WORSHIPFUL COMPANY OF WATER CONSERVATORS

RESPONSE TO THE DEFRA CONSULTATION ON CONTINUOUS WATER QUALITY MONITORING AND EVENT DURATION AND ASSOCIATED GUIDANCE

PROLOGUE

1 This submission to Defra has been produced by the Worshipful Company of Water Conservators in response to the Consultation on continuous water quality and event duration monitoring.https://www.gov.uk/government/consultations/continuous-water-quality-monitoring-and-event-duration-monitoring

2 The Worshipful Company of Water Conservators (WCWC), is a City of London Livery Company, focussed on the long-term health of our water resources and the broader environment. Our members include senior professionals from water, environmental and related industries and regulators, along with others who share our passion for water and the environment. Our experience and knowledge ranges from the complexities of environmental sciences, through the application of engineering to deliver the goals identified by those sciences, and the subsequent management of the assets created. The Company's purpose is ***Promoting a diverse and sustainable environment***

3 To avoid confusion between the use of the term Company and water companies, the acronym WCWC is used.

4 This consultation addresses the implementation of Section 81 (S81) and Section 82 (S82) of the Environment Act 2021 (EA, 2021). S81 is concerned with the accessibility of data from the existing programme of storm overflow event monitors. The associated guidance is in relation to S82 (instream monitoring of discharge impact and consequent data management) which is a new environmental activity.

What are S81 and S82 about?

To assist readers of this response the objects of the two sections of the Act are abstracted from the Consultation and Guidance

Section 81

5 Under S81 of 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. Defra wants 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.

Section 82

6 Under S.82 (1) of the Environment Act 2021. In Chapter 4 of Part 4 of the Water Industry At 1991, after section 141DA insert:

141DB - Monitoring quality of water potentially affected by discharges from storm overflows and sewage disposal works
1) A sewerage undertaker whose area is wholly or mainly in England must continuously monitor the quality of water upstream and downstream of an asset within subsection (2) for the purpose of obtaining the information referred to in subsection (3).
2) The assets referred to in subsection (1) are—
a) a storm overflow of the sewerage undertaker, and
b) sewage disposal works comprised in the sewerage system of the sewerage undertaker,
c) where the storm overflow or works discharge into a watercourse.
3) The information referred to in subsection (1) is information as to the quality of the water by reference to—
a) levels of dissolved oxygen,
b) temperature and pH values,
c) turbidity,
d) levels of ammonia,
and e) anything else specified in regulations made by the Secretary of State.
4) …
5) The Secretary of State may by regulations make —
a) provision as how the duty under subsection (1) is to be carried out (for example, provision as to the type of monitor to be used and where monitors must be placed);
b) provision for exceptions from the duty in subsection (1) (for example, by reference to descriptions of asset, frequency of discharge from an asset or the level of risk to water quality); c) provision for the publication by sewerage undertakers of information obtained pursuant to subsection (1)
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.

SUMMARY OF THE RESPONSE

7 At the end of this document, answers to the specific questions are provided in Appendix 3. But many of the issues, and hence the suggestions made by the WCWC, are more subtle than the simple responses. The more detailed response, summarised here, underpins the answers to the questions.

8 The WCWC supports the extension of access of monitoring data as envisaged by both Sections of the Act. But in total there will be a huge amount of data to manage and the principles of a 'Big Data' project will have to be applied; the proposals should be subjected to the 'value tests' arising from the application of the principles of Better Regulation. The Consultation comes over as a desk top exercise rather than practical delivery. Nothing is mentioned about data management centres, but there is reference to a national template for public access. However, the water industry has announced its intention to set up a National Environment Data Hub.

9 The WCWC has been developing suggestions for what should be included in catchment management in future. The WCWC has discovered that there are many and disparate sources of data and allied information. These proposals in the Consultation add yet another database and the WCWC suggests that there should one place in which all the information on a catchment can be found, or at least from which further connections can be made by hyperlink. The access to S81 and S82 data must be harmonised with whatever emerges for best practice on catchment management. It is suggested that one way is to create a hierarchy of accessibility with the ultimate sites being water bodies within catchments This initiative needs tying into the Integrated Plan for Clean and Plentiful Water. And the monitoring needs tying into the way in which river quality criteria reflect the uses of river stretches, including the preservation of the natural water habitats.

10 There needs to be better linkage with regular monitoring of environmental waters in pursuit of the 2017 Water Environment Regulations and the Bathing Water Regulations (such monitoring has been the goal of bathing water designations, etc.). Page 76 of the Water Plan refers to Common Standards Monitoring.

10 In fact to push the resolution of the disparity of sources of data on river quality, **the WCWC suggests that it may be appropriate for the EA to provide and maintain the S82 monitors and harmonise the outputs with other river data in public registers. There would need to been a contracted-out provision by Water Companies to satisfy the provisions of the 2021 Environment Act.**

12 Because sewage treatment works, storm and emergency overflows can be prioritised by impact, this is a process of the provision of monitors which can be effectively delivered over five to ten years. That would avoid developing excess manufacturing capacity which would subsequently become redundant.

13 There is a case to be made for initially focussing resources and funding towards assets where the greatest benefits can be attained and using the experience gained here to prepare for a more general roll out of monitoring systems.

14 Some specific points particularly on S82:

pH and Temperature

14.1 The Act lumps pH and temperature together as one determinand (presumably because of the relevance of these to the ammonia/ammonium balance), but for practical monitoring purposes these must be separated and thus there are five not four determinands.

Monitoring installation

14.2 It is likely that, pro tem, until integrated 'Environment Act' monitors are available, more than one unit will be involved in each location, although some integrated monitors are currently available. As the Consultation and Guidance intimate, there will be challenges of security, access and signal transmission. These are referred to as issues for data failures rather than practical delivery issues.

Monitor accreditation

14.3 The Guidance in this Consultation requires assurance accreditation for the new monitoring which will probably mean an extension of the MCERTS scheme, which provides still further evidence for the suggestion that the EA should be a monitoring contractor.

Certification

14.4 In 2021 Defra Guidance of 2019 on the monitoring of sewage effluents was updated and sets out current criteria for certification of operator self-monitoring (MCERTS) by the EA. The Guidance in this Consultation requires assurance accreditation for the new monitoring which will probably mean an extension of the MCERTS scheme, which provides still further evidence for the suggestion that the EA should be a monitoring contractor.

Monitor recycling

14.5 The Guidance refers to monitor recycling and states that where a monitor has been placed on an asset which has then been improved and now meets the plan targets, that monitor can be removed and installed at a different asset once it has been established that the improvement has been successful. In practice, this will mean the monitor cannot be recycled until the monitors have provided at least ten years' worth of data once the improvement has been completed. This feels out of place. It must be up to a water company (or the EA if it was to act as a contractor) if it wants to recycle monitors after more than ten years of use, if they can still meet the performance criteria.

Nature of the receiving water body

14.6 Common-sense indicates that large effluent flows will not be going into very small water course. Very small effluent flows can discharge into fast flowing large rivers. The technical challenges of these extremes will be very different, even to that of small effluent flows in small water courses. Whilst the Consultation and Guidance distinguish between rivers and estuarial water, they do not recognise that in some rivers the tidal movement of water in the upper reaches are not classified as estuarial and are not likely to be covered

by the pilot exercises envisaged for estuarial waters. There the definition of upstream and downstream becomes more complicated.

Detailed criteria, clustering, mixing zones etc.

14.7 The WCWC does not offer any comment on the detailed metrics of monitoring. It understands that there needs to be a national framework to allow some comparisons and it may be too onerous to determine best practice on a site-by-site basis. Even so, 'one size will not fit all' circumstances. If the criteria become embedded, even in Regulations, they will be difficult to alter as experience is gained. It would be better to describe a framework for decision making, even using modelling in the most outstanding circumstances and the Guidance should be worded more appropriately allowing the EA and water companies to agree what is best locally. Indeed, if the EA is a monitoring contractor this arrangement would be ideal. The suggestion that the Technical Guidelines for the Identification of Mixing Zones should be used as a starting point on assessing this for individual water bodies is a very good idea and then siting at the ideal location should be possible at most sites.

Harmonising with effluent monitoring

14.8 The Consultation and Guidance ignores the established monitoring of regular discharges of treated sewage effluent and on-site storm overflows. These monitors are based on water company assets. It would be useful to link these with the proposed S82 monitoring.

Exemption of monitoring very small streams into which small sewage treatment works (General Binding Rules) discharge

14.9 The proposed exemption of needing to monitor the impact of discharges into watercourses with flows which never exceed 4cms in depth will still leave many small streams subject to S82 monitoring. Very small works (with flows of less than 5 M^3 / day or roughly 300 people) are exempt under most circumstances for full consents if they meet the general binding rules for discharges to a surface water or the general binding rules for discharges to groundwater. Without joined-up approaches (harkening to the words of the Government's Plan for an integrated approach to clean and plentiful water), situations, for example, could arise whereby according to the basket of requirements a small sewage treatment works might be dealt with by the General Binding Rules discharging to a small ditch but needing to have continuous monitoring up and downstream with the full suite of determinands. Thus, **the WCWC suggests that an exemption could be applied to very small works covered by General Binding Rules**. to avoid waste of resources and the creation of data with no practical value. We need to recognise that some small watercourses can be of outstanding natural value. If the EA was to be the monitoring contractor, it would be ideally placed to deal with this. This would be sensible, significant and justifiable reduction in the extent of monitoring.

Regulations and the inclusion of exemptions

14.10 The WCWC assumes that the proposed exemptions for very low flows and after 10 years of satisfactory monitoring are empowered by Clause 4b of S82 of the Act. It is suggested that the exercise of this power should be spelled out to avoid subsequent legal

challenge. It is anticipated that the Regulations may provide this opportunity. Furthermore, if the suggestions made by the WCWC for further exemptions, particularly for small woks discharging into small watercourse are accepted as being valid, then this could be the legal instrument by which those changes are made.

Pilots for estuarial and coastal waters

14.11 The WCWC support the proposals for estuarial waters and offers no detailed comments.

Cost

14.12 Any investment needs to be prudent. Analysis by the WCWC suggests that upstream and downstream monitors for approximately 22,870 WWTWs and CSOs will be required. If the costs of hardware being developed are right at about £2,000-4,000 per unit for a full suite of parameters and installation costs, this would cost a minimum of £90-180 million for real-time upstream and downstream water quality monitoring. Access costs, IT systems provision annual servicing and battery replacements would have to be added to this. The WCWC is aware that higher figures are being suggested.

14.13 Attributing high costs towards achieve ideal outcomes can sometimes be a shorthand for saying that this is unaffordable. In fact, what matters is attaining the best outcomes as soon as possible for the least cost and then building on this towards ideal outcomes based on the experience gained during the initial work.

Monitoring of the impact of storm and emergency overflows

14.14 The separate aspects of monitoring the continuous impact of sewage effluents and the occasional impact of sewer overflows should be separated for delivery against common principles.

14.15 The Consultation and Guidance refer to the established programme of installing EDM but this is a drive to extend storm and emergency overflow monitoring to include quality impacts and make the EDM data even more accessible as per S81. The proposed instream monitoring as per S82 of the impact of storm and emergency overflows needs to be linked better to the 2018 guidance on the existing regime of overflow permitting.

14.16 It is not clear about the monitoring of the impact of storm and emergency overflows. There are two approaches to this. First there is continuous monitoring of the receiving water in which case if, as planned, the sewer overflow is functional very occasionally, then the monitoring has no purpose most of the time. The alternative approach is that the monitors are switched on automatically when the event monitor comes into action. The problems of access, maintenance, vandalism, power failure, monitor readiness for hopefully very intermittent operation, etc., will be much worse for those monitoring the impact of storm and emergency overflows which are likely to be even more remote.

Data management

14.17 The monitors will generate a great volume of data. Effectively managed, this can be a powerful tool for appreciating the performance of outflows, especially when linked with rainfall data from the Meteorological Office. This could, for example, alert regulators to discharges taking place during dry periods along with alerting managers to the impact of changes in rainfall. Developing methods of utilising and managing this 'Big Data' needs to be a priority from the outset.

THE RESPONSES TO THE ISSUES RAISED BY THE CONSULTATION

Common themes of responses to both aspects

15 Whilst the water companies must provide the information infrastructure to complement the existing programme of installation of event duration monitors, the WCWC suggests that it may become overly complex if ordinary river monitoring data from the Environment Agency (Open WIMS data. Water quality data archive) is situated in a different place to S82 monitoring https://environment.data.gov.uk/water-quality/view/landing.

16 The WCWC has been developing suggestions for what should be included in catchment management in future. It has found that there are many and disparate sources of data and information. These proposals add yet another database and the WCWC suggests that there should be one place in which all the information on a catchment can be found, or at least from which further connections can be made by hyperlink and access must be harmonised with what emerges for best practice on catchment management and it is suggested that one way is to create a hierarchy of accessibility with the ultimate sites being water bodies within catchments. This initiative needs tying into the Integrated Plan for Clean and Plentiful Water. Monitoring needs to be tied into the way in which river quality criteria reflect the uses of river stretches, including the preservation of the natural water habitats.

17 In order to minimise the resolution of the disparity of sources of data on river quality, the WCWC suggests that it may be appropriate for the EA to provide and maintain the S82 monitors and harmonise the outputs with other river data in public registers. There would need to been a contracted-out provision by Water Companies to satisfy the provisions of the Environment Act.

18 There will be huge amounts of data generated and stored and effectively managing them will be a 'Big Data' project; the proposals should be subjected to the 'value tests' arising from the application of the principles of Better Regulation. Effectively managed, this can be a powerful tool for appreciating the performance of outflows, especially when linked with rainfall data from the Meteorological Office. This could, for example, alter regulations to discharges taking place during dry periods along with alerting managers to the impact of changes in rainfall. Developing methods of utilising and managing this 'Big Data' needs to be a priority from the outset. Little is said about data management centres, although the Consultation does suggest that a template for public access may be created in due course. However, the water industry has announced its intention to set up a National Environment Data Hub. (thetimes.co.uk/article/we-re-sorry-this-is-our-chance-to-put-things-right-clean-it-up-pp22d7jzc).

19 The challenges of installing and maintaining environmental monitors, by whoever delivers the practical service is highlighted by the progress to date of the installation by Event Duration monitors for storm overflows, by Water Companies (see Appendix 2).

Programme for S81

20 The WCWC supports the existing programme of installing monitors and it makes sense within the overall context to make the data produced available as envisaged by the Act subject to the concerns about 'Big Data' management. The progress of the current EDM programme gives some insight into the challenges of installing and maintaining environmental monitors. Appendix 2 provides some background here.

Programme for S82

Some generic issues

21 The Consultation raises a technical concern which needs to be resolved. The 2021 Act lumped pH and temperature monitoring together for some reason. This might be a function of managing the balance of ammonia and ammonium (ammonia being a toxin to aquatic wildlife). The consultation in fact refers to four parameters for monitoring, with pH and temperature separated, it is five, which is relevant to the number of sensors provided in any monitoring unit.

22 The Consultation comes over as a desk top exercise rather than practical delivery. To set the background, it is proposed that there must be upstream and downstream monitoring of most sewage effluents and most storm overflows for five determinands with data transmitted to a data centre to provide near real-time access by the public on line. The challenge is going to be in delivering and maintaining this network. It is likely that until integrated 'Environment Act' monitors become the norm (they are already made by at least one company, although their current production capacity is limited), more than one unit will be involved in each location. As the Consultation and Guidance intimate, there will be challenges of security, access and signal transmission. These are referred to as issues for data failures rather than practical delivery issues. Nothing is mentioned about data management centres, but there is reference to a national template for public access.

23 The WCWC suggests that there is a missed opportunity to set this initiative into a much bigger picture of data gathering as discussed earlier. It also ignores the established monitoring of regular discharges of treated sewage effluent and on-site storm overflows. These monitors are based on water company assets.

24 The Consultation focusses principally on the impact of discharges, those for sewer storm and emergency overflows occurring infrequently (hopefully) and the locations of monitors are often in isolated locations. The separate aspects of monitoring the continuous impact of sewage effluents and the occasional impact of sewer overflows should be separated for delivery against common principles.

25 The WCWC suggests that this is a very blunt instrument to deliver a laudable aspiration. The proposals set priorities for 40% delivery for all unexempted assets by at least 2030 (AMP8) and full implementation by 2035 (AMP9).

High priority sites are listed as:

• Sites of Special Scientific Interest (SSSIs),
• Special Areas of Conservation (SAC),
• Urban Wastewater Treatment Regulations sensitive areas,
• chalk streams,
• any assets within 5km upstream of designated inland or estuarine bathing waters; and,
• waters currently failing WFD ecological standards due to storm overflows or final effluent.

There does not appear to be any mention of the EA register of protected zones.

26 This initiative needs tying into the Integrated Plan for Water. As discussed earlier, the approach needs tying into the way catchments will be managed in future. The monitoring needs tying into the way in which river quality criteria reflect the uses of river stretches, including the preservation of the natural water habitats.

27 One part of the Consultation and Guidance is the focus on the monitoring of ammonia v ammonium (presumably to reflect impact on aquatic biota), nitrate and phosphates. These are issues requiring detailed knowledge of the science and practice of monitoring. there is only one nitrate (the plural came from media mismanagement of the term 'nitrate concentrations'). It arises from the treatment removal of total, and in particular ammoniacal nitrogen in treatment and is directed principally to compliance with the surface water standards. There is a case to consider NOX not just NO3. Phosphates are in the plural as they can take more than one form and often cause confusion in data as to whether these are expressed in terms of P04 or P.

28 And to repeat an earlier general point, a decision needs to be taken on how this avalanche of data will be archived and made accessible in the longer term alongside registers of information on discharge performance. There needs to be data linkage with regular monitoring of environmental waters in pursuit of the 2017 Water Environment Regulations and the Bathing Water Regulations (such monitoring has been the goal of bathing water designations, etc). Page 76 of the Water Plan refers to Common Standards Monitoring.

29 The Act makes no distinction of the monitoring of very small streams as compared to large rivers .The consultation just refers to Section 82 of the Environment Act 2021 as a statutory duty to monitor 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). The way that the Consultation is worded would mean that all discharges to water courses with a permanent depth above 4 cm, would need the proposed monitoring regime. This would result in thousands of monitors located in difficult locations, in addition to any other form of discharge monitoring. The WCWC recognises the challenges of installing much simpler EDM, in spite of good intentions. Experience shows that very few water courses, which might be of interest in the public

domain as envisaged, would be below 4cm all year round. This would result in thousands of monitors being located in difficult locations, in addition to any form of discharge monitoring.

30 Common sense indicates that large effluent flows are going to be into very small water course, rather that very small effluent flows can discharge into fast flowing large rivers. The technical challenges of these extremes will be very different, even to that of small effluent flows in small water courses. Whilst the Consultation and Guidance distinguish between rivers and estuarial water, they do not recognise that in some rivers the tidal movement of water in the upper reaches are not classified as estuarial and are not likely to be covered by the pilot exercises envisaged for estuarial waters. The definition of upstream and downstream becomes more complicated.

31 The WCWC does not offer any comment on the detailed metrics of monitoring. It understands that there needs to be a national framework to allow some comparisons and it may be too onerous to determine best practice on a site-by-site basis. By comparison, 'one size will not fit all' circumstances in this case. If the criteria become embedded, even in Regulations, they will be difficult to alter as experience is gained. It would be better to describe a framework for decision making, even using modelling in the most outstanding circumstances. The Guidance should be worded more appropriately allowing the EA and water companies to agree what is best locally. If the EA is a monitoring contractor, this arrangement would be ideal. The Technical Guidelines for the Identification of Mixing Zones should be used as a starting point on assessing this for individual water bodies is a very good idea and then siting at the ideal location should be possible at most sites.

32 Para 6.2 of the Guidance refers to monitor recycling and states that where a monitor has been placed on an asset which has then been improved and now meets the plan targets, that monitor can be removed and installed at a different asset once it has been established that the improvement has been successful. In practice, this will mean the monitor cannot be recycled until the monitors have provided at least ten years' worth of data once the improvement has been completed. This feels out of place.

33 It ought to be up to a water company (or the EA if was to act as a contractor) if it wants to recycle monitors after more than ten years of use, if they can still meet the performance criteria. After more than ten years of use and with the evolution of technology, recycling and relocation of monitors seems unlikely. Para 6.2 refers to the plan targets, without identifying which plan. It is assumed to be the Storm Overflows Reduction Plan. This gives an insight as to how the long data must be available, let alone archived.

34 This proposal implies that the monitors maybe withdrawn after many years. If this is coupled with the current proposed exemption for very low flow waters, the WCWC assumes that such exemptions are empowered by Clause 4b of S82 of the Act. It is suggested that the exercise of this power should be spelled out to avoid subsequent legal challenge. It is anticipated that the Regulations may provide this opportunity. Furthermore, if the suggestions made by the WCWC below in subsequent paragraphs are accepted as being valid, then this could be the legal instrument by which those changes are made.

35 The WWC supports the proposals for estuarial waters and offers no detailed comments.

36 The issue of cost and value for money arises. Any investment needs to be prudent. Analysis by the WCWC suggests that upstream and downstream monitors for approximately

22,870 WWTWs and CSOs will be required. If the costs of hardware being developed are right at about £2,000-4,000 per unit for a full suite of parameters and installation costs, this would cost a minimum of £90-180 million for real-time upstream and downstream water quality monitoring. Access costs, IT systems provision, annual servicing and battery replacements would have to be added to this. The WCWC is aware that higher figures are being suggested.

Some specific issues on monitoring the impact of sewage effluents

37 In 2019, the EA issued guidance for monitoring of sewage effluents https://www.gov.uk/government/publications/waste-water-treatment-works-treatment-monitoring-and-compliance-limits/waste-water-treatment-works-treatment-monitoring-and-compliance-limits. In 2021, guidance was updated and sets out current criteria for certification of operator self-monitoring (MCERTS) by the EA. The Guidance in this Consultation requires assurance accreditation for the new monitoring which will probably mean an extension of the MCERTS scheme, which provides still further evidence for the suggestion that the EA should be a monitoring contractor. https://www.gov.uk/guidance/monitoring-discharges-to-water-guidance-on-selecting-a-monitoring-approach

38 The Consultation and Guidance do not link into the established 2019 criteria for monitoring of sewage effluents. These are set out in performance analyses that must be carried carry out on sewage discharges to freshwaters and estuarine waters:

- normal water body with PE more than 2,000 – analyse for BOD and COD
- sensitive water body with PE more than 10,000 – analyse for BOD and COD, P and N

In the 2019 Guidance, the formal collection of samples for statistical analysis is defined as being from works above the defined thresholds. It cannot be continuous monitoring because of the nature of the determinands and their expression in the permit to discharge. Flows are automatically monitored.

39 Because there is a lack of coordination there is a mismatch of what is being monitored. The 2019 Guidance states 'You must analyse the composite samples for these parameters:

- biochemical oxygen demand (BOD-ATU)
- chemical oxygen demand (COD)

You will also sometimes need to analyse samples for:

- total phosphorus (P, although there is often confusion over this and different data may be expressed as P or PO4)
- total nitrogen (N)

Total nitrogen is the sum of total nitrogen Kjeldahl nitrogen (organic N + NH_3), nitrate (NO_3)-nitrogen and nitrite (NO_2)-nitrogen.'

40 Whereas the Consultation states that the receiving water course must be monitored for:

- levels of dissolved oxygen
- temperature and pH values
- turbidity
- levels of ammonia
- and monitors should have the facility to add at least two further determinands, probably phosphate and nitrate (or maybe NOX)

The Act provides an open-ended opportunity for further determinands to be added, and this is reflected in the Consultation.

41 The programmes need bringing together, with Common Standards Monitoring which is referred in in the Plan for Water.

42 The 2019 guidance for larger works is for compliance assessment against consent requirements. This Consultation serves a wider range of purposes. These purposes need bringing together to provide a more coherent whole.

43 The WCWC suggests that the issue of very small discharges into very small insignificant water courses needs to be addressed to avoid a waste of resources and the creation of data with minimal practical value. Even so, there are some small watercourses which can be of outstanding natural value. The proposed exemption of needing to monitor the impact of discharges into watercourses with flows which never exceed 4cms in depth will still leave many small streams subject to S82 monitoring. Very small works (with flows of less than 5 M^3 per day or roughly equivalent to 300 people) are exempt from full consenting , under most circumstances, if they meet the general binding rules for discharges to a surface water or the general binding rules for discharges to groundwater (https://www.gov.uk/government/publications/small-sewage-discharges-in-england-the-general-binding-rules/general-binding-rules-for-small-sewage-discharges-ssds-with-effect-from-2-october-2023).

44 Compliance for these works is usually dealt with by inspection of receiving waters for matters like the presence of sewage fungus and litter. Works serving populations above the General Binding Rules limit, but under the 2,000 PE threshold have numerical consents but are not defined in the 2019 guidance.

45 Without joined up approaches, situations, for example, could arise whereby according to the basket of requirements a small sewage treatment works might be dealt with by the General Binding Rules discharging to a small ditch but needing to have continuous monitoring up and downstream with the full suite of determinands.

46 To put this into context, three tables (tables 1-3) have been developed by the WCWC using data from the WaSC Annual Performance Reviews for 2021-22. They are provided in Appendix 1. Data are by STW size (1 is smallest band, 6 is largest band) based on the BOD loading received per day. Bands 1-3 cover a PE (population equivalent) of up to 2,000. The Urban Wastewater Treatment Directive kicks in at 2,000. Band 6 is for PEs of above 25,000. The WCWC noted the large number of small treatment works.

47 The WCWC suggests that an exemption could be applied to very small works covered by General Binding Rules. If the EA was to be the monitoring contractor, it would be ideally placed to deal with this.

Some specific issues on monitoring the impact of storm and emergency overflows

48 Part 1 of the Consultation refers to the established programme of installing EDM. This is a drive to extend Storm Overflow monitoring to include quality impacts and make the EDM data even more accessible as per S81. The proposed instream monitoring as per S82 of the impact of Storm and Emergency Overflows needs to be linked better to the 2018 guidance on the existing regime of overflow permitting.
https://www.gov.uk/government/publications/water-companies-environmental-permits-for-storm-overflows-and-emergency-overflows/water-companies-environmental-permits-for-storm-overflows-and-emergency-overflows

49 It is not clear about the monitoring of the impact sewer overflows. There are two approaches to this. First, there is continuous monitoring of the receiving water in which case if, as planned, the sewer overflow is functional very occasionally, then the monitoring has no purpose most of the time. The alternative approach is that the monitors are switched on automatically when the event monitor comes into action. There will be challenges regarding access, maintenance, vandalism, power, monitor readiness for hopefully very intermittent operation, etc., will be much worse for those monitoring the impact of storm and emergency overflows which are likely to be even more remote.

50 To provide a better perspective on what will be needed and to understand the challenge of installing remote environmental monitors the WCWC has analysed the current situation for EDMs. All combined sewer overflows must have an EDM *in situ* and in operation by the end of 2023. The WCWC have collated data on EDM performance and these are given in Appendix 2.

APPENDIX 1

DATA ON SEWAGE TREATMENT WORKS

Data has been extracted from Table 7D in each of the eleven Water and Sewage Company 2021-22 Annual Performance Reviews. Data are by STW size (1 is smallest band, 6 is largest band) based on the BOD loading received per day. Bands 1-3 cover a PE (population equivalent) of up to 2,000. The Urban Wastewater Treatment Directive kicks in a 2,000. Band 6 is for PEs of above 25,000.

Table 1: Load handled by STW size

Kg BOD / day	1	2	3	4	5	6	Total
Anglian	2,583	2,846	17,502	60,883	66,345	288,220	438,379
Dŵr Cymru	2,881	2,862	9,163	19,699	28,382	185,388	248,375
Hafren Dyfrdwy	148	294	589	865	704	0	2,601
Northumbrian	1,000	455	3,166	9,347	11,898	144,656	180,522
South West	1,975	1,937	7,300	16,441	15,248	67,176	110,077
Severn Trent	1,887	1,871	10,403	37,675	53,448	515,766	621,049
Southern	675	637	6,099	20,752	21,785	245,960	295,908
Thames	487	972	4,967	22,249	27,342	911,068	967,624
United Utilities	2,386	1,907	4,238	15,846	33,735	498,086	556,198

Wessex	596	749	7,022	18,246	30,976	146,761	204,350
Yorkshire	1,630	1,471	5,303	20,651	42,919	288,990	360,964
Total	16,248	16,001	75,752	242,654	332,782	3,292,071	3,986,047
	0.4%	0.4%	1.9%	6.1%	8.3%	82.6%	

Almost all BOD is handled by the largest two bands. Their distribution reflects the population distribution each utility serves. Anglian and Dŵr Cymru, along with South West serve areas with a substantial number of small towns and villages which have local WWTWs. Yorkshire, United Utilities and Thames are characterised by fewer small towns and more major cities, allowing for greater volumes of scale.

Table 2: Number of STWs by size

Number	1	2	3	4	5	6	Total
Anglian	425	124	258	208	64	51	1,130
Dŵr Cymru	479	102	121	75	28	23	828
Hafren Dyfrdwy	22	13	11	3	1	0	50
Northumbrian	274	22	50	33	12	21	412
South West	378	81	103	57	17	17	653
Severn Trent	446	87	169	134	56	65	957
Southern	107	29	92	74	22	43	367
Thames	74	46	78	75	28	52	353
United Utilities	299	65	60	47	32	63	566
Wessex	153	34	94	61	31	25	398
Yorkshire	311	66	80	71	42	36	606
Total	2,968	669	1,116	838	333	396	6,320
	47.0%	10.6%	17.7%	13.3%	5.3%	6.3%	

It is evident that 0.8% of the BOD loading is handled by 57.6% of the WWTWs. This suggests that while they do indeed need to be properly managed, they are a lower priority than the 11.6% of facilities which manage 90.9% of the BOD loading.

Table 3: Average load handled by size (Kg BOD per plant per day)

BOD / Plant	1	2	3	4	5	6	Total
Anglian	6	23	68	293	1,037	5,651	388
Dŵr Cymru	6	28	76	263	1,014	8,060	300
Hafren Dyfrdwy	7	23	54	288	704	0	52
Northumbrian	4	21	63	283	992	6,888	438
South West	5	24	71	288	897	3,952	169
Severn Trent	4	22	62	281	954	7,935	649
Southern	6	22	66	280	990	5,720	806
Thames	7	21	64	297	977	17,521	2,741
United Utilities	8	29	71	337	1,054	7,906	983
Wessex	4	22	75	299	999	5,870	513
Yorkshire	5	22	66	291	1,022	8,028	596
Total	5	24	68	290	999	8,313	631

Each utility has its own characteristics. Thames, for example, is highly centralised, with a third of its loading being handled at the Beckton and Mogden WWTWs alone, and nearly 95% at its Band 6 STWs. At South West and Anglian, more than a third of the load is handled at smaller (Bands 1-5) STWs.

APPENDIX 2

DATA ON EVENT DURATION MONITORS

Data for Appendix 2 has been obtained from the Environment Agency (EA) in England and Natural Resources Wales / Cyfoeth Naturiol Cymru (NRW) in Wales. The two agencies present it differently, with NRW separating out categories of EDM. The EDM monitoring for CSO discharges in England and Wales has been broken down as follows:

[1] No discharges recorded during 2022.
[2] Up to one hour during 2022.
[3] Up to ten hours during 2022.
[4] Up to one hundred hours a year during 2022.
[5] Up to one thousand hours a year during 2022.
[6] Up to continual discharge throughout 2022.

At 6,000 to 7,800 hours per annum, a small number of CSOs came close to this upper boundary (there are 8,760 hours in a normal year).

Table 4: Hours of discharge per EDM in 2022

Hours of discharge	0.00	0.01-1.00	1.01-10.00	10.01-100.00	100.01-1,000.00	1,000.1-8,760.00	Total
Anglian Water	138	109	219	343	240	5	1,054
Dŵr Cymru (Lloegr)	19	9	22	47	23	N/A	120
Dŵr Cymru (Cymru)	286	184	308	519	642	177	2,116
Hafren Dyfrdwy	5	1	11	16	13	3	49
Northumbrian Water	208	144	312	535	252	12	1,463
Severn Trent Water	493	273	497	667	466	42	2,438
South West Water	312	113	205	269	334	90	1,323
Southern Water	184	55	133	264	283	19	938
Thames Water	94	17	67	148	130	16	472
United Utilities	302	204	284	575	492	114	1,971
Wessex Water	188	119	243	372	235	25	1,182
Yorkshire Water	355	250	341	597	534	41	2,118
Overall	2,584	1,478	2,642	4,352	3,644	544	15,244

Table 5: Discharges recorded in 2022

Discharges	0.00	0.01-1.00	1.01-10.00	10.01-100.00	100.01-1,000.00	1,000.1-8,760.00	Total
Anglian Water	0	189	1,532	5,527	8,389	445	16,082
Dŵr Cymru (Lloegr)	0	15	178	1,297	1,310	72	2,872
Dŵr Cymru (Cymru)	0	327	2,491	14,230	42,479	23,816	83,343
Hafren Dyfrdwy	0	7	94	325	688	167	1,281
Northumbrian Water	0	337	2,315	12,848	12,731	1,466	29,697
Severn Trent Water	0	555	3,873	13,886	21,857	4,588	44,759
South West Water	0	301	1,652	6,990	18,396	10,310	37,649
Southern Water	0	89	576	3,441	10,728	1,854	16,688
Thames Water	0	20	241	1,821	4,790	1,142	8,014
United Utilities	0	576	2,797	16,860	33,195	15,636	69,064
Wessex Water	0	312	2,144	8,002	9,174	2,245	21,877
Yorkshire Water	0	368	2,516	17,688	30,128	3,573	54,273
Overall	0	3,096	20,409	102,915	193,865	65,314	385,599

Table 6: Length of discharges during 2022

Discharge length (hours)	0	0.01-1.00	1.01-10.00	10.01-100.00	100.01-1,000.00	1,000.1-8,760.00	Total
Anglian Water	0	52	1,020	12,205	69,277	6,960	89,514
Dŵr Cymru (Lloegr)	0	4	107	1,832	7,527	0	9,470
Dŵr Cymru (Cymru)	0	98	1,416	22,869	233,663	334,534	592,579
Hafren Dyfrdwy	0	1	49	660	4,373	2,481	7,563
Northumbrian Water	0	76	1,344	23,046	63,611	19,459	107,536
Severn Trent Water	0	109	2,077	26,760	151,800	68,371	249,116
South West Water	0	54	900	11,180	127,031	151,107	290,271
Southern Water	0	29	603	10,574	103,585	32,087	146,876
Thames Water	0	9	309	6,472	48,129	19,975	74,893
United Utilities	0	81	1,188	23,256	169,117	231,848	425,491
Wessex Water	0	51	1,081	14,884	76,735	37,206	129,957
Yorkshire Water	0	87	1,487	30,581	157,740	42,159	232,054
Overall	0	650	11,580	184,320	1,212,585	946,186	2,355,321

Table 7: Average length of CSO discharge

Hours per discharge	0.00	0.01-1.00	1.01-10.00	10.01-100.00	100.01-1,000.00	1,000.1-8,760.00	Total
Anglian Water	0.00	0.27	0.67	2.21	8.26	15.64	5.57
Dŵr Cymru (Lloegr)	0.00	0.27	0.60	1.41	5.75	0.00	3.30
Dŵr Cymru (Cymru)	0.00	0.30	0.57	1.61	5.50	14.05	7.11
Hafren Dyfrdwy	0.00	0.09	0.52	2.03	6.36	14.86	5.90
Northumbrian Water	0.00	0.23	0.58	1.79	5.00	13.27	3.62
Severn Trent Water	0.00	0.20	0.54	1.93	6.95	14.90	5.57
South West Water	0.00	0.18	0.54	1.60	6.91	14.66	7.71
Southern Water	0.00	0.32	1.05	3.07	9.66	17.31	8.80
Thames Water	0.00	0.46	1.28	3.55	10.05	17.49	9.35
United Utilities	0.00	0.14	0.42	1.38	5.09	14.83	6.16
Wessex Water	0.00	0.16	0.50	1.86	8.36	16.57	5.94
Yorkshire Water	0.00	0.24	0.59	1.73	5.24	11.80	4.28
Overall	0.00	0.21	0.57	1.79	6.25	14.49	6.11

Table 8: Discharges per CSO

Discharge per CSO	0.00	0.01-1.00	1.01-10.00	10.01-100.00	100.01-1,000.00	1,000.1-8,760.00	Total
Anglian Water	0.00	1.73	7.00	16.11	34.95	89.00	15.26
Dŵr Cymru (Lloegr)	0.00	1.67	8.09	27.60	56.96	0.00	23.93

Dŵr Cymru (Cymru)	0.00	1.78	8.09	27.42	66.17	134.55	39.39
Hafren Dyfrdwy	0.00	7.00	8.55	20.31	52.92	55.67	26.14
Northumbrian Water	0.00	2.34	7.42	24.01	50.52	122.17	20.30
Severn Trent Water	0.00	2.03	7.79	20.82	46.90	109.24	18.36
South West Water	0.00	2.66	8.06	25.99	55.08	114.56	28.46
Southern Water	0.00	1.62	4.33	13.03	37.91	97.58	17.79
Thames Water	0.00	1.18	3.60	12.30	36.85	71.38	16.98
United Utilities	0.00	2.82	9.85	29.32	67.47	137.16	35.04
Wessex Water	0.00	2.62	8.82	21.51	39.04	89.80	18.51
Yorkshire Water	0.00	1.47	7.38	29.63	56.42	87.15	25.62
Overall	0.00	2.09	7.72	23.65	53.20	120.06	25.30

The relationship between the length of discharge at each CSO and the number of discharges each year appear to be broadly similar. Both Tables 7 and 8 highlight the fact that at a limited number of CSOs, more discharges are taking place and that these are lasting for a longer time. That may be a case of stating the obvious, yet it matters as it demonstrates that some CSOs deserve more attention than others. This is central to a strategy based on dealing with actual challenges rather than one which allocates equal priority irrespective of each asset's actual environmental impact.

Table 9: Hours of discharge per CSO

Hours of discharge / CSO	0.00	0.01-1.00	1.01-10.00	10.01-100.00	100.01-1,000.00	1,000.1-8,760.00	Total
Anglian Water	0.00	0.48	4.66	35.58	288.65	1,392.00	84.93
Dŵr Cymru (Lloegr)	0.00	0.44	4.86	38.98	327.26	0.00	78.92
Dŵr Cymru (Cymru)	0.00	0.53	4.60	44.06	363.96	1,890.02	280.05
Hafren Dyfrdwy	0.00	0.66	4.45	41.25	336.37	827.00	154.36
Northumbrian Water	0.00	0.53	4.31	43.08	252.42	1,621.58	73.50
Severn Trent Water	0.00	0.40	4.18	40.12	325.75	1,627.89	102.18
South West Water	0.00	0.48	4.39	41.56	380.33	1,678.96	219.40
Southern Water	0.00	0.52	4.53	40.05	366.02	1,688.77	156.58
Thames Water	0.00	0.54	4.61	43.73	370.22	1,248.41	158.67
United Utilities	0.00	0.40	4.18	40.45	343.73	2,033.75	215.88
Wessex Water	0.00	0.42	4.45	40.01	326.53	1,488.25	109.95
Yorkshire Water	0.00	0.35	4.36	51.23	295.39	1,028.26	109.56
Overall	0.00	0.44	4.38	42.35	332.76	1,739.31	154.51

These shows the sheer variance in the discharge data. At one end, there are 6,704 CSOs where discharges occurred for less than 10 hours a year. At the other, 3,644 CSOs discharge on average for an hour a day throughout the year. 544 CSOs discharge for the equivalent of 72 days continually in 2022.

The WCWC is concerned about the quality of the EDM data and what lessons can be learned from the roll-out so far. EDMs operate in a "hostile" environment, with a lot of physical wear and tear, especially during periods of heavy rainfall.

It is of interest to note that the four utilities with a high number of non-functioning EDMs are located in upland waters areas the operating environment is likely to be appreciably more hostile than for utilities located in lower-lying and flatter areas.

Looking at the raw data demonstrates some inconsistency in reporting. For example, some cases of EDMs being out of service for an entire year are not correctly logged into the

applicable spreadsheet. This has been addressed in this analysis. By asking for explanations only where less than 90% of the year is covered by an EDM, DEFRA appears to imply that having no data for 36.5 days a year is acceptable. Given the nature of England and Wales's weather it would be reasonable to expect plenty of rainfall during that time. Table 10 breaks down the performance of the EDMs by the amount of time they were in operation during each year. Table 11 compares EDM performance by utility in 2022.

It was noted that in 2022, 433 EDMs did not record any data at all for the entire year. Disparities in the spreadsheets for reporting these devices caused some inconsistency in the number of EDMs recorded as being in use by each utility and this in turn means there is some evident "noise" when comparing the total numbers of EDMs in operation. Four WaSCs had a comparatively high number of non-functional EDMs (United Utilities; 140, DCWW; 87, Northumbrian; 79 and Yorkshire; 58), while all of the others had less than 25.

Table 10: EDM performance by % of time they were operational

	0-50%	50-90%	90-95%	95-99%	99-100%
2020	4.4%	13.7%	4.3%	8.9%	70.7%
2021	5.3%	15.6%	5.5%	11.6%	66.7%
2022	6.2%	17.3%	6.1%	10.4%	66.1%

2022 was a drier year than 2020 or 2021, so the physical wear and tear ought to have been less. A lot of the non-performance has related to difficulties in getting the hardware to work after installation. Data transmission was a particular problem. This has since been taken over by problems arising after the units have been installed. The number of EDMs with telemetry problems rendering them inoperable across a year suggests either particularly challenging local circumstances or resources have in some cases been spread thinly.

Table 11: EDM performance by WaSC, 2022

2022	0-50%	50-90%	90-95%	95-99%	99-100%
Anglian Water	2.0%	9.6%	2.7%	2.6%	85.7%
Dŵr Cymru (Lloegr)	12.0%	7.2%	2.4%	11.2%	69.6%
Dŵr Cymru (Cymru)	7.3%	11.2%	3.4%	11.6%	69.8%
Hafren Dyfrdwy (Cymru)	4.2%	31.3%	8.3%	16.7%	47.9%
Northumbrian Water	7.7%	17.0%	6.5%	11.1%	64.2%
Severn Trent Water	7.2%	34.3%	12.2%	14.7%	43.7%
South West Water	4.1%	15.0%	3.9%	3.3%	77.6%
Southern Water	5.6%	10.2%	3.0%	9.9%	74.4%
Thames Water	4.6%	15.0%	5.4%	14.8%	65.6%
United Utilities	8.0%	7.8%	4.9%	12.7%	71.5%
Wessex Water	0.5%	9.2%	3.5%	9.5%	80.8%
Yorkshire Water	8.9%	20.1%	5.8%	11.2%	59.8%
Overall	6.3%	16.4%	5.7%	10.6%	66.6%

It is evident that EDM performance varies widely between utilities. This will to be some extent governed by the circumstances they operate in. It may also reflect the hardware which was ordered by each utility and the way it has been operated and maintained both in-house and by third party contractors. Given the vagaries of British weather, operating at less than 95% (18 days a year) and 99% (4 days) means quite a lot of rainfall can be overlooked at these levels of confidence.

Table 12: Overall EDM performance by utility, 2020-2022

	2020	2021	2022
Anglian Water	97.96%	95.86%	96.63%
Dŵr Cymru (Lloegr)	83.33%	92.01%	88.67%
Dŵr Cymru (Cymru)	97.85%	92.71%	89.55%
Hafren Dyfrdwy (Cymru)	94.79%	90.24%	92.66%
Northumbrian Water	93.15%	88.21%	89.85%
Severn Trent Water	93.78%	91.09%	87.18%
South West Water	91.34%	94.90%	93.55%
Southern Water	91.85%	92.48%	92.77%
Thames Water	95.93%	94.36%	93.13%
United Utilities	97.45%	91.94%	95.83%
Wessex Water	96.17%	97.67%	98.01%
Yorkshire Water	89.75%	87.75%	88.18%
Total	94.14%	92.14%	91.62%
Number of EDMs	14,734	14,970	15,242
Downtime (days pa)	23	29	30

Each utility is scored by the time their individuals EDMs were in operation each year. If all EDMs work continually throughout the year there would be a 100% score. Likewise, if all EDMs were out of service for the whole year, they would get a 0% score.

Tables 11 and 12 demonstrate that there is evidence that suggests that there has been a material deterioration in EDM performance from 2020 to 2022. With the typical EDM being out of commission for a month every year in 2022, we have to assume that a significant number of storm events are not being monitored each year. Table 13 outlines the status of EDM monitoring by utility in 2022 as disclosed. All utilities are expected to have comprehensive EDM installation by the end of 2023.

Table 13: Status of EDMs by utility in 2022

2022	Total	In use	To be installed	Decommissioned
Anglian Water	1,552	1,058	486	8
Dŵr Cymru (Lloegr)	126	126	0	0
Dŵr Cymru (Cymru)	2,198	2,198	0	0
Hafren Dyfrdwy (Cymru)	48	48	0	0
Northumbrian Water	1,565	1,543	22	0
Severn Trent Water	2,466	2,455	9	2

South West Water	1,342	1,333	5	4
Southern Water	978	963	14	1
Thames Water	777	479	247	51
United Utilities	2,325	1,974	351	0
Wessex Water	1,300	1,182	114	4
Yorkshire Water	2,221	2,178	17	26
	16,563	15,201	1,265	97

APPENDIX 3

ANSWERS TO THE SPECIFIED QUESTIONS

Event Duration Monitoring

1. Introduction

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

The Worshipful Company of Water Conservators (WCWC), is a City of London Livery Company focussed on the long-term health of our water resources and the broader environment. The Company's purpose is "promoting a diverse and sustainable environment".

Q1 3.1. Equipment failure

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? Yes. Even so, this cannot be a let-out clause. It needs to be robustly framed. We are already seeing a significant number of cases where the hardware is not working. As we have near-real-time reporting, equipment failure can also be reported in near-real-time.

Q2 3.2. Technical Feasibility

2) Are you content near-real-time event duration monitor reporting will apply everywhere it is technically feasible? Yes, but where it is needed to manage water quality and uses.

Continuous Water Quality Monitoring

4.1. Programme objectives

Q1) Should the objectives include any additional aims? Yes or No. If Yes, what additional objectives should be included? Yes, link this to catchment management objectives. It may be useful to consider the CSO monitoring aims of the 2022 revision of the EU's UWWTD.

4.2. Guidance for freshwater watercourses

Q2) Are UPM FIS the appropriate standards against which to benchmark the programme for storm overflow impacts? If not, why? Possibly yes, but Catchment Plans must become the ultimate approach. Does UPM FIS accommodate the notion of occasional small flows into very small ditches. A fit for purpose approach is needed (see text). Many of the concerns about impacts focus on the impact of sewage sanitary litter. Where does monitoring fit in with this?

Q3) Are UPM FIS the appropriate standards against which to benchmark the programme for sewage treatment work final effluent discharge impacts? If not, why?

Probably not. Storm overflows are intermittent, sewage effluents are not. There must be a focus on uses including the needs of nature in water courses and a proposed there will be many very small works discharging into very small water courses and a fit for purpose framework approach is needed (see text). Where does the established programme of inspection of small watercourses fit in, e.g., inspection for sewage fungus etc fit in. Once more the goal must be to fit monitoring programmes into Catchment Plans.

Should Defra explore in future (when technically feasible) if and how nitrates can be monitored in freshwater sites? Yes or No. If Yes, why? Yes, any new knowledge is valuable. Priority ought to be given to installing monitors where really needed not 'just because we can.'

Q5) 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? Must be linked to Catchment Management Plans.

Q6) Is the 24hr lag sufficient for all watercourses? Yes or No. If No, should the lag be longer or shorter and why? Yes.

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? Probably yes, but this has consequences for the regulation of effluents. The definition of harm will need a clearer understanding. Ideally, modelling should be used but this will not be the right approach for small discharges into ditches etc. There needs to be a clear understanding of the relationship of ammonia, nitrite and nitrate (NOX). The drive will be for full denitrification of sewage effluents. There will be many places where dissolved oxygen must still be the dominant determinand and there must be consequences for normal river monitoring, for example, where does BOD (ATU) fit in (or even BOD and COD) Once more the aim should be to fit into Catchment Plans.

8) Is the rule of "not more than 500m downstream from the point of cross-sectional mixing" appropriate? Why? No, probably too arbitrary.

9) Would the 500m rule be better expressed as a ratio based on the width of the watercourse? Why? Surely it is very restrictive and arbitrary to set national criteria for such a detailed practical issue. Would it not be better to set a framework of criteria to select the best point; model wherever possible; local agreement between EA and water company wherever possible

10) Should there be any other site-specific considerations? If so, which? As the Catchment Plans require.

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." Yes, subject to the points made in Q9 and 10.

12) Do you agree with the proposed cap of 10 on clustering? If not, why not, and what should the cap be? No. Do what is practical see Q9, 10 & 11.

13) Is it reasonable to require sewerage undertakers to attribute the source of a breach of standards to a particular asset? Why? Given the current foci of interest, yes. But what standards? Breach implies something regulatory. Is it envisaged that river quality specifications become mandatory, then the whole issue of Catchment Planning becomes more crucial. What will happen if a sewage effluent complies with the discharge permit but causes a breach of river standards? This could be a key element of rebuilding public trust in the utilities. As matters currently stand, public trust had been corroded by the discrepancy between, for example, officially announces discharges, and those identified by machine-learning, demonstrating dry-event discharges from WWTWs.

14) Should there be any additional exemptions? How would they benefit the programme? See the covering text. Yes, small sewage treatment works covered by General Binding Rules. Avoid a waste of resources.