we have switched to Simplex Nitrate Strips. If your site is switching to the new strips, then to compare the results, you need to add both Nitrate and Nitrite values recorded on the Simplex Health strips to compare with the 'Nitrate Nitrogen' value recorded using the Hach Strips.

This is because the Hach strips 'Nitrate Nitrogen ppm' value actually measured the sum of both nitrate nitrogen and nitrite nitrogen. Whereas, the new strips measure nitrate nitrogen and nitrite nitrogen separately, so they must be added to get the equivalent Hach reading.

Note: The nitrite value on the Simplex strips will often be very low or 0, as nitrite is unstable in water and if usually quickly converted to Nitrate.

# Nutrient test 3 – Hanna Ammonia Checker

## Using the Hanna Ammonia Checker – Part 1

Step	Instruction
<b>Rinse</b>	Rinse the cuvette and syringe (if using) with river water
<b>Fill</b>	Fill the cuvette to the 10ml mark and replace the cap
<b>Wipe</b>	Wipe the outside of the cuvette clean
<b>Power On</b>	Press the ON/OFF Button → 'Add C1' will appear, with the word 'press' blinking → The device is now ready for your blank sample to be added
<b>Insert C1</b>	Insert the cuvette and close the lid, holding the top of the cuvette to avoid touching the sides
<b>Press</b>	Press the ON/OFF Button again → 'Add C2' will appear blinking → The device is now zeroed
<b>Add A</b>	Remove the cuvette, take off the cap and add 4 drops of Reagent A → Replace cap and swirl to mix
<b>Add B</b>	Unscrew the cap again and add 4 drops of Reagent B → Replace cap and swirl to mix
<b>Insert C2</b>	Wipe the cuvette clean, removing any fingerprints → Insert the cuvette and close the cap
<b>Press &amp; HOLD</b>	Press and HOLD the ON/OFF Button until the 3 min 30 sec counter begins
<b>Record</b>	Record the reading in ppm → Device turns off automatically after two minutes

## Tips for Phosphate & Ammonia Checkers

- Filter turbid samples before analysis
- Remove bubbles by swirling or tapping
- Always clean and dry cuvettes before inserting
- Wipe off fingerprints
- In cold weather, reagent may dissolve slower
- Use separate cuvettes for blank and reacted samples
- Avoid letting samples settle too long before testing

## Settling Warning

Avoid leaving samples to stand before analysis. Phosphate may react or settle out, leading to inaccurate results. If a sample is left for more than one hour, note this clearly in your survey.

# Interpreting your results



**Phosphate<sup>\*1</sup>** - Orthophosphate ( $\text{PO}_4^{3-}$ ) as measured by Hanna Colorimeter

High	Good Ecological Status	Moderate / Poor
< 0.077 ppm	0.077 – 0.306 ppm	> 0.306 ppm

**Nitrate<sup>\*2</sup>** - as measured by Hach Nitrate Test Strips

Natural	Elevated	Excessive
< 1 ppm	1 – 4.9 ppm	$\geq 5$ ppm

**Ammonia<sup>\*1</sup>** - as nitrogen as measured by Hanna Colorimeter

High	Good Ecological Status	Moderate / Poor
< 0.3 ppm	0.3 – 0.6 ppm	> 0.75 ppm

<sup>\*1</sup> Water Framework Directive (WFD) standards set as annual means.

Standards are site specific, hence there is a range for good ecological status.

<sup>\*2</sup> There is no WFD standard set for Nitrate in rivers.

# Interpreting your results

## Electrical Conductivity

Significantly elevated electrical conductivity (EC) can indicate that pollution has entered the river. A measure of EC cannot tell you what the pollutant is, but it can help identify that there is a problem that may harm invertebrates and/or fish. EC may be high in a river without any visible effects on the clarity of the river water. Any human activity that adds inorganic, charged chemicals to a river will alter the EC.

Water Type	Typical Conductance Range
Distilled water	0.5 – 3 (µS/cm)
Snow Melted	2 – 42 (µS/cm)
Tap Water	50 – 800 (µS/cm)
Freshwater Streams	50 – 1,500 (µS/cm)
Chalk Streams	100 - 2,000 (µS/cm)

For example, EC may be higher in a river downstream of a sewage treatment works due to chemicals such as chloride and phosphate from household products. Winter road runoff, containing salt, can be very high in electrical conductivity. If this runoff reaches rivers, then it may, depending on the quantity of water, temporarily elevate the EC in the river.

## Phosphate

Standards for Phosphorus in UK Rivers were introduced under the Water Framework Directive (WFD) and associated Regs/Directions. The standards are site-specific and depend upon the altitude and alkalinity of the site. The standards for good ecological status (close to natural) in Rivers are broadly in the range 0.077 – 0.306 ppm of Orthophosphate (PO<sub>4</sub> 3-), as annual means, as measured by the Phosphate Colorimeter. The Phosphate Colorimeter upper limit is 2.5 ppm, the lower test limit is 0.00 ppm with an accuracy of ± 0.04 ppm. So, a 0.00 ppm reading does not mean there is no phosphate present, it will be between 0.00 and 0.04 ppm. A 2.5 ppm reading means that it is in excess of 2.5 ppm.

## Nitrate

There are no ecological status standards for Nitrogen in Rivers. The Environment Agency's approach is to focus on Phosphate as the main cause of river eutrophication and the nutrient they are most able to reduce to levels that will improve the ecology. There is a standard for Lakes and Reservoirs, which is 0.75 – 1.5 mg/l (ppm). Natural levels of Nitrate in freshwater are typically low, generally well below 5 ppm.

## Ammonia

Standards for Ammonia in UK Rivers are also set out in the Water Framework Directive (WFD). As with Phosphate, standards are site-specific and depend upon the altitude and alkalinity of the site. The standards for good ecological status (close to natural) in rivers and lakes are broadly in the range 0.3 – 0.6 ppm for Ammonia, as annual means, as measured by the Ammonia Colorimeter. The Ammonia Colorimeter upper limit is 9.99 ppm, the lower test limit is 0.00 ppm with an accuracy of ± 0.05 ppm ± 5%. So, a 0.00 ppm reading does not mean there is no ammonia present, it will be between 0.00 and 0.05 ppm ± 5%. A 9.99 ppm reading does not mean that is the total phosphate, it means that it is in excess of 9.99 ppm. **Your local EA Fisheries Team should be able to tell you what your local standards are for Phosphate and Ammonia. Contact [aap@anglingtust.net](mailto:aap@anglingtust.net) to be put in touch.**