

EXPLAINER: BATHING WATER CLASSIFICATIONS



Regulators calculate bathing water classifications based on results from 10 to 20 samples from the bathing site, which are taken during the official bathing season each year. Samples are taken on a weekly basis, and the classification is determined at the end of each bathing season.

Bathing water classifications use both *E. coli* and intestinal enterococci results, and having specific threshold values which place bathing water sites into categories.

Inland and Coastal Waters – what are the differences?

The Bathing Water Regulations 2013 allow for higher values of *E. coli* and enterococci at inland waterways when calculating the classification.

The thresholds for **inland** bathing waters are as follows:

Classification	<i>Escherichia coli</i> (CFU/100mL)	Intestinal Enterococci (CFU/100mL)
Excellent (95 th percentile)	<500	<200
Good (95 th percentile)	<1000	<400
Sufficient (90 th percentile)	<900	<330
Poor	Values are worse than sufficient	

Table 1

The thresholds for **coastal and transitional** bathing waters are as follows:

Classification	<i>Escherichia coli</i> (CFU/100mL)	Intestinal Enterococci (CFU/100mL)
Excellent (95 th percentile)	<250	<100
Good (95 th percentile)	<500	<200
Sufficient (90 th percentile)	<500	<185

Poor	Values are worse than sufficient
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Table 2

‘Excellent’ and ‘Good’ classifications are both determined using data from the 95th percentile, and ‘Sufficient’ classifications are determined using data from the 90th percentile. Percentile measurements are a statistical technique whereby only the top 5-10% of results are used. This allows us to determine the relative likelihood of high contamination occurring, using a risk-based approach.

Bathing water calculator

At SAS, we’ve developed a bathing water classification calculator. This allows us to take all of the data that has been generated from citizen science data to determine bathing classifications, in a way that is comparable to the Bathing Water Regulations method that the Regulator uses.

You can access:

- [Calculator for 10+ weeks of samples](#)
- [A video on how to edit the calculator](#)

How it works:

The calculator generates results for both the 90th and 95th percentiles, and then classifies each site according to where the results sit within tables 1 and 2 above. This is done for both *E. coli* and intestinal enterococci separately. An overall classification for the site is then generated based on both of these results; the lowest classification will be taken into account, as a site has to be below the threshold for a classification for both *E. coli* and enterococci to meet that classification. For example, if a site received Good status for *E. coli* but Sufficient status for enterococci, the overall classification will be Sufficient.

Why measure in 95th and 90th percentiles?

In simple terms, a ‘percentile’ can be thought of as a value that ‘X%’ of measured values (in these cases 95% or 90%) must fall below for the standard to be met. This is calculated based on the overall distribution of the data rather than the simple number of samples that fall above or below the specified figure. This means, for instance, that one or two significantly high values out of 20 could preclude a bathing water from achieving one of the 95- or 90 percentile classification standards respectively. As a specific example, in order to be classed as ‘excellent’ the results of samples at an inland site must be such that their overall distribution will have 95% of values with no more than 200 ‘colony forming units’ of IE and 500 colony forming units of *E. coli* in 100 millilitres of water. A ‘colony forming unit’ is a unit of measurement for the bacteria IE and *E. coli*. The ‘excellent’ and ‘good’ classifications are based on 95 percentile evaluations, whereas ‘sufficient’ reflects a 90-percentile evaluation. This explains why the figures for ‘sufficient’ look, at first sight and in purely numerical terms, to be more stringent than those for ‘good’. This is because a bathing water could be

classified as 'sufficient' when a larger number of samples exceed the standard for that classification, compared to the number of exceedances that would enable a site to be classified as 'good' or 'excellent'. It is also notable that the specified levels of bacteria for the different classifications at inland sites are greater than those for coastal waters. For example, levels of bacteria that would lead to an inland bathing water being judged as 'excellent' would only lead to a classification of 'good' on the coast. The levels for an inland site to be 'good', meanwhile, might lead a coastal water to be 'poor'.

Total Coliforms

On your results from the lab, you'll notice there are results for three parameters: *E. coli*, intestinal enterococci and total coliforms.

Total coliforms are a broad group of bacteria, including *E. coli*, that naturally occur in soil, vegetation and the intestines of mammals. Their presence in water can indicate that contamination has entered the waterbody, but unlike *E. coli* and intestinal enterococci, total coliforms are not specifically linked to sewage pollution or human health risk. For this reason, the regulators – including the Environment Agency (EA) – do not use total coliform results when determining official bathing water classifications.

However, total coliforms are still included in the laboratory analysis we receive. They provide useful additional context about overall water quality and potential environmental contamination sources at a site. If you see low *E. coli* and high coliforms, this could be an indication of another bacteria being present in high numbers, such as *Klebsiella*