Department for Environment Food & Rural Affairs

Consultation on Continuous Water Quality Monitoring and Event Duration Monitoring

Implementing s.81 and s.82 of the Environment Act 2021, and associated technical guidance

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We work closely with our 33 agencies and arm's length bodies on our ambition to make our air purer, our water cleaner, our land greener and our food more sustainable. Our mission is to restore and enhance the environment for the next generation, and to leave the environment in a better state than we found it.

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1.7 If you have any comments or complaints about the consultation process, please address them to:

Consultation on Continuous Water Quality Monitoring and Event Duration Monitoring
Consultation Coordinator,
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2nd Floor, Foss House, Kings Pool,
1-2 Peasholme Green, York, YO1 7PX

Or email: consultation.coordinator@defra.gov.uk

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1. Introduction

This consultation on Continuous Water Quality Monitoring and Event Duration Monitoring outlines the government's proposals to enhance the monitoring of storm overflow and final effluent discharges. This is in addition to the current monitoring programme involving event duration monitors at nearly 90% of all storm overflows across the country, and we will reach 100% by the end of this year. Once implemented, this will provide world leading information on the impact of storm overflow and final effluent discharges on watercourses. This additional monitoring will enhance our existing water quality programme to target improvements and increase our understanding of the health of our rivers.

1.1. Background

In the Environment Act 2021 ["the Act"], government introduced a requirement for sewerage undertakers to monitor sewerage assets and the impact they have on their local environment, and to publish data from those monitors, as well as from event duration monitors within an hour of operation. The two duties in the Act place a renewed focus on monitoring the receiving waters and increasing public transparency of those impacts.

2. Responding to this consultation

A wide range of stakeholders have a role in helping us to develop this plan. This consultation starts on 12 April 2023 and closes on 23 May 2023. This is a 6-week consultation. This consultation is being conducted in line with the Cabinet Office consultation principles.

Please send responses by email return.

As this is a technical consultation, responses will be considered from invited consultees. If you are not a consultee and need further assistance, you can contact the Defra helpline below:

defra.helpline@defra.gov.uk

Question:

1) **Are you responding as a charity, consumer or interest organisation, sewerage undertaker, academic, or other (please state)?**

3. Part 1 - Event Duration Monitoring

When a storm overflow discharges, event duration monitors measure when the discharge starts and when it ends. An ‘event’ refers to a single discrete discharge at an asset. Prior to 2013, event duration monitoring was largely targeted at sensitive sites such as shellfish waters and bathing waters. From 2013 onwards, government instructed companies to extend that coverage comprehensively across the network, and we will have 100% event duration monitor coverage by the end of this year. The purpose of event duration monitoring is to understand performance and to help inform planning and prioritisation of investment for improvement. Monitoring of storm overflows is an important tool that has allowed regulators to hold sewerage undertakers to account, improved transparency for recreational and industrial users of water, and the wider public who are concerned about their operation.

In section 81 of the Environment Act 2021, sewerage undertakers wholly or mainly in England are required to report on discharges from storm overflows in near-real time (within one hour). This new data will show where the discharge to the environment happened, when it started and when it ended. The published information will be updated within an hour of a discharge starting, and within one hour of when it ends. The data will be made available both to regulators and the public.

We want to:

- increase transparency around discharge events for stakeholders and the public by making sewerage undertakers publish each storm overflow discharge and its duration publicly available in near-real time,
- provide data to inform water usage; and,
- provide data to inform regulatory action.

3.1. Equipment failure

event duration monitors operate in harsh environments therefore equipment failures are inevitable. These failures can compromise the event duration monitors’ ability to report on a discharge within an hour of the event starting or ending. An indicative list of possible failures in event duration monitor operation is outlined in **Annex A.** Sewerage undertakers will be expected to exercise due diligence and take all reasonable steps to rectify performance or reporting issues as soon as possible. Action taken must be published alongside the near-real-time data. Sewerage undertakers also need to report the primary reason for event duration monitor non-operation in any given year in the Event Duration Monitor Annual Returns.

Question:

1) **Are you content to allow for equipment failure, so long as sewerage undertakers are required to take all reasonable steps to address any failures as soon as possible?**

3.2. Technical infeasibility

It may not be possible to fit some existing event duration monitors with the appropriate telemetry to report within one hour. It is intended that this exception will only be available for instances in which it is genuinely impossible due to extreme barriers to access.

Question:

2) **Are you content near-real-time event duration monitor reporting will apply everywhere it is technically feasible?**

4. Part 2 - Continuous Water Quality Monitoring

In section 82 of the Environment Act 2021, Parliament created a duty to require sewerage undertakers to monitor the water quality impacts of their discharges on the receiving watercourse. This monitoring duty will support our understanding of water quality impacts of sewerage undertaker assets by providing targeted data. The proposals in this consultation have been informed using data and input from the Environment Agency, sewerage undertakers, interested academics, and the supply chain. This consultation is intended to test the proposals in that guidance with a wider audience. The results will inform the shape of the finalised guidance.

This monitoring programme will capture the local impacts of discharges from both storm overflows and sewage treatment works, showing their impact over time. It will monitor for key contaminants which can lead to harm for aquatic life. Combined with data from the event duration monitor network, it will increase industry, scientific and public knowledge of the effects of storm overflow and final effluent discharges on the environment.

Defra have developed provisional technical guidance to inform how the programme should be implemented by sewerage undertakers. As outlined in the guidance, the objectives of the programme are to:

- quantify the local water quality impacts of sewerage undertaker assets on a watercourse,
- increase stakeholder and public understanding of the impact on water quality of discharges from sewerage undertaker assets,

- inform sewerage undertaker improvement programmes to meet the Storm Overflow Discharge Reduction Plan targets; and,
- inform regulatory action.

Monitoring Sites

Section 82 of the Environment Act 2021 limits the statutory duty to watercourses, which are defined in the Water Industry Act 1991 as all: *"rivers, streams, ditches, cuts, culverts, dykes, sluices, sewers and passages through which water flows (except mains or other pipes belonging to the Environment Agency, Natural Resources Wales or a water undertaker)"*. This definition includes estuaries, but not coasts or inland bodies of standing water (such as lakes).

There is significant public interest in monitoring the water quality impacts of discharges to sites other than watercourses, such as coasts, lakes, canals or groundwater. However, at present it is not technologically possible to use optical sensors to monitor for ammonia in saline conditions. The hydrodynamics of standing bodies of fresh water are not sufficiently well understood to be able to know where sensors should be best placed to monitor discharges into lakes. These issues are compounded in estuarine and coastal waters. In recognition of this public interest, the Environment Agency are allowing pilot schemes to take place in the next Price Review cycle to learn more about how these sites can be included in this programme in the future.

4.1. Programme objectives

The Continuous Water Quality Monitoring programme ["the programme"] objectives are intended as guiding principles, from which the other rules in the guidance flow. Each rule in the Technical Guidance flows from at least one of the programme objectives.

Programme objectives
The objectives of the programme are to: • quantify the local water quality impacts of sewerage undertaker assets on a watercourse, • increase stakeholder and public understanding of the impact on water quality of discharges from sewerage undertaker assets, • inform sewerage undertaker improvement programmes to meet the Storm Overflow Discharge Reduction Plan targets; and, • inform regulatory action. To achieve these objectives, the monitoring must: • be linked to existing regulatory standards,

- provide data which can be attributed to the target assets,
- provide understandable data to the public,
- provide understanding of how performance and water quality impacts of sewerage undertaker assets change over time; and,
- show water quality impacts of sewerage undertaker assets in near real time.

Question:

1) **Should the objectives include any additional aims? Yes or No. If Yes, what additional objectives should be included?**

4.2. Guidance for freshwater watercourses

These principles are designed to ensure the programme provides scientifically valuable data, which allows for understanding of any impact and can be used by regulators where necessary. The below rules have been designed, where relevant, to take account of existing standards, principally those in the Urban Pollution Management Fundamental Intermittent Standards (UPM FIS). This is preferred over less focused alternatives, such as the Water Framework Directive, because UPM FIS are specifically designed to measure the impact of storm overflows, which constitute around three quarters of statutory assets.

Questions:

2) **Are UPM FIS the appropriate standards against which to benchmark the programme for storm overflow impacts? If not, why?**
3) **Are UPM FIS the appropriate standards against which to benchmark the programme for sewage treatment work final effluent discharge impacts? If not, why?**

4.2.1. Monitoring parameters

We have not included phosphates in this programme as they cannot be monitored through a multi-parameter sonde, as the technology does not yet exist. With nitrates, we are conscious that these are mostly of concern in estuarine waters or in groundwater, in which a multi-parameter sonde will not function.

4) **Should Defra explore in future (when technically feasible) if and how nitrates can be monitored in freshwater sites? Yes or No. If Yes, why?**
5) **Would you support, where technically feasible, the inclusion of nitrate monitoring at wastewater treatment works for freshwater sites in catchments caught by nutrient neutrality rules – for example, in the Tees, The Broads or Stodmarsh? If so, why?**

4.2.2. Continuous monitoring

We anticipate that most installations will not have a sensor placed directly in the watercourse and instead will have water samples pumped to the sensor at regular intervals (“pumped kiosk”). Continuous monitoring requires that monitors measure water quality as regularly as possible. We propose to set the testing frequency at 15 minutes at times where there is higher risk of environmental harm. High frequency leads to increased instrument wear and maintenance programmes.

To reduce instrument wear and maintenance, monitors can report every hour when there is low risk of overflow operation or where final effluent quality is constant. Monitors can be fitted with telemetry which will allow them to automatically switch to less regular testing at these times, as defined below. This should be linked to event duration monitor activation data, weather data, or other appropriate information, or switched manually. All monitors related to the discharge outlet must switch to more regular testing at the defined times.

To allow for contaminants to reach the downstream monitor, there must be a lag on reverting back to 1 hour testing. This has been designed to take account of variable flow rates in different watercourses and of variation in each watercourse throughout the seasons.

Testing intervals

Testing must take place at least every 15 minutes if either of the following conditions are met:

- during storm overflow operation; or
- where anything occurs that affects the water quality of a final effluent discharge.

At other times, monitoring must take place at least every hour.

Where the conditions are met, testing must remain at 15 minutes frequency for 24 hours following the end of the event which triggered the switch.

Question:

6) **Is the 24hr lag sufficient for all watercourses? Yes or No. If No, should the lag be longer or shorter and why?**

4.2.3. Siting

Where to place monitors in relation to the target asset, especially the downstream monitors, is key given the unique nature of each site. The rules around siting have been designed with a view to balancing practicality with producing a scientifically robust programme.

4.2.3.1. Downstream monitors

The rules on downstream monitors carry a significant degree of uncertainty due to the uniqueness of each catchment, watercourse, and asset. Government is therefore unable to technically specify where exactly in each instance sewerage undertakers should site monitors. As such, the rules on downstream monitors are intended to provide a minimum baseline to ensure the scientific integrity of the programme, while allowing for sewerage undertakers to take site-specific decisions on the most appropriate point at which to install downstream monitors.

Using ammonia as the key determinant for siting decision

Of the four statutory parameters, the maximum point of harm arising from ammonia is to be used as the key determinant for siting decisions.

The point of optimal monitoring for ammonia and dissolved oxygen are unlikely to be on the same points on a given watercourse in relation to the target asset. Ammonia was selected as the determining metric as it should be easier to identify the point maximum harm, the first point of full cross-sectional mixing).

Question:

7) **Is using the maximum point of harm arising from ammonia the right approach, rather than dissolved oxygen? Yes or No. If No, why not?**

Sub-optimal siting

For exceptional cases where siting at the optimal point is not possible, then the monitor must be placed at the first suitable point downstream. To ensure data validity, the downstream monitor must not be more than 500m downstream from the point of cross-sectional mixing of the target discharge outlet.

This rule is important in setting a baseline distance to assure data validity, as it provides a backstop to mitigate against the dilution that will take place due to dispersal of the contaminants through advection. Without this rule, if a downstream monitor is placed too far downstream, it is likely that instances of harm and breaches of standards will not be detected.

In developing this rule, government considered two options; setting the maximum downstream range as a ratio based on the width of the river (e.g., not more than a distance equal to 20 times the width of the river downstream); and setting a maximum downstream distance, e.g., a range not more than 500m downstream from the target discharge outlet. The proposed rule, not more than 500m from the point of the mixing, was settled on as allowing for an element of flexibility with the choice of location, but also

ensuring that the downstream monitor remains within a reasonable distance on wider watercourses. Views are sought on the suitability of this rule.

Questions:

8) **Is the rule of "not more than 500m downstream from the point of cross-sectional mixing" appropriate? Why?**
9) **Would the 500m rule be better expressed as a ratio based on the width of the watercourse? Why?**

Local factors

Local and site-specific factors should also be considered in final siting of monitors. Factors that may need to be considered include:

- river features or geography, including catchment type, variable annual flow, sources of dilution, and sources of diffuse pollution;
- the influence of other pollutant sources or significant sources of dilution on the end data; and,
- health and safety considerations for access for maintenance or repair.

Question:

10) **Should there be any other site-specific considerations? If so, which?**

4.2.3.2. Clustering

In certain environments, such as urban or suburban environments, there can be asset discharge outlets in relatively close proximity. This poses a challenge for monitoring, as siting at the optimum point to test for one asset will often mean that there is another asset which discharges into the watercourse in between the target asset and its monitor. This will mean that data from that monitor will not show the impact of its target asset. It is therefore necessary to cluster assets and allow monitors to be placed at a point on the watercourse where the cumulative impact of the cluster can be assessed. In order to assure that the source of a contaminated discharge can be more easily identified, Government intends to set a cap on the number of assets which can be in any given cluster.

Where assets are clustered, it is in both the public interest and in the interests of the sewerage undertaker to investigate the source of a breach of water quality standards. Government intends to place a legal duty on the sewerage undertakers to investigate the source of a breach of standards, and to make this information available to regulators and the public.

Clustering range

Where there are two or more discharge outlet within 250m of one another in a single length of a watercourse, these can be considered a cluster and monitored by one pair of monitors. The downstream monitor for a cluster should be placed at the point of cumulative cross-sectional mixing, usually the point of cross-sectional mixing for the last asset in the cluster. This will naturally mean that the first asset in a cluster will be further away from the downstream monitor. To assure quality of data, the downstream monitor should be no more than 500m downstream from the point of cross-sectional mixing for the first asset in the cluster.

In developing this rule, Government considered whether it was appropriate to set a clustering range based on a fixed distance, or whether a rule requiring site specific analysis is more appropriate. The latter rule is outlined in the question below.

Questions:

11) Would this rule be better if expressed as below? If yes why, or why not? "Where there are two or more assets *with overlapping mixing zones* within 250m of one another in a single length of watercourse, these can be considered a cluster and monitored by one pair of monitors."

Clustering - cap on numbers

In the rare occasions where there are high numbers of discharge outlets in a cluster, more downstream monitors will be required in order to assure that the source of any contamination can be identified. There should therefore never be more than 10 discharge outlets in a cluster. This means monitors should be placed at appropriate intervals on a stretch of watercourse to ensure that there are not more than 10 discharge outlets in a cluster.

12) Do you agree with the proposed cap of 10 on clustering? If not, why not, and what should the cap be?

Investigatory duty

Where assets are in a cluster and the downstream monitor detects a harmful discharge, the sewerage undertaker should investigate the source of that discharge and make this information public alongside the continuous water quality data. This investigation should be undertaken in two phases. Firstly, a desktop assessment using corresponding

complimentary data, allowing chronic impacts to be identified. This preliminary assessment should be completed within 90 days of a breach being detected.

If the preliminary assessment is inconclusive, a longer-term assessment should be carried out using data analysis of longer datasets to properly assess the source and significance of any impact. This should be completed within 12 months of detecting a breach of standards. A summary of the results of these investigations should be made available to the public through the data visualisation platform.

This rule is drafted in recognition of the public interest in knowing which discharge is causing ecological harm within a reasonable timescale. The duty to investigate is intended to allow sewerage undertakers to better understand their networks.

13) **Is it reasonable to require sewerage undertakers to attribute the source of a breach of standards to a particular asset? Why?**

4.3. Exemptions

We propose to exempt only those sites which it is technically impossible to monitor. We are seeking views on other possible exemptions that could help further prioritise monitoring.

Question:

14) **Should there be any additional exemptions? How would they benefit the programme?**

4.4. Data availability and visualisation

The draft technical guidance outlines the government's intended vision for the output of the programme. This is connected to the objective of increasing public understanding of any impacts of asset discharges. With this objective in mind, Government will require that sewerage undertakers provide near-real-time data to a third party, such as Water UK, to publish on an England-wide data visualisation platform. As in the Technical Guidance, we envisage this will take the form of an interactive map overlaid with easy-to-understand information about the water quality, with the underlying data made available through the platform (for example, a drop-down box). This should show the impact of discharges and be overlaid with event duration monitor data and other contextual information.

Questions:

15) **What data should be included and what is the best way to display this data to ensure it usefully informs the public/meet your needs?**
16) **What other contextual information is required to ensure that everyone will be able to understand the data?**

Annex A. List of proposed issues which may restrict event duration monitor near-real time reporting

Outages

- **Maintenance and testing:** Planned maintenance or routine/ad hoc testing may require the asset to be out of action for a period which is likely to be less than one day. Testing cycles depend on whether the event duration monitor is battery powered, or if a genuine verified release has occurred in the last 12 months. Testing cycles can vary by sewerage undertaker.
- **Power failure:** Third-party power failures could prevent measurement, data logging and data communication. Battery back-ups are often in place but have a finite life. Restoration times can vary but can be 1-2 days in exemptional circumstances.
- **Communication failure:** Third party communication infrastructure outages can occur to both mobile and fixed telecoms. Communication failures can result in a loss of data. Restoration times can vary from less than an hour (if a simple outage) to weeks (if a line replacement is required).
- **Instrument failure:** Unexpected failure due to a variety of reasons would require a reactive repair. Restorations can be only a few days but can increase if there are access restrictions. Reporting anomalies would also need to be rectified as soon as feasible.
- **Damage due to extreme weather:** Storms and tidal surges can damage assets or otherwise make them inoperative. Restoration times can vary depending on when the weather event ends and whether there are access restrictions.
- **IT/systems failure:** An IT/systems failure will result in a loss of the reporting service for all instruments. Restorations times may vary depending on the fault.
- **Vandalism/theft:** Damage caused by vandalism and theft can have an immediate impact on timely reporting. Restorations times can vary depending on the level of damage and whether there are access restrictions.

Access Restrictions

- **Traffic management permissions:** Assets located in areas that require traffic management will require permission from the relevant authority to access.
- **Safety restrictions:** Assets located in areas that require complex risk assessments and procedures to reduce risk to life will require planning to ensure safe access. This process can delay the rectification of a fault.
- **Public area embargos:** Assets located in areas that are subject to additional temporary access restrictions, such as large events or festivals. Obtaining permission from the relevant authority to access the asset may be delayed.

- **Private property and land access:** Assets located on private property or land require permission before any work can commence.
- **Construction:** Third party construction work in the area of an asset may require the removal or disconnection of the asset. A temporary monitor may be installed, but this may still cause a lag in reporting and may not have the same level of operational response.