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House of Commons

Environmental Audit Committee

Water quality in rivers

Fourth Report of Session 2021–22

Report, together with formal minutes relating to the report

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Environmental Audit Committee

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Summary

Getting a complete overview of the health of our rivers and the pollution affecting them is hampered by outdated, underfunded and inadequate monitoring regimes. It is clear, however, that rivers in England are in a mess. A 'chemical cocktail' of sewage, agricultural waste, and plastic is polluting the waters of many of the country's rivers. Water companies appear to be dumping untreated or partially treated sewage in rivers on a regular basis, often breaching the terms of permits that on paper only allow them to do this in exceptional circumstances. Farm slurry and fertiliser run off is choking rivers with damaging algal blooms. Single use plastic sanitary products—often coated with chemicals that can harm aquatic life—are clogging up drains and sewage works and creating 'wet wipe reefs' in rivers. Revolting 'fatbergs' as big as blue whales are being removed from sewers, costing companies and their customers in the region of £100 million a year. Not a single river in England has received a clean bill of health for chemical contamination. Disturbing evidence suggests they are becoming breeding grounds for antimicrobial resistance.

Cleaning up our rivers is important for public health and vital to protect wildlife. The world is experiencing an extinction crisis and freshwater eco-systems are on the frontline. The build-up of excess nutrients like phosphorus and nitrogen from animal waste and sewage is reducing oxygen levels in rivers and in severe cases can cause fish kills. Along with the stresses of plastic and synthetic chemical pollution and climate change this is creating multiple pressures undermining the health and resilience of these key ecosystems. It should ring alarm bells that wild Salmon are classed as 'at risk' or 'probably at risk' in almost every river they traverse. Rivers where we know important species such as the North Atlantic Salmon are in danger must be protected from pollution as a priority.

The sewerage system is overloaded and unable to cope with the increasing pressures of housing development, the impact of heavier rainfall, and a profusion of plastic and other non-biodegradable waste clogging up the system. Successive governments, water companies and regulators have grown complacent and seem resigned to maintaining pre-Victorian practices of dumping sewage in rivers. There has been investment in the network since privatisation, but underlying problems have not been resolved and capital investment has not kept pace with housing and other development pressures on the drainage and treatment network. Biodiversity has not been priced adequately into economic decision making. The water regulator Ofwat has hitherto focused on security of water supply and on keeping bills down with insufficient emphasis on facilitating the investment necessary to ensure that the sewerage system in England is fit for the 21st century.

A step change in regulatory action, water company investment, and cross-catchment collaboration with farmers and drainage authorities is urgently required to restore rivers to good ecological health, protect biodiversity and adapt to a changing climate. Investment must be accelerated so that damaging discharges from water treatment assets including storm overflows cease and that any spills occur only in genuinely exceptional circumstances. Financial penalties for pollution incidents and misreporting

must be set at a level that puts the issue on the agenda in water company board rooms. Ofwat should examine the powers it may have to limit the payment of bonuses to water company executives while companies persistently breach their permits.

Intensive livestock and poultry farming is putting enormous pressure on particular catchments, such as the one feeding the River Wye. As many as twenty million chickens are being reared there and their waste may be raising the river's phosphorus levels. Planning permission seems to be granted for individual units without any cumulative assessment being made of the overall impact of all the intensive farms in the area. Each catchment should have a nutrient budget calculated. Pollution from all sources in the catchment must then be progressively reduced or mitigated until it does not exceed the capacity of the river to handle the nutrients. New poultry farms should not be granted planning permission in catchments exceeding their nutrient budgets.

National Highways must accelerate its efforts to eliminate toxic chemical and plastic pollution from the most polluting outfalls on the Strategic Roads Network by 2030 in line with the Government's commitments to halt species decline. We expect to see far more assertive regulation and enforcement from Ofwat and the Environment Agency to restore our rivers to their natural glory.

1 Assessing water quality in rivers in England

1. Healthy rivers are vital for biodiversity and to human health and well-being. Rivers provide habitats for a range of wildlife, protect against flooding and provide beautiful places for recreation and reflection. Freshwater ecosystems are in crisis globally and in England there are concerns about the multiple stresses being placed on riverine biodiversity and the dangers posed to swimmers and other river users from bacteria from sewage pollution.

2. In its 25 Year Environment Plan, issued in 2018, the Government pledged to deliver cleaner air and water in England's cities and rural landscapes, to protect threatened species and to provide richer wildlife habitats.[1] It promised to secure clean and plentiful water by 'improving at least three quarters of our waters to be close to their natural state as soon as is practicable'.[2]

3. The most recent figures published by the Environment Agency, under obligations originally established by the EU Water Framework Directive, show that only 14% of English rivers met good ecological status and no river met good chemical status. The requirements of that directive, implemented in domestic legislation by the Water Environment (Water Framework Directive) (England and Wales) Regulations 2017,[3] remain in force, though Parliament has now given Ministers the express power to amend these regulations.[4] Water pollution remains a major impediment to achieving targets established under the Directive (requiring all European surface water to reach 'good ecological status' by 2015 with a maximum deadline of 2027), and measures to address pollution in rivers, other surface water and groundwater in England will be crucial to achievement of the Government's objectives for water quality in the 25 Year Environment Plan.

4. The Environment Act 2021, which received Royal Assent in November 2021, empowers Ministers to set long-term statutory targets for the improvement of the natural environment, and requires a long-term target for the improvement of water to be set not later than 31 October 2022. Long-term targets set under section 1 of the Act must have a minimum duration of 15 years.[5]

1 HM Government, A Green Future: Our 25 Year Plan to Improve the Environment, 2018

2 *Ibid.*, p.25

3 SI 2017/407

4 Section 89 (1) of the Environment Act 2021: ' The Secretary of State may by regulations amend or modify any legislation to which this section applies for the purpose of—(a) making provision about the substances to be taken into account in assessing the chemical status of surface water or groundwater; (b) specifying standards in relation to those substances or in relation to the chemical status of surface water or groundwater.' Section 89(2) specifies that the section applies to the Water Environment (Water Framework Directive) (England and Wales) Regulations 2017.

5 Section 1 of the Environment Act 2021. Subsection (2) of Section 1 "requires the Secretary of State to set at least one long-term target in each of four priority areas. Subsection (3) defines those priority areas as air quality, water, biodiversity, and resource efficiency and waste reduction. Section 4(9) requires that a draft statutory instrument (or instruments) satisfying the requirement in subsection (2) must be laid before Parliament by 31 October 2022." Explanatory Notes to the Environment Act 2021, para 68.

1.1 About this inquiry

5. The Chair of the Committee, Rt Hon Philip Dunne MP, having been successful in the ballot for private members' bills in the 2019–21 Session, chose to introduce a bill which proposed to place a duty on water companies to ensure that untreated sewage was not discharged into rivers and other inland waters.[6] This prompted the Committee to launch an investigation into the issues.[7] As the inquiry progressed, it became apparent that the challenges to good water quality in rivers were not confined to sewage pollution from storm overflows—significant though this is—and that agricultural pollution and road run off also need urgent attention.

6. Regulation of water quality in the UK is largely devolved. This inquiry has therefore primarily focused on rivers in England. Rivers flow across borders, and on occasion borders run down the middle of rivers: because there are lessons to be learned from the Welsh Government's approach to water regulation, we also refer to matters there. Many of the issues raised in this report will also be of relevance to the other devolved administrations with responsibility for water quality.

7. We received 105 pieces of written evidence and heard in person from 31 witnesses, including the Parliamentary Under Secretary of State at the Department for Environment, Food and Rural Affairs, Rebecca Pow MP, the chief executives of the Environment Agency, Ofwat and Highways England and the chief executives of five of the water and sewerage companies operating in England.[8] The National Audit Office undertook an exploratory analysis of data used by the Environment Agency as part of its regulation of storm overflows, and provided a paper containing contextual data to support our inquiry and setting out areas for further consideration.[9] We undertook a visit to the River Windrush in the Cotswolds, facilitated by the campaign group Windrush Against Sewage Pollution (WASP), and to the Thames Water waste water treatment works at Burford. We are very grateful to all those who took the trouble to submit written evidence, who provided oral

6 The Sewage (Inland Waters) Bill (Bill 16 of Session 2019–21).

7 The Committee's call for evidence and terms of reference are published on the Parliament website

8 17 men and 14 women gave oral evidence. The witnesses who gave oral evidence, and the written evidence received, are listed in full on pages XX and YY respectively.

9 National Audit Office (WQR0097), subsequently published by the NAO as *Understanding storm overflows: Exploratory analysis of Environment Agency data*, September 2021.

evidence and who otherwise assisted us in this inquiry. We would in particular like to thank Professor Ian Barker, appointed as specialist adviser to this inquiry, whose insight and technical expertise has been invaluable.[10]

The structure of this report

8. After looking at the ecological health of rivers in this introductory chapter, we turn in Chapter Two to look at how the growing interest in swimming in rivers has focused attention on bacteriological water quality. The following three chapters deal in turn with the three main sources of river pollution—agriculture, sewage and urban diffuse pollution. Chapter Six sets out how to deliver the step change in investment, regulation and cross-catchment governance that we consider is required to clean up England's rivers and achieve the Government's goals under the 25 Year Environment Plan, the Environment Act 2021 and the UK's international commitments under the UN Convention on Biological Diversity.

1.2 Water quality in English rivers

9. Only 14% of rivers in England can currently claim to have good ecological status.[11] The Government is not on track to meet the Water Framework Directive requirement—subsequently transposed into UK law—for all rivers to reach good status by 2027.[12] Wildlife and Countryside Link has warned that the water quality of rivers in England is the worst in Europe.[13]

Good ecological status (GES) is a metric for assessing the health of the water environment. It is assigned using various water flow, habitat and biological quality tests. Failure to meet any one individual test means that the whole water body fails to achieve good ecological status. This indicator, and the statutory framework that supports it, have been retained in UK law after the UK's departure from the EU.

Source: Department for Environment, Food and Rural Affairs (DEFRA) (WQR0028)

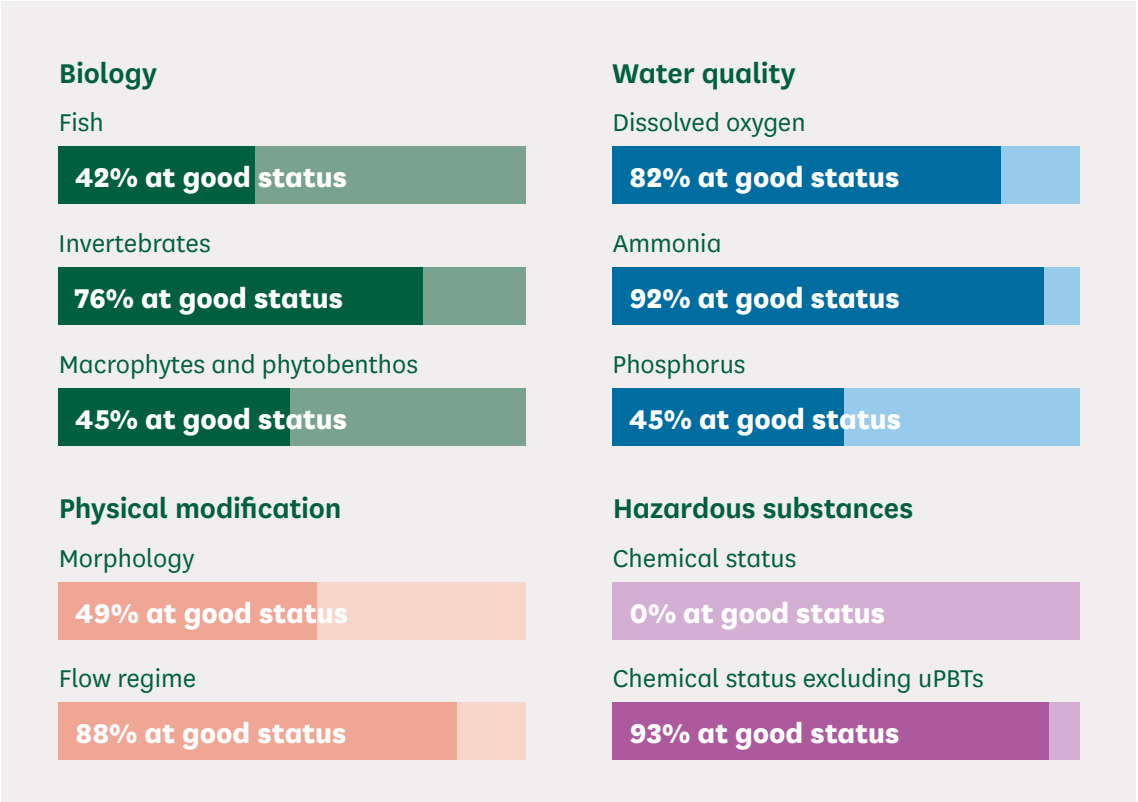
10 Professor Barker was appointed as specialist adviser to the Committee's inquiry on 10 February 2021. He made the following declaration of interests on appointment:
"1. I am the founder and Managing Director of Water Policy International Ltd, an independent consultancy working in the water and environmental sectors. The company has no current contractual relationship with any UK water company, or other organisation relevant to this Inquiry. My wife is also a Director, but has no other links to the water sector.
2. I am an unpaid non-Executive Director of the following not-for-profit organisations: a) Society for the Environment: the body responsible for the registration of environmental professionals, including the award of Chartered Environmentalist; b) Institute of Water (where I also hold the position of Vice President Environment): the only professional body that exclusively supports the careers of anyone working in the UK water industry, and c) Water Industry Forum: the only neutral stakeholder forum and information hub for the UK water sector, enabling conversations that would not otherwise happen.
3. I am a Visiting Professor at the University of Exeter's Centre for Water Systems, but am not involved in any current project at the Centre which might conflict with this inquiry.
4. I am a member of the RSPB, but not active within the Society."
On 5 July 2021 Professor Barker declared that as from 1 July 2021 he had been appointed as a member of Ofwat's Advisory Panel. He has declared that throughout the duration of this Inquiry his relationship with and advice to Ofwat has been solely about water security and water supply planning.

11 'Shocking state of English rivers revealed as all of them fal pollution tests', *The Guardian*, 17 September 2020

12 Surfers Against Sewage (WRQ0031)

13 Wildlife and Countryside Link (WQR0077)

Figure 1: Environment Agency indicators for water quality in rivers in England



Source: Gov.uk, State of the water environment indicator B3: supporting evidence, June 2021.

10. Water quality is assessed through the use of several different indicators. Figure 1 lists the main indicators used and the proportion of rivers in England which achieved good status under each at the date of last measurement.

11. The Government, regulators and water companies assert that water quality in English rivers has improved since the 1990s.[14] This statement is accurate in certain respects, as figure 1 shows: but overall measures can conceal less reassuring indicators. For instance, the Department for Environment, Food and Rural Affairs (DEFRA) told us that the Environment Agency's work with water companies over the last two decades meant that the waste water effluent discharging into rivers now contained 67% less phosphorus (P)—a key pollutant found in sewage and animal waste that can choke rivers with algal blooms—and 79% less ammonia (NH_3) than in 1995.[15] Nevertheless, excess phosphorus remains the most significant pollutant in terms of water bodies failing to achieve good ecological status. The state of the water environment indicators published annually by the Environment Agency show that only 45% of rivers are currently achieving a good status for phosphorus.[16]

14 Department for Environment, Food and Rural Affairs (DEFRA) (WQR0028); Q322 [Rebecca Pow MP, 15 September 2021]; Environment Agency, James Bevan blog: The state of our waters: the facts, October 2020 ; Water UK, 21st Century Rivers: Ten actions for change, October 2021

15 Department for Environment, Food and Rural Affairs (DEFRA) (WQR0028); Q201 [Sir James Bevan, 23 June 2021]

16 Gov.uk, State of the water environment indicator B3: supporting evidence, 11 June 2021

12. Sir James Bevan, chief executive of the Environment Agency, told us that water quality in English rivers was 'flatlining' because the 'the two main polluters, the water and farming sectors, are not yet … doing enough to protect and enhance the environment.'[17] While he suggested that rivers were in a 'better condition, in many respects, than they were several decades ago', he said that progress had 'stalled' and the situation was not nearly as good as it should be. Sir James went on to emphasise the complexities within the overall criterion of good ecological status:

> If you take biological status, which is one element in that classification, over three quarters of our rivers are at good status for things like invertebrates. For physicochemical status, things like temperature, pH, dissolved oxygen, most rivers are up to good status for ammonia and dissolved oxygen. On the other hand, chemical status, which is the concentrations of specific things like arsenic and iron in water, our last results show that no—zero—surface water bodies met good chemical status. That is a significant drop from the last few years, due to the different way in which the EA is assessing and giving a more accurate picture.[18]

1.3 Sources of pollution

13. In its annual reports on progress against the targets set in the 25 Year Environment Plan, DEFRA identifies the major pressures that cause water bodies to fail to achieve good ecological status. The most recent progress report indicates that after the physical modification of rivers (a factor unavoidable in many urban environments), the main three drivers preventing water bodies achieving good status are:

- Agricultural pollution from rural areas (affecting 40% of water bodies);
- Sewage and wastewater (36%);
- Run-off from towns, cities and transport, referred to as urban diffuse pollution (18%).[19]

These proportions represent estimates for all inland waters in England: the balance of drivers will differ for each catchment and stretch of river. Sewage and urban diffuse pollution are likely to be the main pollutants in urban areas. In rural stretches of river, agricultural practice is likely to be the dominant form of pollution.[20]

17 Q201 [Sir James Bevan, 23 June 2021]
18 *Ibid.*
19 DEFRA, 25 Year Environment Plan Annual Progress Report April 2020 to March 2021, October 2021
20 Friends of the Upper Wye (WQR0094)

A **catchment** is an area of land, often bounded by hills, which drains into a river and its tributaries, eventually flowing out to the sea. Some of the rainfall over a catchment is absorbed underground into porous rocks (aquifers), such as the chalk of southern England. Water from aquifers seeps out to support river flows, particularly during times of low rainfall.

Point source pollution and diffuse pollution: Significant sources of pollution which can be identified at a single location—such as a sewage outflow or a poorly maintained slurry store—are referred to as 'point sources'. Many other pollutants enter watercourses in smaller amounts from multiple sources: this is termed 'diffuse' pollution. For instance, agricultural pollution from the use of pesticides and fertilisers are likely to enter water courses from run off and seepage at multiple points. Similarly, urban runoff carries pollutants from roads and urban surfaces into storm drains and out into watercourses at many locations.

14. The Environment Agency's analysis of Reasons for Not Achieving Good Status (RNAGs) record the source, activity and sector involved in causing waters to be at less than good status. This dataset provides 15,029 individual reasons why watercourses in England are not all at good ecological status: some water bodies fail to achieve good status for multiple reasons, of which all are counted separately. Table 1 indicates the overall contribution to RNAGs of the three biggest drivers of poor water quality, namely agricultural usage, sewage pollution and pollution from urban and transport sources.

Table 1: Highest impact sectors among Reasons for Not Achieving Good Status (RNAGs) for rivers in England

Water management issue	Changes to the natural flow and level of water	Physical modifications	Pollution from rural areas	Pollution from towns, cities and transport	Pollution from waste water	Totals
Agriculture and rural land management	116	820	5148	8	3	6,095
Water Industry	289	365	0	130	3355	4,139
Urban and transport	0	779	0	892	33	1,704

Source: Environment Agency (Gov.uk), Challenges data for England, September 2021. Lesser drivers, such as pollution from abandoned mines or from invasive non-native species, have not been included in this table.

15. Human wastewater, farm slurry and fertiliser run-off from farms are sources of phosphorus and nitrogen.[21] Excessive concentrations of these nutrients can cause algal blooms in rivers: these consume oxygen from the water, undermining ecosystems within the river and their surrounding habitats. Nitrogen and phosphorous are naturally present in the environment and in low quantities are necessary nutrients. The high levels of nitrates found in sewage, agricultural run-off, nitrogen-based fertilisers and manure pose a problem requiring active management to resolve, as the Committee reported following an inquiry undertaken in 2018.[22]

21 Environment Bill - environmental targets - GOV.UK (www.gov.uk) 19 August 2020.

22 Environmental Audit Committee, *UK Progress on Reducing Nitrate Pollution*, Eleventh Report of Session 2017–19, HC 656

1.4 Current monitoring arrangements

16. All of the issues raised in this inquiry, from overall water quality to the abundance of insects and fish populations within rivers or the frequency, volume and bacterial load of sewage spills, require some form of monitoring, be it through spot samples taken by hand or from instruments *in situ*. Many of our witnesses suggested that the availability of a comprehensive overview of the data to monitor the health of England's rivers, and the pollution affecting them, has been hampered by monitoring arrangements variously characterised as outdated,[23] underfunded[24] and inadequate.[25]

17. Dr Michelle Jackson, Associate Professor of Freshwater Marine Ecology at the University of Oxford, warned of the increasing pressure on freshwater environments globally, including from exposure to a 'rapidly diversifying chemical cocktail' of antibacterial disinfectants, preservatives, insecticides, herbicides, antibiotics and fungicides. She also emphasised the cumulative impact of all the different stressors on the aquatic environment:

> When we think about water quality and pollution, we need to think about how it also interacts with all these other stresses in the catchment. At the moment I would probably be most worried about the effects of land use change, the associated pollutants that come with that and the potential for chemical cocktails, for instance, and pollutants that might interact with one another to make an effect that is much worse than the sum of their parts.[26]

18. Dr Jackson observed that 'most national and international monitoring and management strategies are still based on the perspective that one dominant stressor is influencing the ecosystem—usually nutrient enrichment (i.e. via fertilisers or sewage run-off) or acidification'.[27] Coventry University's Centre for Agroecology and Water Resilience echoed this, arguing that current invertebrate biomonitoring methods 'lack the capacity to diagnose 21st century pressures, such as global heating, extreme events, microplastics, pharmaceuticals and personal care products'.[28]

19. The water and effluent quality monitoring currently undertaken by the Environment Agency and water companies is mainly focused on the levels of nutrients such as nitrogen, phosphorous and ammonia.[29] A variety of other substances—metals, pesticides, pharmaceuticals, industrial chemicals, and plastics—also contribute to poor water quality, yet many of these are simply not monitored routinely. Gathering data on the full range of pollutants requires sampling and laboratory analysis: given the resources currently made available for systematic monitoring both regionally and nationally, some consider that the levels of such pollutants are unlikely to be monitored. Levels of many legacy and

23 Peter Lloyd (WQR0026); Q19, Dr Michelle Jackson, 10 March 2021
24 Wildlife and Countryside Link (WQR0077); Q232, Sir James Bevan, 23 June 2021; Catchment-Based Approach Urban Water Group (CUWG) (WQR0037)
25 UK Centre for Ecology and Hydrogeology (WQR0013); Peter Lloyd (WQR0026); Q11 Dr Michelle Jackson, 10 March 2021
26 Q5, Dr Michelle Jackson, 10 March 2021
27 Dr Michelle C. Jackson, Professor Nick Voulvoulis, Professor Guy Woodward, Multiple stressors in freshwater ecosystems: biocides and climate change, Grantham Institute Briefing paper No 27, October 2018
28 Centre for Agroecology and Water Resilience, Coventry University (WQR0035)
29 Q19, Dr Michelle Jackson, 10 March 2021

emerging pollutants, including microplastics, narcotics and so called 'forever chemicals', are therefore simply not being routinely measured.[30] Few inland sites are monitored for the kinds of bacterial pollution that can cause gastroenteritis.[31]

20. We received evidence raising serious concerns about the robustness of the Environment Agency's systems of water quality spot sampling[32] and the system of operator self-monitoring it relies on to regulate sewage treatment works. We examine these issues in more detail in Chapter Four below.

Monitoring of sewage discharges

21. Monitoring of sewage spills from storm overflows and wastewater treatment plants has improved in recent years as Event Duration Monitors (EDMs) have been rolled out across 80% of outflows on the network since 2015. Between twelve and thirteen thousand of these monitors have already been installed, and installation across the network is due to be completed by 2023.[33] Data from these monitors has begun to show how raw sewage mixed with rainwater or partially treated sewage is released into rivers hundreds of thousands of times a year.[34]

Sewer overflows are the safety relief valves in the sewerage network. There are nearly 18,000 sewer overflows at pumping stations, sewage treatment works and combined sewer overflows (CSOs) across the network in England, including emergency overflows. Their use has increased in recent years as population growth, urban development and the heavier rainfall attributable to climate change has increased the pressure on an aging sewerage network.

Overflows are designed to operate during heavy rainfall when rivers are at high flow.[35] Should sewer pipes become blocked, or the sewerage system be overwhelmed with water, they prevent a combination of sewage and rainwater from backing up pipes into homes and businesses, by discharging untreated or partially-treated sewage directly into rivers.[36]

22. The monitors currently installed on the network record the time and duration of each discharge, but do not record the volume or the pollutant load. Dr Rob Collins of the Rivers Trust explained why this was significant:

> We know nothing about pollution levels in CSOs. It is all very well monitoring their duration and the flow but, if you think about it, they combine raw sewage with what runs off the urban environment. That is a huge chemical cocktail: faecal microbes, hydrocarbons, industrial chemicals, plastics, pharmaceuticals, personal care products will be found in those flows. We know something about their impact on the aquatic environment but we know very little about their impact upon human health if you ingest a big mouthful or two of that.[37]

30 Q19, Dr Michelle Jackson, 10 March 2021
31 Q66, Professor Becky Malby, 21 April 2021
32 Peter Lloyd (WQR0026)
33 Q207, Sir James Bevan, 23 June 2021; DEFRA (WQR0028)
34 ENDs report, 'Organised pollution': Sewage dumped into England's waters 400,000 times in 2020, 23 March 2021
35 Chartered Institute of Water and Environmental Management (CIWEM) (WQR0074)
36 Wessex Water, Storm overflows [accessed November 2021]
37 Q54, Dr Rob Collins, 10 March 2021

23. We examine issues arising from current arrangements for monitoring discharges from sewer overflows and wastewater treatment works, including the statutory provisions recently introduced under the Environment Act 2021, in Chapter Three.

Emerging pollutants

24. The presence in rivers of a number of so-called emerging pollutants—such as microplastics, and a range of chemicals, such as pharmaceuticals and narcotics—is not being systematically measured. Wastewater treatment removes some chemicals, but current treatment methods have not been designed to deal with the vast array of chemicals in use in modern life. For example, a study that analysed the presence of narcotics in the River Thames, found 27 drug residues including caffeine, cocaine and benzoylecgonine, with the periods of elevated occurrence correlating with CSO spill periods.[38] The CHEM Trust warned that routine water quality monitoring 'only shows the tip of the iceberg in terms of chemical pollution in UK rivers'.[39]

Forever chemicals

25. Several submissions highlighted the threat that so-called emerging pollutants such as 'forever chemicals' pose to biodiversity and water quality in rivers.[40] Chemical pollutants present in river waters include per- and polyfluorinated alkyl substances (PFASs), bisphenols and flame retardants, all of which are known to affect river water quality, freshwater biota and human health.

Persistent chemicals—sometimes referred to as 'forever chemicals'—are chemicals that do not degrade easily in the natural environment. In some cases, such as PFAS (polyfluoroalkyl and perfluoroalkyl substances), it will take centuries for these chemicals to degrade. Removing these contaminants from rivers is extremely challenging.

Source: CHEM Trust (WQR0022)

26. PFASs are used widely in stain repellents, paints and polishes.[41] One chemical in this family, PFOS, is prohibited under the 2009 Stockholm Convention on Persistent Organic Pollutants.[42] Despite this, in 465 samples taken between 2014 and 2018, 46% of English rivers failed the Water Framework Directive threshold for PFOS.[43] This underlines its persistence in the environment.[44]

38 Kelly Munro, Claudia P.B. Martins, Matthew Loewenthal, Sean Comber, David A. Cowan, Luisa Pereira, Leon P. Barron, Evaluation of combined sewer overflow impacts on short-term pharmaceutical and illicit drug occurrence in a heavily urbanised tidal river catchment (London, UK), Science of the Total Environment, Volume 657, 20 March 2019, pp 1099–1111

39 CHEM Trust (WQR0022)

40 CHEM Trust (WQR0022); Fidra (WQR0071)

41 Ahrens, L. and Bundschuh, M., 2014, Fate and effects of poly- and perfluoroalkyl substances in the aquatic environment: A review. Environmental Toxicology and Chemistry, 33(9), pp. 1921–1929.

42 http://www.pops.int/TheConvention/Overview/tabid/3351/Default.aspx

43 Environment Agency, 2021 river basin management plans, October 2019

44 CHEM Trust (WQR0022)

Plastic pollution

27. We heard that plastic pollution was now 'ubiquitous' in English rivers and other freshwater environments.[45] Large items of plastic can cause wildlife injury or death through entanglement, suffocation and choking.[46] Single use and 'unflushable' plastic products—in some cases coated with antimicrobial chemicals—are also polluting riverbanks with unsightly and harmful 'wet wipe reefs', blocking drains and causing overflows: we will return to this issue in Chapter Five. No comprehensive study of macro-plastic prevalence in freshwater environments has yet been completed.[47]

28. Research on the harm from microplastics is still in its infancy. However, there is evidence that these persistent pollutants can cause harm to creatures that ingest them by, for instance, affecting their feeding by causing animals to falsely sense they are full and by delivering chemical pollutants into the bodies of animals.[48] Professor Steve Ormerod, Professor of Ecology and Co-Director of the Water Research Institute at Cardiff University, described the prevalence of micro-plastic pollution:

> They are everywhere we can look in the freshwater system. Some data collected in the River Irwell system a few years ago illustrated that in some sections of the river there were 500,000 fragments of plastic for every 1 square metre of riverbed. That is many, many times more than the number of insects, for example, that are so important in those same riverbed environments.[49]

Recent research by Professor Jamie Woodward at the University of Manchester has suggested that untreated sewage discharged from storm overflows during dry weather may be the main source of microplastics found in river sediment.[50] Professor Woodward told us what his programme of riverbed sampling and laboratory analysis on the River Tame in the upper Mersey basin of Northwest England had discovered:

> We found very high levels of microplastic contamination in the urban and sub-urban riverbeds. The rural headwaters showed much lower microplastic loadings. Urbanised zones in particular showed alarming microplastic concentrations–the highest recorded anywhere in the world. The microplastic assemblages showed wide variation, with each reach having a different mix of microplastic types (microbeads, microfibres, fragments and others).[51]

45 Q9, Professor Ormerod, 10 March 2021
46 Environment Agency (WQR0029); Natural England (WQR0040); Fidra (WQR0071); Wildlife and Countryside Link (WQR0077)
47 Debbie J. Winton, Lucy G. Anderson, Stephen Rocliffe, Steven Loiselle (Feb 2020) Macroplastic pollution in freshwater environments: Focusing public and policy action, Science of The Total Environment, Volume 704
48 Royal Society, Microplastics in freshwater and soil: An evidence synthesis, November 2019
49 Q9, Professor Steve Ormerod, 10 March 2021
50 Woodward, J.C., Li, J., Rothwell, J.J. and Hurley, R.R. (2021) Acute riverine microplastic contamination due to avoidable releases of untreated wastewater, Nature Sustainability 4, 793–802.
51 Professor Jamie Woodward (Professor of Physical Geography at The University of Manchester) (WQR0095)

Another major source of plastic pollution in some rivers are the tiny particulates worn away from brakes and tyres which then get washed into watercourses from roads.[52] We discuss the suspected sources of microplastic pollution in rivers in Chapter Five below.

Monitoring plastic pollution

29. Regulators do not currently monitor river water systematically for micro-plastics. DEFRA is working with the Environment Agency and the water industry to establish methods to detect, characterise and quantify microplastics entering waste water treatment works and to evaluate the efficiency of treatment processes for their removal from domestic waste water.[53] Professor Woodward called for wider use of bed sediment sampling (in, for example, Environment Agency surveys) to monitor the extent of microplastic contamination and thereby to assess the quality of river bed habitats (and any threats) and to police water industry practice.

1.5 Biodiversity as an indicator of water quality

30. Surfers Against Sewage, an organisation set up in Cornwall in 1990 by a group of surfers to campaign against sewage pollution in coastal waters, argued that a crucial indicator of river water quality was the health, abundance and diversity of the various species which a river and the surrounding habitats in the catchment areas hold.[54] Professor Steve Ormerod explained that routine monitoring of the ecological health of rivers had reduced in recent decades. 'In the 1980s and 1990s, probably about 25,000 individual locations were frequently assessed for the regulatory framework that was in operation at that time.'[55] In more recent years there had been 'a progressive reduction in the number of locations that are assessed', which was likely 'to diminish further under cost constraints.'[56]

Biodiversity in urban and rural stretches of river

31. The decline of heavy industry in the UK, combined with water company investment in sewage treatment in certain respects, has allowed some river environments to recover. For instance, indicator species such as sea trout and otter have returned to England's rivers.[57] Professor Ormerod described how some species had returned to urban stretches of river in England and Wales, while the condition of rural river environments had generally worsened:

> Globally, freshwaters are in crisis in that they are losing freshwater biodiversity faster than any other ecosystem type. […] Here in the United Kingdom—and England and Wales in particular—we generally see an improvement in the general sanitary quality of the urban river network. For example, in the 1970s something like 70% of our industrial river network was closely polluted by sewage and, on the whole, we have got on top of that

52 See, for example, Kole, et al. "Wear and Tear of Tyres: A Stealthy Source of Microplastics in the Environment", *International Journal of Environmental Research and Public Health* 14(10):1265, October 2017, cited in DEFRA and Department for Transport, *Call for Evidence: Brake, Tyre and Road Surface Wear*, July 2018.
53 Department for Environment, Food and Rural Affairs (DEFRA) (WQR0028)
54 Surfers Against Sewage (WRQ0031)
55 Q14, Professor Ormerod, 10 March 2021
56 *Ibid,*
57 Department for Environment, Food and Rural Affairs (DEFRA) (WQR0028)

> urban water quality problem. We have seen clean water organisms, various species of insects, Atlantic salmon, dippers, otters recolonising the urban rivers. Rural rivers tend to have gone in the opposite direction.[58]

Invertebrates

32. Invertebrate species—insects and other animals without a backbone—are an important part of the river food chain and are considered good indicators of water quality and the overall health of a river.[59] The Environment Agency reports that there has been a 'big increase in the numbers of macro-invertebrates in rivers; animals like snails, worms and insects' since the 1990s.[60] The Agency's own river quality indicators record 76% of rivers at a good status for invertebrates.[61]

33. Evidence from elsewhere indicates a more mixed picture. The Wiltshire Fishery Association, which promotes the fishery and conservation interests of rivers within the upper Hampshire Avon catchment, told us that its regular river monitoring in the upper Avon, Wylye, Nadder, Ebble, Bourne and their tributaries over the last 10 years had shown a gradual decrease in invertebrate numbers:

> Several species [of river fly] such as the blue winged olive and the iron blue dun, which were common 20 years ago, no longer exist in large parts of the catchment area.[62]

Salmon and Trout Conservation cited its own Riverfly Census, which used professionally sampled and analysed invertebrate data to indicate the health of 12 rivers across England. It found only '14 pristine, unimpacted sites out of a total of 120 sites sampled'.[63] Pesticides and other toxic chemicals, excess fine sediments and excess nutrients were found to be the major stressors.[64]

Fish populations

34. Fewer than half (42%) of English rivers are achieving 'good status' for fish populations overall, according to the Environment Agency.[65] Salmon and Trout Conservation told us that wild salmon and trout populations were indicators of a healthy water environment.[66] The South West Rivers Association suggested that river water quality was a major factor affecting the ability of rivers to support natural flora and fauna including fish, especially salmonid species.[67]

35. The latest progress report against the Government's 25 Year Environment Plan shows that indicators for wild salmon rivers indicators are moving in the wrong direction.[68] The

58 Q2, Professor Ormerod, 10 March 2021
59 Wiltshire Fisheries Association (WQR0036)
60 Environment Agency (WQR0029)
61 Gov.uk, State of the water environment indicator B3: supporting evidence, 11 June 2021
62 Wiltshire Fisheries Association (WQR0036)
63 Salmon and Trout Conservation, Riverfly Census 2015, May 2016
64 Salmon and Trout Conservation (WQR0002)
65 Environment Agency, State of the water environment indicator B3: supporting evidence, May 2021
66 Salmon and Trout Conservation (WQR0002)
67 South West Rivers Association (WQR0051)
68 25 Year Environment Plan indicators, B7: Health of freshwaters assessed through fish populations [Date accessed 16 November]

percentage of principal salmon rivers at risk in England has risen by 10 percentage points, from 48% in 2004 to 58% in 2019. Over the same time frame the percentage of rivers in the 'probably at risk' category has increased by 15 percentage points, from 21% to 36%. The percentage of rivers in the 'not at risk' category has fallen by 24 percentage points to zero between 2004 and 2019, and while the percentage of rivers in the 'probably not at risk' category has fluctuated in the intervening years, it is the same in 2019 as it was in 2004.[69] Salmon and Trout Conservation warned that:

> … we have 42 main salmon rivers in England. In 39 of the 42 the populations are categorised as being at risk or probably at risk. No rivers are categorised as not at risk at all. The salmon population is in a bit of a mess. There are other threats other than pollution facing salmon but pollution of the rivers, where they spawn, is a serious one.[70]

Feargal Sharkey, Chairman of Amwell Magna Fishery, pointed out to us the risks to endangered North Atlantic salmon populations from sewage pollution. He said that the Ribble and the Lancashire Calder, 'two of the last remaining salmon rivers on the west coast of England' were being grossly polluted with sewage.[71] He also pointed to the situation on the Hampshire Avon catchment:

> … not only is it made up of five chalk streams, some of the rarest habitats in the country, but it is also afforded designation as a special area of conservation, some of the highest legal protection we have in this nation. It has its own subspecies of salmon, unique to the southern chalk streams. Last year Wessex Water spent in the region of 26,916 hours dumping sewage into five of the rarest ecosystems on the planet, afforded the highest level of environmental legal protection we have and home to not only one of the rarest species in the north Atlantic but a subspecies of an endangered species that only finds refuge in the Hampshire Avon.[72]

1.6 Improving water quality to restore biodiversity

36. Improving the overall water quality in rivers is vital to protect biodiversity. The 2019 Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) global assessment report showed that the diversity and abundance of life on earth is being lost at an alarming rate.[73] Around one million animal and plant species are threatened with extinction, one quarter of all species.[74] Freshwater species are going extinct more rapidly than terrestrial or marine species globally.[75] Almost one-third of freshwater biodiversity faces extinction worldwide. The IPBES report informs negotiations under the United Nations Convention on Biological Diversity, to which the UK is a party.

69 *Ibid.*
70 Q44, Guy Linley-Adams, 10 March 2021
71 Q103, Feargal Sharkey, 21 April 2021. The Amwell Magna Fishery is the oldest angling club in England.
72 *Ibid.*
73 IPBES, Summary for policymakers of the global assessment report on biodiversity and ecosystem services of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services, May 2019
74 *Ibid.*
75 IUCN.org, 'Freshwater biodiversity' [Date accessed 4 March 2021]

The **United Nations Convention on Biological Diversity (CBD)** is the forum for international negotiations to protect biodiversity, which commenced at the UN Earth Summit in 1992. The 15th Conference of the Parties to this convention was opened in Kunming in China in October 2021: further in-person negotiations are to be held in 2022 with the aim of agreeing further international targets. Parties to the CBD—including the United Kingdom—failed to achieve most of the 2020 Aichi Biodiversity Targets to safeguard ecosystems, species and genetic diversity.

37. The situation in the UK mirrors this concerning global picture. In June 2021 we published a report on biodiversity in the UK which highlighted the poor record of successive governments in protecting biodiversity at home.[76] The UK is one of the most nature-depleted countries in the world with the lowest level of biodiversity remaining of any G7 country. In that report we argued that action to protect biodiversity needed to be stepped up in scale, ambition, pace, and detail in order to halt the decline of species.[77] In this inquiry we have examined the measures needed to improve water quality in rivers in order to protect the biodiversity of freshwater bodies in England.

Our view

38. **Improving the quality of the water in rivers in England should be considered a principal objective through which the Government and public bodies can deliver on the legally binding duty, established in the Environment Act 2021, to halt the decline in domestic species by 2030.**

39. **A 'chemical cocktail' of sewage, agricultural waste, plastic and persistent chemicals is polluting rivers. River water quality has improved by some measures in recent decades, but in others it appears to be getting worse. The establishment of a complete overview of the health of rivers in England and the pollution affecting them is hampered by outdated, underfunded and inadequate monitoring regimes. Many harmful pollutants are not routinely monitored, and the Environment Agency has reduced the number of monitoring sites.**

40. **Poor monitoring arrangements mean that river users cannot currently make informed decisions about when it is safe or not to use rivers. The prevalence of plastic pollution, the presence of persistent chemicals and spread of antimicrobial resistant pathogens in rivers in England are all issues of grave concern. Not a single river in England has received a clean bill of health for chemical contamination.**

41. **The current range of pollutants being monitored is too narrow. The Environment Agency must begin work to extend the number of substances it is regularly monitoring in rivers. Existing datasets do not provide a comprehensive picture of risks to human health, aquatic life nor microplastic contamination in rivers.**

42. ***We recommend that the Secretary of State for Environment, Food and Rural Affairs commission, in conjunction with the devolved administrations, a UK-wide survey of emerging pollutants and microplastic pollution of river environments, including an assessment of their potential impact on aquatic ecology.***

76 Environmental Audit Committee, *Biodiversity in the UK: bloom or bust?,* First Report of Session 2021–22, HC 136
77 *Ibid.*

43. **Wild salmon are iconic and important species. It should ring alarm bells that wild salmon are classed as 'at risk' or 'probably at risk' in almost every river in England they traverse. Protecting rivers where important species such as the North Atlantic salmon are known to be in danger must be a priority for the Environment Agency. Pollution levels in these rivers must be reduced as a matter of urgency.**

2 Rivers fit to swim in

44. In this chapter we examine the public health risks of swimming in polluted rivers and explore how the designation of more stretches of river as fit for bathing could help to drive improvements in water quality.

2.1 Wild swimming and public health

45. We heard that paddleboarding, canoeing and open water swimming are undergoing a boom in popularity.[78] Swim England said that 2.1 million people swam in rivers, lochs, lakes and seas in 2017/18.[79] Jane Nickerson suggested this figure may have risen in 2020/21 due to the closure of swimming pools and restrictions on other activities during the pandemic.[80] This recent surge in activity has helped to focus attention on water quality in rivers and the human health risks associated with exposure to sewage pollution.[81]

Well-being benefits of blue space

46. There is increasing recognition that outdoor swimming and water activities can boost our physical and mental health.[82] Surfers Against Sewage reported the outcome of a survey which showed that during the pandemic blue spaces were considered more important than ever, and cited evidence of people feeling 'free, calm, alive and peaceful when close to blue spaces':

> Rivers, beaches and lakes have become essential community amenities delivering health, prosperity and wellbeing in villages, towns and cities nationwide. It is therefore crucial that people are able to access and interact safely with these spaces.[83]

Ben Seal, of British Canoeing, told us that getting out on rivers was one thing that had 'got him through' the lockdowns:

> [M]illions of people said the same thing. We had an incredible membership increase last year and people were telling us that the three top reasons for going paddling were to enjoy nature and the outdoors, because they just loved being near the water, and simply to relax and de-stress.[84]

47. Both sewage and agricultural pollution can contaminate rivers with biological material that pose potential risks to swimmers, canoeists, paddlers and pets. Yet many river users are unaware of the health risks that swimming in polluted rivers can bring. The Chief Executive of Swim England, Jane Nickerson, told us that around half of the people it surveyed did not even know that untreated sewage was discharged into rivers:[85]

78 Surfers Against Sewage (WQR0031);
79 Swim England (WQR0032)
80 Q104, Jane Nickerson, 21 April 2021
81 Professor Nigel Watson (Geography and Environmental Management, Lancaster University) (WQR0007)
82 Outdoor Swimmer, *Trends in Outdoor Swimming Report*, 2021
83 Surfers Against Sewage (WQR0031)
84 Q107, Ben Seal, 21 April 2021
85 Q115, Jane Nickerson, 21 April 2021

> Most people who go swimming in the water, in the open water, do not realise the risks they are taking.… It would not make you that happy if you knew what you were swimming in. It really would not, and people do not know, and that is what worries me.[86]

Ben Seal asked why it was acceptable to pollute rivers in this way:

> [M]illions of people use our waterways to relax and unwind, and we would never in a million years accept this on our football pitches, our cricket pitches, our tennis courts or our footpaths, but we seem to be able to accept it is okay to tip raw sewage into the places where millions of people play. I personally find that quite frustrating, especially as it has an impact on where I paddle with my children. It is a real frustration for a lot of paddlers, and concern is growing.[87]

Public health risks from pollution

48. Surfers Against Sewage said that poor water quality was a public health issue, 'putting water users at risk of exposure to harmful viruses and antimicrobial resistant bacteria causing sickness, distress and in some cases, long-term health effects.'[88] Amy Slack, the organisation's head of campaigns and policy, said:

> The quality of the water with the threats of antimicrobial resistance, the threat of E.coli, the threat of intestinal enterococci are similar as a result of diffuse pollution and sewage pollution whether you are using the sea or the inland waterways.[89]

There was no 'monitoring in river environments in the way that we do on the coast because there is not a legal obligation to do that in the same way.'[90] British Canoeing said that since only one river in England held Bathing Water Status, which entailed monitoring of water for bacterial levels, the vast majority of recreational river users were unable to make an informed choice about where and when they paddle to avoid sewage pollution. Swim England argued that, without improved data, swimmers wishing to swim in on stretches of river not classified as designated 'bathing waters' were unable to make an informed decision on where to swim safely.

49. We heard anecdotal evidence of river users falling ill after swimming in rivers. Professor Becky Malby described how river users had been taken ill after swimming in the River Wharfe near Ilkley, the one stretch of river in England which has since been designated as bathing water:

> The EA was saying: 'the water is good enough to drink, Becky.' I would go, 'Is it really? I do not want to drink it.' We knew that kids were sick and missing school. We knew that local people who tend to swim, paddle and play downstream of the sewage works were getting ill in the summer. We did a bit of a campaign on Facebook to find out how often, and we had masses

86 Q104, Jane Nickerson, 21 April 2021
87 Q105, Ben Seal, 21 April 2021
88 Surfers Against Sewage (WQR0031)
89 Q40, Amy Slack, 10 March 2021
90 *Ibid.*

> of responses. Then Professor Rick Battarbee instigated the first citizen science approach in this country, because the Environment Agency does not measure faecal bacteria. It does not measure the E. coli and enterococci, the things that make humans and animals sick if they go near the river. The stuff that comes out of our toilets.[91]

Jane Nickerson, of Swim England, was worried that most people did not know that the water they were swimming in could potentially make them ill:

> We know that it causes mild and serious illnesses. It is difficult to prove. You go swimming, you get a funny tummy. Is that because you went swimming or is it something you ate?[92]

Ben Seal from British Canoeing recounted that:

> … paddlers in Burton who train every morning in their race boats, […] are paddling among brown foam and solids. I have heard from paddlers on the Yorkshire Derwent who have become seriously ill, on a river that is supposed to be a SSSI.[93]

Antimicrobial resistance

50. We heard that sewage treatment works and the rivers they discharge into were becoming breeding grounds for antimicrobial resistance. A study of UK coastal waters found that 11 of 97 waters sampled contained E. coli resistant to antibiotics.[94] Surfers Against Sewage cited a study which had found that surfers were three times more likely than non-surfers to have antibiotic-resistant bacteria in their gut.[95] Professor Peter Hammond vividly described how antimicrobial resistance could develop in waste water:

> If you think about what is going into the sewage treatment works—all the drugs and the bugs that we have are going in, all the effluent from hospitals, the chemotherapeutic drugs and all these chemicals from cleaning products—it forms a kind of soup that is very good for encouraging genetic mutations in the bugs, which helps them resist the effect of the antimicrobials we have now.[96]

Antimicrobial resistance (AMR) refers to the intrinsic or acquired ability of microorganisms to resist the effects of otherwise inhibitory chemicals. Acquired AMR is at the core of the global increase in drug-resistant infections, which is already costing the NHS an estimated £30 billion per year.[97]

51. Dr Andrew Singer, Senior Pollution Scientist at the UK Centre for Ecology and Hydrology, explained that antimicrobials (antivirals, antibacterials, antifungals, antiprotozoals, anthelmintics) represented only a fraction of all chemicals known to select for, or aid, resistance with antimicrobial resistance-driving chemicals (ARDCs), including

91 Q66, Becky Malby, 21 April 2021
92 Q104, Jane Nickerson, 21 April 2021
93 Q105, Ben Seal, 21 April 2021. SSSIs are Sites of Special Scientific Interest.
94 Leonard et al, 2018, Exposure to and colonisation by antibiotic-resistant E. coli in UK coastal water users
95 Q39, Amy Slack, 10 March 2021
96 Q100, Professor Peter Hammond, 21 April 2021
97 Dr Andrew Singer (WQR0092)

metals, biocides, pesticides and many other environmental pollutants.[98] Concentrations of ARDCs that do not kill bacteria are sufficient to select for antimicrobial resistant genes (ARGs).[99]

52. Even when wastewater is treated it still contains many tens to hundreds of thousands of ARGs per litre, according to Dr Singer: approximately 11 billion are released into UK waters per day.[100] Agricultural sources of ARDCs and ARGs are also substantial in some catchments, where animal waste is introduced directly or indirectly into freshwaters.[101] Given the thousands of wastewater treatment plants across the country and the low degree of dilution that this effluent can receive during dry weather periods in many English rivers, Dr Singer suggested that wastewater treatment needed to be improved to minimise the impact of ARDCs and ARGs in freshwaters and the transmission risks it poses to animals and humans.[102]

53. DEFRA has set up a multi-agency project to examine pathogens in agriculture, food and the environment, which will include a workstream to investigate antimicrobial resistance in waters in two river catchments.[103]

Our view

54. **We have heard disturbing evidence that sewage treatment works and the rivers that they discharge into are becoming breeding grounds for antimicrobial resistance. There will need to be cross-sector collaboration to reduce the growth of antimicrobial resistance genes in rivers.** ***Following the work streams of the Pathogen Surveillance in Agriculture, Food and the Environment programme on antimicrobial resistance, we recommend that the Government bring together farming groups and water companies to decide on a programme of action to reduce opportunities for resistance to develop in the water environment.***

55. **We welcome the Environment Act's inclusion of a requirement on water companies to reduce the impact on public health of sewage discharges.** ***We recommend that this includes consideration of antimicrobial resistance.***

2.2 Designating rivers as bathing waters

56. In December 2020, a stretch of the River Wharfe in Ilkley popular with swimmers became the first river site in the UK to be designated by the Secretary of State for Environment, Food and Rural Affairs as a 'bathing water'.[104] Designation of bathing waters in England had hitherto been restricted to coastal locations. Other countries have designated a greater number of stretches of river as bathing water: for example, there are 32 bathing water stretches in rivers in Germany, 76 in Poland and 420 in France.[105]

98 *Ibid.*
99 *Ibid.*
100 *Ibid.*
101 *Ibid.*
102 *Ibid.*
103 Official Report (House of Lords), 1 December 2021, col. 1340.
104 Gov.uk, Ilkley gets green light for first river bathing site in England, 22 December 2020
105 Salmon and Trout Conservation, Time to Fix the Broken Water Sector, September 2021

57. The designation of a stretch of the Wharfe followed a local campaign against sewage discharges into the river, to which we were told the Environment Agency had initially responded quite dismissively. Ilkley resident Professor Becky Malby, who played a prominent role in the campaign, told us that 'our visiting tourists and our public were sitting among sewage solids—condoms, tampons, sanitary towels, wet wipes—and human solids without realising it.'[106] She and her fellow local campaigners had 'obviously [been] horrified' upon discovering that sewage was being discharged straight into the river.[107] She described the response she and local campaigners received when they raised it with the Environment Agency:

> We assumed that this was not a regular occurrence. The volume of sewage that we were seeing in the rivers was something that people did not know about, and when we first approached the Environment Agency and Yorkshire Water there was a narrative. The narrative was, 'The public know we do this, it is just common.' And, 'We cannot afford to do anything about it, so what is the problem? You do not want to pay any more money.' That was the underlying culture. We said, 'The public do not know about this and would be absolutely horrified.' […] What the Environment Agency was telling us at the time was the water quality is good, the sewage is not spilling very much.[108]

58. The Secretary of State is responsible for designating sites as bathing waters. Applications for designation are usually submitted by local authorities or made with the support of the relevant local authority.[109] The Environment Agency says that, following the designation of the River Wharfe in Ilkley:

> More applications may be received in the future as interest in wild swimming continues to increase. Whilst there are costs associated with designating inland bathing waters, there will also be benefits, including an improved amenity value of the local environment. We will help achieve society's ambitions for inland bathing waters.[110]

The Agency pointed out that:

> Until now, river water quality standards have been set to protect wildlife rather than for public health protection. Controlling levels of faecal indicator organisms (bacteria) to meet standards set by the Bathing Water Regulations inland will require significant planning and investment.[111]

Bathing water bacteriological standards

59. The designation of a stetch of the Wharfe has meant that since May 2021 the Environment Agency has been required to test the water in the designated stretch during the bathing season to determine the level of faecal pollution at the site.[112] We understand

106 Q65, Becky Malby, 21 April 2021
107 *Ibid.*
108 *Ibid.*
109 Department for Environment, Food and Rural Affairs (DEFRA) (WQR0028)
110 Environment Agency (WQR0029)
111 *Ibid.*
112 *Ibid.*

that the designation of a stretch of river as bathing water entails testing at least twenty times a year in season (between 15th May and 30th September), at an estimated cost of around £45 per monitoring sample, including staff and laboratory time. When a designated bathing water is classed as 'excellent' the number of monitoring visits can be reduced.[113]

60. The Bathing Water Regulations 2013 specify values for faecal bacteria—such as intestinal enterococci and E.coli—for bathing water classification in inland waters.[114] The use of bacteria levels as the main indicator for river water quality in bathing waters suggests that the standard reflects public health concerns rather than environmental ones. Surfers Against Sewage argued that the existing bathing water testing regime

> has myriad flaws. At present the regime does not measure for emerging pollutants such as antimicrobial resistant bacteria or microplastics. The limited bathing water season and sampling days means just 20 out of 153 days in the season are monitored. Shockingly an optional provision within the Water Framework Directive has allowed 1 in 7 samples to be discounted in 2019 meaning potentially 65 bathing waters in England achieved a higher quality rating then they should.[115]

Potential outcome from designation

61. The Rivers Trust says that designation of stretches of river as bathing waters 'could drive action to clean up pollution from all sources, including water company assets, private sewerage, agriculture, road run-off and minewater.'[116] Surfers Against Sewage said that 'the legal obligation that is placed on water companies to improve water quality when a bathing water is officially designated has triggered huge improvements in coastal water quality'.[117] It said that 98.5% of the 625 designated bathing waters in the UK are now classed as excellent, good or sufficient, when in 1990 just 27% met the same standards.[118] Amy Slack remarked that 'there is a real opportunity for us to take our rivers on a similar journey'.[119]

62. Wildlife and Countryside Link said the Government should consider designating a minimum of two inland bathing waters every year. Protecting and enhancing water quality for people by designating rivers as fit for bathing should complement increased investment to bring more water bodies to good ecological status. Bathing water would bring wider benefits 'through community health and wellbeing, enhanced quality of life, and tourism.'[120]

63. Guy Linley-Adams, of Salmon and Trout Conservation, argued that designation of the River Wye as bathing water would help to drive the investment necessary to improve its water quality:

> People swim near me; I am in Herefordshire. They swim on the Lugg, the Wye, the Arrow, the Teme […]. The Wye is a navigable river under order

113 Environment Agency briefing conversation with Committee specialists, 17 June 2021
114 Legislation.gov.uk, The Bathing Water Regulations 2013 (SI 2013/1675)
115 Surfers Against Sewage (WRQ0031)
116 Rivers Trust (WQR0043)
117 Surfers Against Sewage (WRQ0031)
118 *Ibid.*
119 Q41, Amy Slack, 10 March 2021
120 Wildlife and Countryside Link (WQR0077)

> of Parliament, all 100 miles of it, from Hay-on-Wye down to Chepstow. It is used for all sorts of water sports, not just swimming; fishing, canoeing paddle boarding, the lot. There is no reason why that whole river should not be designated as an inland bathing water. That would drive the investment that is required to clean up … the Wye.[121]

Costs of achieving bathing water status

64. Professor Nigel Watson, Professor of Geography and Environmental Management at the University of Lancaster, observed that the focus on coastal bathing water quality in the 1990s 'did bring about significant investment from water companies and improvements to beaches, some of which now benefit from Blue Flag status.' He pointed out that

> It should be anticipated that water prices would need to increase substantially in the same way that they did in the 1990s and early 2000s to provide the necessary investment, assuming the water industry structure remains as it is at present.[122]

Thames Water welcomed the ambition to designate more rivers, but warned that it was:

> one that would put significant upward pressure on bills. Meeting water quality standards suitable for swimming requires extensive pre-treatment of effluent as well as ultraviolet treatment, both at a very significant cost.[123]

65. The National Farmers Union (NFU) also expressed concerns. It said that 'a designation may attract more tourists and boost the local economy' but for local farmers there may be 'costs associated with greater use of a designated site, such as more trespass, litter and anti-social behaviour on nearby land'.[124] It also argued that, as a consequence of designation, 'farmers may be expected to take additional measures in the short and medium term' whereas water companies could plan years ahead through the price review process.[125] The NFU called on the Government to consider the costs and benefits of designations:

> Perhaps there is a more fundamental question to be asked; having now left the EU, why is the UK Government still considering designations under EU legislation that carry the potential to seriously impact farmers and other local stakeholders? We believe there is now an opportunity to review bathing water legislation to ensure it fully considers the costs and benefits of any designations in the future.[126]

121 Q43, Guy Linley-Adams, 10 March 2021
122 Professor Nigel Watson (Professor of Geography and Environmental Management at Lancaster University) (WQR0007)
123 Thames Water (WQR0047)
124 National Farmers Union (WQR0042)
125 *Ibid.* The price review process for water companies is discussed further at Chapter Six below.
126 *Ibid.*

Industry views on designation

66. Water UK said the industry supported the increased recreational use of rivers through designating more areas as safe for bathing.[127] Several water companies are now working to trial bathing water sections in rivers in their areas. Liv Garfield, chief executive of Severn Trent, explained the work that the company had planned:

> Over the course of the next three and a half years, we will make for the first time ever bathing water quality standard rivers. It is a 49 km stretch and so it is quite a big situation. It is across two areas. One part of it is not far from Ludlow and one part of it is on the River Avon. We have chosen locations where most people can get to easily, where there is a history of people previously wanting to swim there, so there are effectively customers who want to go there and swim, and where we think we can build amenities. Think of Munich or Copenhagen where they have the setup already there. In Munich 1 million a year go and swim and use it almost like a beach on hot days.[128]

Concerns about designation

67. Jo Bradley, of Stormwater Shepherds, disagreed with the strategy of designating stretches of river as bathing waters as a driver for improvement in water quality. She argued that a focus on the designation of rivers as bathing waters could cause stakeholders to focus too heavily on faecal indicators when oxygen depletion, toxic metals, sedimentation of spawning grounds and eutrophication had a far greater impact on aquatic life:

> On the River Wharfe at Ilkley where the river is to be designated for inland bathing, there is huge focus on the CSO spills affecting the river. I don't disagree that the spills from the CSO are unacceptable and happen too frequently, but what about the run-off from the main roads […]—they are not being addressed at all. For the aquatic life, the reduced CSO spills will be excellent, but they also need the road run-off to be addressed to remove the toxic metals and carcinogenic, bio-accumulative compounds from the river. We are allowing ourselves to be distracted from the true purpose of environment protection, by high-profile, headline-catching topics and it is a mistake. We need to refocus on the function of rivers and streams and the life within and around them, and stop trying to appropriate every habitat for human use.[129]

127 Water UK (WQR0075)
128 Q501, Liv Garfield, 13 October 2021
129 Stormwater Shepherds UK (WQR0004)

Our view

68. **Every community in the country should have access to waters—whether coastal or inland—that are safe for people to swim in without running the risk of falling ill. Regulators and water companies have made a great deal of progress since the 1990s in cleaning up and monitoring our coastal waters so that they are fit for bathing. This progress must now be extended to rivers. We welcome the efforts made by those water companies that are already working towards designation of river stretches.**

69. ***We recommend that the Government actively encourage the designation of at least one widely used stretch of river for bathing in each water company area by 2025 at the latest. In their Business Plans for Ofwat's Price Review 24, each water and sewerage company should set out how they intend to work with stakeholders to support further applications for the designation of river bathing waters in their area, and to continue the process in subsequent Price Reviews.***

70. **Most river users cannot currently make informed decisions about when it is safe or not to use rivers downstream of storm overflows and wastewater treatment works. *We recommend as a matter of urgency that the Environment Agency work with water companies to ensure that easily accessible information on sewage discharges in waterways in as near to real time as possible is made available to the public, as now required under the Environment Act 2021. Signage should also be provided at commonly frequented bathing sites downstream from wastewater treatment works with information about how to access the data on recent discharges.***

71. **When deciding on areas for designation, the costs and benefits for local stakeholders should be carefully assessed, with consideration given to the potential impact on land adjacent to bathing waters. *We recommend that DEFRA ensure its Environmental Land Management Scheme supports action by farmers with land adjacent to designated waters to minimise the risk of any faecal contamination from livestock which might pose a risk to bathing water quality.***

72. **Designation of stretches of river as bathing waters will help to drive coordinated action to improve water quality: but achieving rivers safe to swim in is only one aspect of securing an overall improvement in water quality. Designation of bathing waters must therefore go hand in hand with further measures to preserve and improve riverine biodiversity.**

3 Agricultural pollution

73. In this chapter we examine concerns around agricultural pollution in rivers. The impact of diffuse pollution from rural areas is (other than physical modification) the most common factor preventing rivers and other water bodies from achieving good ecological status, affecting 40% of them.[130]

3.1 The contribution of agriculture to poor water quality

74. Sewage overflows were the initial focus of this inquiry because of the egregious nature of the 'point source' pollution they cause. It soon became apparent to us that the effects of diffuse agricultural pollution also needed scrutiny. The use of fertilisers and pesticides and the intensive farming of livestock and poultry can all contribute to poor water quality, as rainfall run-off from farm land carries chemicals and faecal matter into streams and rivers. As soil is eroded, it deposits silt and the phosphates and nitrates contained within it into watercourses. Field drainage can also provide a rapid and direct pathway for nutrients to enter watercourses.[131] Salmon and Trout Conservation told us:

> We believe that [the farming] industry remains the greatest threat to the future health of riverine ecology throughout England, albeit that pollution from sewage treatment works is still a major threat, especially in rural sites where infrastructure investment has been severely lacking.[132]

The Rivers Trust echoed this, arguing that 'the importance of rural diffuse pollution upon water quality needs to be recognised and not addressed in isolation' by our inquiry, 'not least because several pollutants have both urban and rural sources and source apportionment may be required to effectively target measures.'[133]

75. The National Farmers Union (NFU) argued that the under-reporting of sewage pollution incidents, such as in the recent Southern Water case discussed in greater detail below,[134] raised doubts about the apportionment of nutrient pollution attributed to agriculture by the Environment Agency:

> Ofwat's findings [in the Southern Water case] caused some alarm among our members, both in the local area and further afield, and cast further doubt over the apportionment of pollution to different sources. Although we have since received assurances from the EA about the impact on source apportionment in this case, concerns remain around how widespread these practices were, the potential for similar occurrences in the future, and the levels of nutrient pollution assigned to agriculture as a result.[135]

130 HM Government, 25 Year Environment Plan Annual Progress Report: April 2020 to March 2021, October 2021
131 Addiscott, T. & Brockie, D. & Catt, J. & Christian, D. & Harris, G. & Howse, K. & Mirza, N. & Pepper, Tim. Phosphate Losses through Field Drains in a Heavy Cultivated Soil. Journal of Environmental Quality 29, 2000
132 Salmon and Trout Conservation (WQR0002)
133 Rivers Trust (WQR0042)
134 See para 192ff below for a discussion of the case
135 National Farmers Union (WQR0042)

76. Several of the water companies which have provided evidence to us have contended that agricultural pollution plays a greater role in rivers failing to achieve good ecological status than pollution from the water industry. Severn Trent suggested that the most recent Environment Agency analysis of the data on good ecological status of rivers showed that, the total number of Reasons for Not Achieving Good Status attributable to actions of the water industry had fallen by 3.2% from the previous analysis and had been 'consistently reducing'.[136] According to Liv Garfield, chief executive of Severn Trent:

> … while the water sector has improved year on year for the last few years, all of that gap has been eaten up by agriculture, so our rivers have no better quality. We are plateauing but that is because the contribution from agriculture has, importantly, swallowed the investment spent from water companies.[137]

77. South West Water said that, in its region, agriculture was the source of twice the number of issues preventing waters reaching 'good status' as wastewater.[138] In a similar vein, Daniel Johns pointed out that more than 40% of the reasons for not achieving good river water quality status in Anglian Water's region were due to agriculture and rural land management.[139] Sir James Bevan told us in June that 'statistically, the largest sector that is impacting our waters, in one way or another, is the farming sector.'[140]

Pollutants from farming

78. The Environment Agency says that the main pollutants from farming are:

- nutrients such as phosphorus and nitrates;
- chemicals including pesticides, veterinary medicines, and emerging chemicals (such as organic chemicals and antimicrobial resistance found in materials spread to land);
- faecal bacteria and pathogens (all livestock farming and some off-farm wastes are sources);
- soil sediment (both arable and livestock farming are significant sources, and
- microplastics (present in sewage sludge, compost and other organic manures).[141]

79. The Environment Agency identifies the following pressures and impacts on water quality caused by these pollutants:

- eutrophication, which lowers the diversity of plant life in a river;
- silting of fish spawning grounds;
- risks to human health via bathing, water contact sports, and drinking waters;

136 Letter from the Severn Trent Plc Chief Executive, relating to the 13 October Water quality in rivers evidence session, dated 18 October 2021
137 Q410, Liv Garfield, 13 October 2021
138 Pennon/South West Water (WQR0041)
139 Q192, Daniel Johns, 26 May 2021
140 Q217, Sir James Bevan, 23 June 2021
141 Environment Agency, 2021 River Basin Management Plans 2019.

- increased water treatment costs as pesticides have to be removed from drinking water; and
- damage to fisheries, tourism and recreation.[142]

The impact of phosphates and nitrates

80. The chemical elements phosphorus (P) and nitrogen (N) act as nutrients. Compounds containing these elements—phosphates and nitrates—are present in chemical and organic fertilisers such as slurry and in off-farm wastes such as anaerobic digestate and sewage sludge.[143] Although beneficial in balanced quantities, their use can also pollute soil and the water environment when they exceed the capacity of crops and the wider environment to use and process the nutrients. Academic evidence suggests that significant agricultural soil phosphorus surplus poses an increased risk of diffuse pollution to watercourses.[144] Any imbalance between the agricultural input of phosphorus-rich fertiliser, manure and sewage sludge (sometimes referred to as biosolids) and the phosphorus that is harvested in the form of grass and crops results in an accumulation of phosphorus in the soil.[145] Excess phosphorus can then find its way into watercourses when rainfall runs off farmland, soil erodes and groundwater seeps into streams and rivers.

81. As noted in Chapter One, high levels of phosphate account for more water bodies failing to achieve good ecological status than any other water quality pressure.[146] The Environment Agency reports that 55% of river water bodies assessed in England have failed phosphorus standards for good ecological status.[147] High levels of nutrients within water pose a problem, because they cause algal blooms and oxygen depletion, which is harmful to fish, plants and invertebrates living in the river. Phosphorus is the main cause of this eutrophication in freshwater, though excess nitrogen also causes freshwater eutrophication in some settings, for instance in lakes.[148] Feargal Sharkey described the harm caused by phosphates:

> Phosphate is a particularly pernicious chemical. It lasts long term. It does not run down a river into the sea after a heavy storm, it stays around. It elevates the nutrients in the river, which leads to algae growth. That algae in turn reduces the oxygen levels, which physically strangles anything in that river, including fish. Depletion of oxygen levels is one of the main sources of fish kills in this country.[149]

Phosphorus surpluses on farmland

82. Farming practices over the last 70 years have tended to apply surplus phosphate to farmland, thus creating large legacy reserves within the soil.[150] According to the Environment Agency, reductions in fertiliser use over the last 30 years have helped to

142 *Ibid.*
143 *Ibid.*
144 RePhoKUs (WQR0101)
145 *Ibid*
146 Environment Agency, Phosphorus and freshwater eutrophication pressure narrative, October 2019
147 *Ibid.*
148 *Ibid.*
149 Q102, Feargal Sharkey, 21 April 2021
150 Environment Agency, Phosphorus and freshwater eutrophication pressure narrative, October 2019

control phosphorus loadings to water from agricultural sources.[151] There nevertheless remains an annual phosphorus surplus in UK agriculture with greater P inputs (in fertilisers and manures) than that removed via crop and fodder production, so P continues to accumulate in soils.[152] The latest figures available from DEFRA show that there was an annual average gain per hectare of 3.2 kg of phosphorus and 75.9 kg of nitrogen across farmland in England during 2019.[153]

Case study 1: intensive poultry farming in the river Wye catchment

The River Wye flows for 155 miles from the Cambrian Mountains through mid-Wales and Herefordshire down to the Severn Estuary below Chepstow. Its catchment spans much of southern Powys, including part of the Brecon Beacons National Park, and western Herefordshire. The river and the landscape it runs through is recognised as a conservation area and designated as the Wye Valley Area of Outstanding Natural Beauty, containing three Special Areas of Conservation, four National Nature Reserves and more than forty Sites of Special Scientific Interest.[154]

The river is home to many species of fish, birds and mammals, including Atlantic salmon, twaite and allis shad, pike, trout, cormorants, kingfishers, dippers, otters, and the once common, now threatened, water vole.[155] A small population of beavers has recently been introduced on a stretch of the Wye in South Herefordshire to engineer dams naturally with a view to reduce flash flooding.[156] Herefordshire Council told us that in 2020 a damaging algal bloom impacted many miles of the river's ecology:

It started in Llanbister, 231km upstream of the tidal stretch and by the time it reached the lower Wye it was like pea soup. Blanket weed blocked out light and the water became oxygen depleted. Around 70 miles of river lost the protected plant water crowfoot (ranunculus) and therefore fish and invertebrate life were impacted as river keepers reported widespread loss of cygnets from starvation. Hardly any of this ranunculus came back in 2021 and as a consequence the river remains devoid of the natural and diverse ecosystem that we deserve.[157]

Research has shown the reddish silty soils that dominate the catchment are naturally phosphorus-rich and disperse easily during rainfall events leading to high rates of phosphorus loss.[158] Much of the Upper Wye catchment is rural and until recently has been predominantly farmed for sheep and cattle. Since the turn of the millennium there has been an expansion of poultry farms in the area.

Poor water quality in the River Wye has been linked to agricultural pollution from poultry farming this was a focus of concern in a number of submissions to our inquiry.[159] We discussed the issue with the National Farmers Union, the Country Landowners Association and the Minister for Nature Recovery and the Domestic Environment, Rebecca Pow MP.[160]

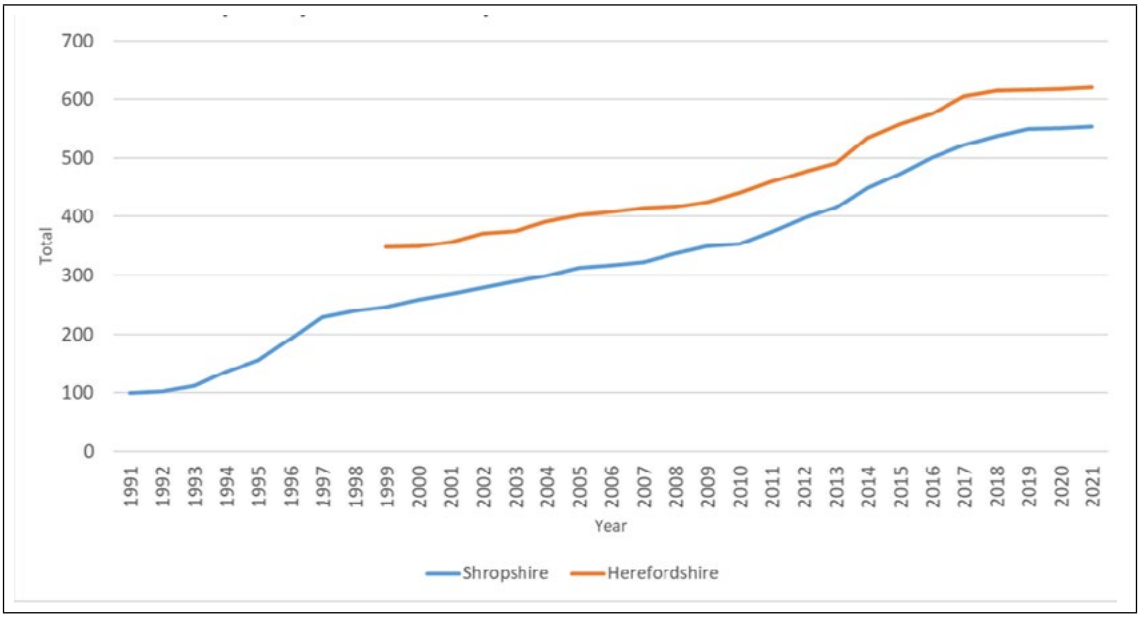
151 *Ibid.*
152 RePhoKUs (WQR0101)
153 DEFRA, Soil Nutrient Balances Regional Estimates for England, 2019 (Provisional), May 2021
154 Angela Jones, Wild Swimming the River Wye, April 2021
155 *Ibid.*
156 *Ibid.*
157 Letter to the Chair from the Leader of Herefordshire Council, concerning water quality in rivers, dated 5 October 2021
158 RePhoKUs (WQR0101)
159 Marinet Limited (WQR0014); River Action (WQR0044); Friends of the Upper Wye (WQR0094); The Food, Farming and Countryside Commission (WQR0098); RePhoKUs (WQR0101)
160 See transcript for 5th Water Quality in Rivers evidence session held on 15 September 2021

The number of intensive poultry units in Herefordshire and Shropshire has increased significantly since 2000. The number of poultry sheds in Herefordshire and Shropshire has risen from about 600 in 2000 to over 1150 in 2020.[161] For example, an additional 90 intensive poultry unit (IPU) 'sheds' were added to a plant in Hereford in 2014.[162] According to the FFCC, newly-constructed sheds have nearly twice the capacity they had in the 1980s and 1990s: new sheds now hold over 50,000 birds.[163] Over 150 new intensive poultry developments have been granted planning permission in Powys (in Wales) in the last five years, according to the citizen science volunteer campaign group the Friends of the Upper Wye (FOUW). Campaigners estimate that there are 20 million farmed birds on premises in the Wye catchment and millions more in neighbouring catchments, including the River Severn catchment.[164]

3.2 Animal farming

83. We heard that practices associated with the farming of outdoor and indoor reared animals could contribute to river pollution.[165] The Food, Farming and Countryside Commission (FFCC) argued that 'intensive livestock operations have been allowed to proliferate with little regard to the cumulative impacts generated from the associated volumes of manure'.[166]

Figure 2: Total numbers of poultry sheds in Shropshire and Herefordshire, 1991–2021



Source: The Food, Farming and Countryside Commission (WQR0098)

161 The Food, Farming and Countryside Commission (WQR0098)
162 *Ibid.*
163 *Ibid.*
164 Friends of the Upper Wye (WQR0094); The Food, Farming and Countryside Commission (WQR0098)
165 Marinet (WQR0080); The Food, Farming and Countryside Commission (WQR0098); RePhoKUs (WQR0101)
166 The Food, Farming and Countryside Commission (WQR0098)

Phosphorus loads and water quality in the Wye catchment

84. The Role of Phosphorus in the Resilience and Sustainability of the UK Food System project (RePhoKUs)—a collaboration between the Universities of Lancaster and Leeds—is using the Wye as one of its study catchments. RePhoKUs calculates that the agricultural input of phosphorus (via fertilisers, manure and biosolids) exceeds the harvested phosphorus offtake (taken up in grass and crops) by 3000 tonnes every year in the Wye catchment, equivalent to 17 kilograms per hectare.[167] This is creating a net annual gain of phosphorus accumulating in soils and river sediments in the Wye catchment. FOUW said that earlier (lower) estimates of the net gain were equivalent to 1.5 million tonnes of cattle farmyard manure or 500,000 tonnes of poultry manure being spread over and above the crop and grass requirements every year:

> Currently that extra phosphorus is being spread on the land in the catchment as fertiliser, but the excessive quantity of phosphorus means the Wye is experiencing devastating algal blooms along the length of the whole river, as phosphate leaches from the soils as the soil concentration of phosphate increases.[168]

Sources of surplus phosphorus

85. According to Paul Withers, Professor of Catchment Biogeochemistry at Lancaster University, the phosphorus surplus in the Wye catchment is nearly 60% greater than the national average, and is driven by the large amounts of livestock manure being produced locally.[169] FOUW says that over two thirds of the phosphorus pollution in the river Wye catchment (in Wales and the English border counties) comes from agriculture.[170] The RePhoKUs project states that poultry is now the dominant livestock sector driving phosphorus flows in the catchment, estimating the percentage contribution of various types of livestock to the manure loading in the catchment as follows: cattle (27%), poultry (42%), sheep (28%), pigs (1%), other (1%).[171]

86. FOUW explained how phosphate can enter rivers from poultry farms:

> At free-range egg units, particularly prevalent on the sloping Welsh hills, birds defecate directly on the ground around the sheds and that washes directly into local watercourses when it rains. For all poultry units, the resultant manure collected from inside the sheds is spread on surrounding land, and when it rains there will be run off into soil and rivers. Some of it leaks from storage facilities and heaps. The major issue is the overall quantity of manure in the catchment being more than the land can absorb, and more than the grassland or crops need to grow. That excess nutrient will reside in the soil and enter watercourses through leaching or soil erosion—another major problem in the Wye catchment due to poor land management.[172]

167 The RePhoKUs Project (WQR0104)
168 Friends of the Upper Wye (WQR0094)
169 The RePhoKUs Project (WQR0101)
170 Friends of the Upper Wye (WQR0094)
171 The RePhoKUs project (addendum to previous evidence with updated figures) (WQR0104)
172 Friends of the Upper Wye (WQR0094)

They cited Environment Agency modelling that gives the following percentages for the sources of phosphate load:

- Upper Wye sub-catchment: 66% agriculture, 25% sewage, 9% other;
- River Lugg sub-catchment: 66% agriculture, 25% sewage, 9% other; and
- Lower Wye sub-catchment: 61% agriculture, 33% sewage, 6% other.[173]

87. A comparison of phosphorus concentrations in the Wye against water quality targets, carried out by the Welsh environmental regulator Natural Resources Wales, highlighted widespread failures, some of them sizeable. Fourteen water bodies passed their targets, 28 failed and the outcome from a further three was unknown. Water bodies achieving their phosphate targets were in the Upper Wye whereas all of the downstream tributaries to the Middle Wye failed their targets.[174]

A causal connection?

88. The Chair of the NFU Environment Forum, Richard Bramley, disputed the link between high phosphorous concentrations in the Wye catchment and the poultry farms in the area.[175] While the link between the expansion of poultry farms in the Wye catchment and water quality issues 'might seem plausible', it was 'just not supported by recent and reliable evidence.'[176] The NFU cited an assessment published by Natural Resources Wales in January 2021 which stated that 'the overall pattern of failures in the Wye does not support the hypothesis that poultry units are the main or even a particularly important reason for nutrient failures on the Wye'.[177] The Natural Resources Wales assessment cited states that 'an investigation of nutrient sources in the Upper Wye is needed that takes into account all potential nutrient sources, including smaller local sewage treatment works which may not have been included in previous work.'[178]

89. The RePhoKUs project confirmed that a direct causal connection had not been evidenced in the Wye:

> While clear evidence of positive links between annual catchment P input pressure (and P surplus) and river P concentrations and fluxes exists at the regional scale across Great Britain, and at sub-catchment scales in Northern Ireland (NI), evidence of this link across the Wye catchment has not yet been found.[179]

Professor Withers, RePhoKus project leader, did not consider the Environment Agency/ Natural Resources Wales water quality monitoring programmes adequate to capture the impact on river water quality of short-term or small area changes in agricultural practice.[180] He also argued that agricensus data was not of a sufficiently fine resolution to accurately to

173 *Ibid.*
174 Natural Resources Wales, Compliance Assessment of the River Wye SAC Against Phosphorus Targets [Date accessed 16 November 2021]
175 National Farmers Union supplementary evidence (WQR0099)
176 *Ibid.*
177 Cited in: National Farmers Union supplementary evidence (WQR0099); Original source: Natural Resources Wales, Compliance Assessment of Welsh River SACs against Phosphorus Targets, January 2021
178 Natural Resources Wales, Compliance Assessment of Welsh River SACs against Phosphorus Targets, January 2021
179 The RePhoKUs Project (WQR0101)
180 *Ibid.*

quantify the spatial distribution of phosphorus inputs within catchments. These problems confound the provision of robust evidence on cause and effect.[181] Friends of the Upper Wye questioned whether Natural Resources Wales had looked for a direct connection:

> The agencies need to monitor upstream and downstream of all potential pollution sources (including land to which arising manures will be spread) and build a smart picture of where phosphorus is entering our rivers. Instead, the agencies monitor once a month (at most) at just a few points along the main river and neglect almost all small streams and tributaries.[182]

Planning applications for new poultry units

90. Friends of the Upper Wye claimed that there had been a failure by the planning authorities involved to consider properly the cumulative effects of agricultural developments in driving the recent surge of diffuse pollution entering the river:[183]

> Planning permission should not have been granted for so many animals in a sensitive catchment—cumulative impacts of these developments on water quality weren't accounted for or correctly assessed. Most manure management plans focus on nitrates without mentioning phosphates and, even then, these plans weren't properly scrutinised, let alone checked for compliance after units were approved.[184]

91. The Food, Farming and Countryside Commission (FFCC) told us that only 18 planning applications for intensive poultry units had been refused in Herefordshire and Shropshire between 2000 and 2020, with 164 and 184 successful planning applications in each respective county in the same period.[185] FFCC point out that 'as IPUs are defined as agricultural they avoid policies which would prohibit similar industrial development in rural, green field sites.'[186]

92. The FFCC argued for a planning moratorium on new intensive livestock operations, calling for agricultural financial support to be directed to supporting less intensive livestock farming systems.[187] FOUW says that its analysis of manure management plans submitted to planning applications in the Wye catchment that have now been granted found that:

> the phosphate spreading rate in the approved plans is around 150 kg of phosphorus per hectare per year, whilst even a low P index soil growing an aggressive two cuts of silage and a maize crop will only require phosphate application to the tune of 100 kgP/ha/y.[…] This shows that many developments recently approved for construction will be routinely over-fertilising land by using it for excess manure or digestate disposal. FOUW

181 *Ibid.*
182 Friends of the Upper Wye (WQR0094)
183 *Ibid.*
184 *Ibid.*
185 The Food, Farming and Countryside Commission (WQR0098), citing research produced by Alison Caffyn
186 *Ibid.*
187 *Ibid.*

> have never seen the results of a soil phosphate test published in a manure management plan, a pre-requisite to calculating phosphorus requirements for crops.[188]

93. Asked whether there should be a cumulative nutrient impact assessment before new pig or poultry units were consented to, the NFU's Richard Bramley responded that any assessment of the best use of the nutrients farmers were trying to recycle in the UK would be extremely valuable.[189] Asked about the situation on the Wye, he said that the local farmers he had spoken to were

> … very aware of the situation. They are very aware of their responsibilities. […T]he initiatives they are developing […] are based specifically around making sure we are not overloading nutrients on land that is going to be running into the Wye. They are in the process of exporting a lot of the valuable organic manures further afield. It obviously all has huge cost implications for a business, but […] it is understood there is an issue of responsibility there for farmers in that area. That is progress.[190]

94. Susan Twining, Chief Land Use Policy Adviser at the Country Land and Business Association, said that to reduce the risk of pollution it was important to plan how to use land to manage manures:[191]

> It is about having sufficient land to be able to apply manures and slurries at a rate that is acceptable that does not cause significant risk to water, which is the key. It is making sure you have sufficient land at the right time.[192]

She added that there was a lot of collaborative work going on in the Wye area, and cited the RePhoKUs project. She argued:

> Many of the landowners in that area and the farmers are working together to try to find a resolution that works for everybody. That may include looking at limits in the future, but I think there are possibly steps beforehand that could be taken, which might not have such a big impact on the local economy.[193]

95. Historic overapplication appears to have resulted in large legacy phosphorus reserves in the soil of the Wye catchment, posing a risk of phosphorus from soil running off into river waters. Reducing these legacy phosphorus reserves would require the catchment to be in a negative P balance, requiring major changes to current practice.[194] RePhoKUs have argued that bringing the Wye catchment into a net-zero phosphorus balance would require significant change in practice on phosphorus use roughly equivalent to ceasing to apply fertiliser and only applying half the level of poultry manure currently in use.

188 Friends of the Upper Wye (WQR0094)
189 Q294, Richard Bramley, 15 September 2021
190 Q293, Richard Bramley, 15 September 2021
191 Q295, Susan Twining, 15 September 2021
192 Q298, Susan Twining, 15 September 2021
193 Q295, Susan Twining, 15 September 2021
194 The RePhoKUs Project (WQR0101)

Nutrient neutrality

96. Soil nutrient balances provide a method for estimating the annual nutrient loadings of nitrogen and phosphorus to agricultural soils. The nutrient balances are used as a high-level indicator of the pressure on the environment from agricultural practices, and of how that pressure is changing over time.

97. DEFRA publishes annual estimates of soil nutrient balances across England.[195] This provides a method for estimating the annual nutrient loadings of nitrogen and phosphorus to agricultural soils, and an indication of the potential risk associated with losses of nutrients to the wider environment, which can have an impact on air and water quality and on climate change. The estimates for 2019 published in 2021 show that there were net gains of phosphorus in 5 of the 8 regions of England and net gains of nitrogen in every region.[196]

98. Minister Pow told us that the Government was developing the idea of nutrient neutrality, which would have to be applied before new developments are allowed 'whether it is a new chicken unit or a new housing development.'[197]

Table 2: Provisional estimates from DEFRA for the nitrogen and phosphorus balances in English regions in kilogram of nutrient per hectare (2019)

Region	Kilogram of nitrogen per hectare	Kilogram of phosphorus per hectare
North West	+111.4	+10.2
South West	+110.3	+9.0
West Midlands	+107.2	+8.2
Yorkshire and the Humber	+71.2	+2.8
East Midlands	+65.7	+0.7
South East and London	+48.8	-1.2
North East	+43.8	-0.7
East of England	+34.9	-4.8
ENGLAND	+75.9	+3.2

Source: DEFRA, Soil Nutrient Balances Regional Estimates for England, 2019 (Provisional), May 2021

99. The Environment Agency, in partnership with Natural England, developed a Nutrient Management Plan in 2014 for the River Wye Special Area of Conservation following consultation with stakeholders. Following a 2018 ruling of the European Court of Justice on the implementation of the Habitats Directive, which clarified that where a site is already exceeding its environmental limits, further nutrient inputs must be 'necessarily limited', the Environment Agency, Natural Resources Wales and Natural England have taken stronger action to reduce new phosphate inputs in the catchment, stipulating that plans and projects that increase phosphate discharges into failing parts of the River Wye Special Area of Conservation have adverse effects on the integrity of the site and thus cannot proceed unless they provide their own mitigation—that is, unless

195 DEFRA, Soil Nutrient Balances Regional Estimates for England, 2019 (Provisional), May 2021
196 *Ibid.*
197 Q373, Rebecca Pow MP, 15 September 2021

they are nutrient neutral.[198] Herefordshire Council raised concerns with us over this approach, acknowledging the devastating impact on the Wye of algal blooms, but also warning of the negative impact that current planning restrictions were having on housing development in the area.[199]

100. We will return to the potential contribution of nutrient neutrality to catchment-based approaches to water quality in Chapter Six below.

Potential mitigations

101. One potential mitigation to reduce phosphorous and nitrogen loadings in particular catchments is to transport manure from livestock farms to arable farms in other parts of the country. This could remove phosphorus from the high surplus areas and reduce the amounts entering freshwater ecosystems. Our predecessor committee recommended that the Government undertake research into the feasibility of livestock manure as a biofertiliser, which can be transported to arable farms to reduce dependency upon artificial fertilisers.[200] We nevertheless note the limits to the potential for balancing nutrient loads in this way, given the scale of legacy reserves and the continued net phosphorus gains being made on agricultural land in most regions of England.

102. Many farmers send manure to anaerobic digestion (AD) units to generate renewable energy and produce digestate byproduct to spread on land as a fertiliser. According to the FFCC, there are 30 such units in Herefordshire and Shropshire alone, mostly sited at poultry units.[201] Companies are developing ways to turn anaerobic digestate cake into high-grade compound fertiliser and applying the similar techniques for the sewage sector capturing waste Phosphorous and Ammonia, currently being discharged into watercourses, to integrate the nutrients into bio-solid fertiliser.[202]

103. Nitrogen and phosphorus are transformed by the microbial processes involved in anaerobic digestion, but these nutrients are not destroyed. A negligible amount of nitrogen may be emitted as ammonia gas during the process, but the majority of the phosphorus and nitrogen remain in the digestate sludge and liquid effluent.[203] This is 'another disconnect in the process' according to the FFCC, and 'not taken into account in cumulative impacts'.[204] The Friends of the Upper Wye also claim that there are pollution incidents and fish kills linked to an anaerobic digester unit on the river Llynfi, a tributary to the Wye.[205]

198 Natural Resources Wales, Environment Agency and Natural England, River Wye SAC Nutrient Management Plan Phosphate Action Plan, November 2021

199 Letter to the Chair from the Leader of Herefordshire Council, concerning water quality in rivers, dated 5 October 2021

200 Environmental Audit Committee, *UK Progress on Reducing Nitrate Pollution,* Eleventh Report of Session 2017–19, HC 656

201 The Food, Farming and Countryside Commission (WQR0098)

202 See, for example, CCM Technologies, Technology Focus Areas [Date accessed 22 December 2021]

203 NRCS, Manure Chemistry – Nitrogen, Phosphorus, & Carbon, 2007; Penn state extension, Fate of Nutrients and Pathogens During Anaerobic Digestion of Dairy Manure, September 2012; Friends of the Upper Wye (WQR0094)

204 The Food, Farming and Countryside Commission (FFCC) (WQR0098)

205 Friends of the Upper Wye (WQR0094)

104. Other potential mitigations include reductions in livestock numbers, reductions in the phosphorus content of animal feed, and removal of nutrient enriched sediments from drains and ditches.[206]

Net zero for phosphorus

105. RePhoKUs advised Government and regulators to direct governance measures towards achieving net zero phosphorus surpluses at catchment and regional scale: this could be achieved by better enforcement and support of existing regulations and guidance, such as the existing Farming Rules for Water, which are discussed further below.[207] Richard Bramley said there was merit in the idea of balancing nutrient use,[208] though the NFU also warned that the ability to source food locally—with its associated environmental benefits in terms of reduced carbon emission—might be made more difficult if other land users were to take land out of agricultural production to offset water pollution issues.[209] Richard Bramley said that sewage sludge was always tested for its chemical content and further suggested that progress was being made on measuring and managing nutrient loads:

> Farm assurance [certification] as well involves regular testing of land in order to address nutrient balance, nutrient management planning and Nitrogen Vulnerable Zone calculations as well in order to make sure you do not over-apply nitrogen. [… I]n the last 36 years there has been a 69% reduction in the amount of phosphates applied to land and a 42% decline in the amount of nitrogen.[210]

We discuss the idea of catchment wide nutrient budgets further in Chapter Six.

Our view

106. **Intensive livestock and poultry farming appears to be putting enormous pressure on particular catchments, such as those feeding the river Wye running through Wales and the south-west Midlands. The number of chickens being reared there appears to have increased significantly, and pollution from their waste appears to be finding its way into river waters. The potential impact of intensive agricultural practices on river water quality must be fully acknowledged and the risks mitigated. One means of doing this is through farming which is as sensitive as possible to its effect on water quality in catchments.**

107. **Development of catchment sensitive farming will require calculations of the overall nitrogen and phosphorous load for farmland and river catchments. *We therefore recommend that DEFRA commission a periodic (five yearly) appraisal of catchment-wide nutrient flows across each of the major river catchments in England. Such appraisals should then be used by local authorities and planning authorities to inform decisions on new housing developments and intensive livestock units, taking into account the cumulative impact of such developments on river catchments.***

206 Parliamentary Office of Science and Technology, POSTnote on *Reducing Agricultural Pressures on Freshwater Ecosystems* [in review]
207 The RePhoKUs Project (WQR0101)
208 Q297, Richard Bramley, 15 September 2021
209 NFU (WQR0042), referring to a proposal being made for land use in the Solent.
210 Q319, Richard Bramley, 15 September 2021

108. ***We further recommend that planning authorities in England establish a presumption against granting planning permission for new intensive poultry or other intensive livestock units in catchments where the proposed development would exceed the catchment's nutrient budget, unless evidence is presented of robust mitigation plans in place that are demonstrably effective in reducing the accumulation of phosphate and nitrate loads in soils and river sediments within sensitive areas in the catchment.***

3.3 Guidance and support for farmers

109. The Government and regulators have taken steps aimed at reducing negative impacts of agricultural practices on water quality. The Reduction and Prevention of Agricultural Diffuse Pollution (England) Regulations 2018 came into force in April 2018.[211] DEFRA published the Farming Rules for Water as accompanying guidance: this directed farmers as to the steps they should take to prevent manure, fertiliser and soil entering watercourses.[212]

The Farming Rules for Water

110. The Farming Rules for Water require slurry applications to be planned so as not to exceed the needs of the soil and crop on the land, or to give rise to a significant risk of agricultural diffuse pollution. The rules require farmers to safeguard water quality by judging when it is best to apply fertilisers to meet crop and soil needs, applying best practice in storing manures, and avoiding soil erosion. In summary the rules require farmers to:

- plan the application of organic manures and manufactured fertilisers to meet soil and crop nutrient needs and not exceed these levels;
- take into account significant risks of pollution, such as: sloping land; the proximity to fresh waters, wetlands or coastal waters; the soil type and condition; and the presence and condition of agricultural land drains;
- test phosphorus, potassium, magnesium, pH and nitrogen levels in the soil at least every five years;
- prevent organic manures being stored or applied to land within 10 metres of inland freshwaters or coastal waters; and
- take reasonable precautions to prevent soil erosion from the farming practices employed.[213]

111. In 2018 our predecessor committee examined the progress made in reducing nitrate pollution, an inquiry prompted by water quality and climate concerns. The report of that inquiry welcomed the introduction of the Farming Rules for Water. During that inquiry, some stakeholders suggested that nitrogen and phosphorous budgets should be used in agriculture as a means of restoring balance to nutrient flows in the environment. The Committee called on the Government to explore incentives, such as nitrogen and

211 The Reduction and Prevention of Agricultural Diffuse Pollution (England) Regulations 2018 (SI 2018/151)
212 DEFRA, Farming rules for water – getting full value from fertilisers and soil, updated April 2018
213 *Ibid*

phosphorous budgets and nitrogen pricing, to reduce the use of artificial fertilisers.[214] It said that farming rules must be supported by good advice and information for farmers and other land managers, so as to encourage beneficial behaviours and practices.

112. During the current inquiry, river quality campaigners and water companies have called for increased enforcement of the current Farming Rules for Water, while farming groups have argued that progress on reductions in phosphate levels is being made and have warned of the impact of current regulation on the sector. The NFU has argued that continuing UK compliance with the requirements of the Water Framework Directive ought to be reviewed now that the UK has left the EU, in the light of their impact on farmers.[215]

Slurry storage

113. Much agricultural pollution is diffuse, meaning it comes from many small sources, but poor agricultural practice can also result in concentrated or 'point source' pollution incidents. For example, undersized, damaged or poorly constructed and maintained slurry and silage stores can be significant sources of pollution. Insufficient provision of slurry storage can result in pollution and may also cause farmers to spread slurry at times when restrictions on the practice apply.[216] Susan Twining explained the problem:

> [… S]lurry storage is expensive and you only invest in that maybe once every 20 years or maybe even more in some cases. We know that some of the slurry storage infrastructure on some farms is deteriorating and that is an area that would be ripe for targeting. It has been identified by DEFRA for a slurry investment scheme it is going to be introducing next year to help farmers upgrade. That will be a huge step in helping to minimise both point-source pollution where there are failures that can cause catastrophic problems and also being able to manage and apply the slurries at the right time of the year, when there is less risk to water.[217]

Farm inspections

114. The Environment Agency is responsible for enforcing the Farming Rules for Water and inspecting farms to check on the storage and use of animal waste and slurry. The Agency can take enforcement action and prosecute if rule breaches are not rectified. Fixed penalties of £100 or £300 can be issued as well as 'variable money penalties' of up to £250,000.[218]

214 Environmental Audit Committee, *UK Progress on Reducing Nitrate Pollution,* Eleventh Report of Session 2017–19, HC 656

215 National Farmers Union (WQR0042). The Environment, Food and Rural Affairs Committee has announced its own investigation into disagreements between the Environment Agency and the agricultural sector over the impact of the current Rules on farming practices: see Environment, Food and Rural Affairs Committee news story, MPs investigate farm fertiliser spreading rules, 26 November 2021. The Committee was expected to hold an evidence session on the issue in January 2022.

216 Environment Agency, 2021 River Basin Management Plans, 2019.

217 Q298, Susan Twining, 15 September 2021

218 ENDS Report, Why farmers and environmental groups are at odds over pollution rules, March 2021

115. Concerns were raised with us about the level of enforcement. In England, there had been no fines or prosecutions under the regulations underpinning the Farming Rules for Water,[219] until a dairy farm in North Somerset was ordered to pay out £37,000 in December 2021 for repeated pollution offences blighting a tributary of the Congresbury Yeo.[220] Salmon and Trout Conservation calculated that, at the current Environment Agency inspection rate, farms in England could expect to be inspected once every 263 years.[221] In June 2021 the Environment Agency told us that the majority of breaches to the Farming Rules for Water regulations had been up until that point dealt with mainly through offering 'advice and guidance on how to become compliant'.[222]

116. The FFCC argued that greater resources ought to be devoted to enforcement of existing water and farming regulations.[223] Sir James Bevan conceded that funding reductions had reduced the Environment Agency's ability to police the farming rules:

> [… B]ecause of the reduction in our grant and because most farming is not regulated and, therefore, we do not get income from the cost of regulating farms in those cases, we have been able to do fewer and fewer farm inspections over the last several years. Right now, at least last year, we had sufficient resource that would allow us, in theory, to visit every farm in Britain less than once every 200 years. That is not a great disincentive to a farmer to stay on the right side of the line, so there is an issue about resourcing and about the overall regulatory framework for farming.[224]

Daniel Johns, of Anglian Water, argued that the Environment Agency needed "more boots on the ground to be able to understand what is actually happening with river water quality and, in particular, to police the farming rules for water system."[225]

117. The CLA reported frequent confusion about regulatory requirements among its membership. An engagement exercise among its membership in England in 2021 had revealed that half of its members were aware of the Farming Rules for Water, while most had had no contact with the Environment Agency on water quality rules and regulations.[226] This is supported by findings from the Rivers Trust and from a related academic study showing that poor understanding of existing regulations contribute to low compliance with freshwater policy interventions.[227]

Changes to the Farming Rules for Water

118. Recent regulatory changes affecting the interpretation of the Farming Rules for Water have prompted a reaction from farming organisations. In August 2021 the Environment Agency published Regulatory Policy Statement 252 on how farmers should approach

219 *Ibid*
220 Farming UK, Lye Cross Farm ordered to pay out £37k for pollution offences, 9 December 2021
221 Salmon and Trout Conservation. 2021. Doing its job?
222 'Revealed: no penalties issued under 'useless' English farm pollution laws', *The Guardian*, 12 February 2021
223 The Food, Farming and Countryside Commission (FFCC) (WQR0098)
224 Q226, Sir James Bevan, 23 June 2021
225 Q192, Daniel Johns, 26 May 2021
226 CLA. 2021. A CLA water strategy: A vision for the water environment 2030
227 Rickard, A. et al. (2020). Headlines from The Rivers Trust Feedback on the Government review of the Nitrates and Slurry and Silage Storage Regulations. The Rivers Trust; Inman, A. et al. (2018). An exploration of individual, social and material factors influencing water pollution mitigation behaviours within the farming community. Land Use Policy, Vol 70, 16–26

spreading manures in the autumn of 2021.[228] The statement caused many to believe that the Environment Agency had banned the autumn application of manures, moving to springtime-only application.[229] The NFU challenged the Environment Agency's interpretation of the rules, which it said it had effectively banned spreading manure in the autumn of 2021 and would have severe impacts on cultivation. It said the Environment Agency had "fundamentally failed to recognise the huge amount of additional benefits" organic manures had over manufactured fertilisers.[230]

119. The Environment Agency updated the regulatory statement on 25 August 2021. The updated statement provided a hierarchy that land managers should follow. It also made it clear that if land managers could not comply with the conditions in the statement, the Agency would allow activities during the autumn of 2021 if they were assessed not to cause 'significant risks' of water pollution: such risks might arise from repeated applications to the same field or spreading close to protected sites.[231] However, the Environment Agency also warned that it would take regulatory action where activities resulted in a significant pollution incident.

120. The CLA said that the revised statement represented an improvement, since it now made clear that manure applications were allowed provided certain steps were followed.[232] The NFU said that the updated hierarchy appeared to 'offer more flexibility than before for farmers who cannot comply with Rule 1': it nevertheless insists that the statement be retracted and has called for the enforcement of Rule 1 of the Farming Rules for Water to be suspended until further clarity is received.[233] Susan Twining, of the CLA, said that the Environment Agency had 'completely underestimated' the impact on farmers and that it had 'undermined trust' in the outcomes-based approach that the Farming Rules for Water were supposed to represent.[234] She said that the Environment Agency

> [had] not understood the impact. It has not understood the need for data. It feels wrong. […] Most farmers are trying to do their best and not pollute water. It feels like there has been an assumption they are intent on polluting water, which is just not true. They are trying to balance a lot of different needs around building up soil, organic matter and improving the soil and doing the right thing in using the organic manures. It feels like it is undermining the whole range of progress we have made over the last few years working with the Environment Agency.[235]

228 Gov.uk, Spreading organic manure on agricultural land: RPS 252, issued 3rd August 2021, updated 15 October 2021 [last accessed 11 December 2021]. It applies to Regulation 4(1)(a)(i) of the Reduction and Prevention of Agricultural Diffuse Pollution (England) Regulations 2018. Regulation 4 constitutes Rule 1 of the Farming Rules for Water.

229 Rule 1 of the Farming Rules for Water requires land managers to plan each application of manure or fertiliser to agricultural land so that it does not 'exceed the needs of the soil and crop on that land' or 'give rise to a significant risk of agricultural diffuse pollution'.

230 'Autumn spreading: We need greater clarity and more time', (nfuonline.com) 10 August 2021

231 Environment Agency (Gov.uk), Spreading organic manure on agricultural land: RPS 252, Published 3 August 2021, Last updated 15 October 2021

232 CLA, Clarity over manure spreading guidance

233 NFUonline.com, Farming Rules for Water: Read our latest guidance, updated December 2021

234 Q300, Susan Twining, 15 September 2021

235 *Ibid.*

Use of sewage sludge on agricultural land

121. The sludge that remains in treatment works after waste water treatment is commonly sold to farms to be spread on agricultural land as a fertiliser. Wildlife and Countryside Link argued that increased monitoring of treated sewage sludge was required before it could be spread on agricultural land. Sewage treatment processes can remove a proportion of microplastics from waste water: yet these microplastics are present in high quantities in sewage sludge spread on agricultural land as fertiliser.[236] The NFU said that 'the Government could play an active role in encouraging increased filtration at sewage treatment works to remove both macro- and microplastics, ensuring that any material spread to land would be free from plastic contamination.'.[237]

122. The recent regulatory policy statement affecting the interpretation of the Farming Rules for Water specifies that land managers risk breaching the rules—and must notify the Environment Agency—if they do not have the necessary storage for treated sludge (referred to as biosolids) received from sewage plants and, as a result, spread this waste on cropped land with an application that exceeds the needs of the soil and crop.[238]

Support for farmers to reduce pollution levels in rivers

123. South West Water observed that a combined approach of restoring habitats and working with farmers and landowners could have a sustained positive impact on river water quality. Actions to address sources of agricultural pollution are often relatively small, such as advice from specialists or grants for new concrete yards or barns, but needed to be taken at multiple points across a catchment. South West Water noted that the new Environmental Land Management Scheme (ELMS) payments would be an important means of "addressing agriculture-led catchment improvements for wider river water quality, be that for environment or amenity benefits.".[239] River Action argued that it was essential for farms, especially intensive livestock and poultry units, to have nature-based solutions in place, such as holding lagoons with reed bed filtration, to prevent damaging run-offs, and offered assistance to farmers in the installation of such facilities.[240]

Government assistance to reduce pollution from farms

124. The Government is now increasing the levels of funding available to provide advice to farmers on catchment-sensitive farming and is developing a new Slurry Investment Scheme to help livestock farmers avoid endangering water and air quality.[241] In August 2021 DEFRA announced an additional £17m over the next three years for its Catchment Sensitive Farming Programme.[242] The programme is now to cover 100% of the farmland in England, as opposed to the 40% coverage at present. By March 2023 it is planned that every farmer will have access to advice and to a range of solutions to reduce pollution of water catchments.

236 Wildlife and Countryside Link (WQR0077)
237 National Farmers Union (WQR0042)
238 Environment Agency on Gov.uk, Spreading organic manure on agricultural land: RPS 252, Updated 15 October 2021
239 Pennon/South West Water (WQR0041)
240 River Action (WQR0044)
241 HM Government, 25 Year Environment Plan Annual Progress Report: April 2020 to March 2021, October 2021
242 Funding boost for farmers to tackle water pollution - GOV.UK (www.gov.uk)

Our view

125. **The agricultural sector has a responsibility for improving water quality in rivers, just as the water industry and other stakeholders do. The Farming Rules for Water ought to be amended over time so as to reduce phosphorus surpluses in land and water and thereby improve water quality. This must be done in a way that promotes cooperation from farmers. The Environment Agency must recognise the impact on the sector of rule changes made with insufficient notice or options for mitigation.**

126. **In order to drive down further the excess levels of phosphate and nitrates on agricultural land, annual chemical assessments will be required. Where appropriate, farmers ought to be supported to assess the existing phosphorus and nitrogen status of their land before spreading either farmyard manure or sewage sludge from water companies. The new Environmental Land Management Scheme provides an opportunity to provide financial help to farmers for measures to reduce progressively the input of phosphates and nitrates that cannot be taken up by crops.**

127. ***We recommend that the Environment Agency work with DEFRA to intensify its work in the inspection and, where necessary, remediation of large animal slurry stores. Where remediation is required, funding from the Slurry Investment Fund should be made available to support the work.***

128. **The sewage sludge currently spread on agricultural land contains microplastics which have been caught in the wastewater treatment process. It may also contain e-coli, antibiotics, biocides, persistent chemical pollutants and pharmaceuticals. This practice appears to be the principal means of disposal of biosolids from such processes. If it is to continue, a means must be found to ensure that the microplastics which find their way in to waste water are disposed of safely and not spread over food-growing farmland thereby polluting productive soils. *The Government should commission an independent evaluation of the potential risks to human health and the environment of spreading sewage sludge, with all the pollutants it contains, on farmland.***

129. ***We recommend that the water industry work urgently with the Environment Agency and the farming sector to assess and mitigate the clear risk of microplastic pollution from this practice, and to develop a comprehensive plan for the separation of microplastics from biosolids at wastewater treatment works.***

4 Sewage pollution

130. In this chapter we examine the concerns around sewage pollution in rivers. The impact of wastewater from sewage treatment works and sewer overflows is one of the most common contributors to poor water quality, preventing 36% of water bodies from achieving good ecological status.[243]

4.1 Trends in the use of sewer overflows

131. The sewerage networks operated by water companies frequently discharge untreated and partially-treated sewage into streams and rivers. These discharges are made from overflows at pumping stations, waste water treatment works and other locations on the sewerage network. Overflows are intended to act as safety valves on the sewerage system. Their use is subject to permits granted by the Environment Agency.

132. The Environment Agency has issued permits for nearly 18,000 overflows on the sewerage network in England. These permits cover storm overflows at wastewater treatment works, emergency overflows that operate when there is equipment failure, and so-called combined sewer overflows (CSOs) elsewhere on the network.[244] There are around 15,000 CSOs on the network in England, of which 13,350 discharge to rivers and streams.[245]

133. Without these overflows, sewage could potentially back up into domestic and commercial properties when the sewerage system is overloaded, for instance in periods of heavy rainfall.[246] Overflows are intended to be used infrequently and under exceptional conditions: this is reflected in the permit conditions stipulated by the Environment Agency. Their use nevertheless appears to be increasingly routine, as pressures on the sewerage network grow. Monitoring data seems to show instances where overflows are being triggered at times of low or no rainfall.

134. The number of sewage spills from overflows officially recorded by water companies and reported to the Environment Agency reached 403,171 in 2020, a 27% increase on the 292,864 recorded in 2019.[247] The Environment Agency explains that this increase is partially attributable to increased levels of monitoring: 80% of outflows are now fitted with Event Duration Monitors.[248] The increase in the use of overflows is also often attributed to the failure of sewerage systems to keep pace with ongoing urbanisation, population growth, plastic pollution and the intense rainfall events associated with rising global temperatures.[249]

243 HM Government, 25 Year Environment Plan Annual Progress Report: April 2020 to March 2021, October 2021
244 Personal communication from Environment Agency to Professor Ian Barker, 2019
245 Gov.uk, Storm Overflow Evidence Project Final Report, November 2021
246 Despite this, the Consumer Council for Water reported that in 2019–20 some 3,713 properties were flooded internally with sewage, and 27,127 were flooded externally: Water, water everywhere: CCW 2019–20 report, September 2020
247 ENDs Report, 'Organised pollution': Sewage dumped into England's waters 400,000 times in 2020, 23 March 2021
248 ENDs Report. 2021. 'Organised pollution': Sewage dumped into England's waters 400,000 times in 2020
249 Q208, Sir James Bevan, 23 June 2021. See also McKenna Davis, Ina Krüger & Mandy Hinzmann, Coastal protection and SUDs—nature-based solutions, Ecologic Institute, November 2015, ,p 7, citing evidence from overloading of the sewerage network in Copenhagen.

Combined sewerage systems

135. Much of England is covered by combined sewerage systems comprising hundreds of thousands of miles of sewers, many of them built in the nineteenth century. In a combined sewerage system, clean rainwater from surface water drainage systems and wastewater from toilets, bathrooms and kitchens are conveyed to a sewage treatment works in the same pipes.[250] Since the 1950s the trend has been to construct separate foul and surface water systems in new developments. Nevertheless, connections to combined sewerage networks continue to increase, just as the volume of surface water run-off entering the system has grown with the expansion of impermeable surfaces in towns and cities. Consequently, many drainage systems no longer have the capacity to cope with less-than-exceptional rainfall.[251]

136. Sir James Bevan, Chief Executive of the Environment Agency, summarised the pressures:

> Over the last several decades, those combined sewage overflows—which are designed to overflow when there is heavy rainfall and there is a risk of sewage backing up into people's homes or into the sewage treatment works—are spilling more frequently and spilling larger volumes. We think that is likely to be happening because there has been more development and therefore more people and therefore more sewage, and because climate change is causing more violent weather and therefore more rain and heavier rainfall events.[252]

137. These pressures are set to grow as climate change intensifies and populations grow. For example, Thames Water expects the population of London to swell by over 430,000, a 5% rise, by 2028.[253] Susan Davy, chief executive of South West Water, described the increasing demand on the sewerage system in her region:

> Over the last 15 years we have had a 20% increase in population in our region. We have had a 50% increase in tourism over the last 15 years and a 25% increase in flows coming through into our treatment works as well. What is being demanded of our catchment is actually increasing and, therefore, when we are investigating why those spills are occurring, a good proportion that is coming back is because of the infiltration and the extra flows that are coming into the network—that 19,000 km of network that we have in our region.[254]

250 Environment Agency. 2020. Blog: Combined Sewer Overflows Explained
251 Notes from the Committee's Specialist Adviser, Professor Ian Barker
252 Q208, Sir James Bevan, 23 June 2021
253 Thames Water (WQR0047), citing figures from the Office of National Statistics.
254 Q413, Susan Davy, 13 October 2021

Conditions for Environment Agency overflow permits

138. All discharges to the water environment, including those from wastewater treatment works and sewer overflows, require a permit issued by the Environment Agency under the Environmental Permitting (England and Wales) Regulations 2016.[255]

139. **Overflow permits for wastewater treatment works** define the volume of sewage flow that should receive full treatment at a site. Only once an overflow threshold is reached—typically because of heavy rainfall—should flow be diverted into a storm tank of specified capacity. The contents of this should then be sent for treatment once inflows reduce, unless the ongoing inflow exceeds its capacity. If that is the case, the contents of the tank are permitted to be discharged as a storm overflow.

Treatment provided at wastewater treatment plants in England is undertaken at the following levels:

- **Preliminary treatment**—to remove grit and gravel and screening of large solids
- **Primary treatment**—to settle larger suspended, generally organic, matter
- **Secondary treatment**—to biologically break down and reduce residual organic matter
- **Tertiary treatment**—to address different pollutants using different treatment processes.

Source: Department for Environment, Food and Rural Affairs, Waste water treatment in the United Kingdom—2012. Implementation of the European Union Urban Waste Water Treatment Directive—91/271/EEC, p. 7

140. **Sewer overflow permits** do not specify a quantifiable threshold of rainfall that distinguishes permitted from unpermitted spills, even though the term that is often used is 'exceptional rainfall'.[256] Professor Peter Hammond considered the lack of a definition of a rainfall threshold in the Environment Agency permits to be 'problematic'.[257] He pointed out that:

> … when the spill happens the sewage works must carry on treating sewage at a minimum rate. That is specified in the permit. […] The rainfall amount is not specified. When you hear water companies and the agency trying to justify spills to the media and to the public, you hear people use the phrase 'heavy rainfall and storms,' but the permit does not specify a trigger amount or anything like that. Secondly, the further I have investigated by getting data through environmental information regulations from the water companies, I found that many of them do not continue to treat at the minimum rate when they are spilling. Many such illegal spills are not identified by the Environment Agency.[258]

255 The most recent Environment Agency guidance to water companies on the issue of environmental permits for overflows (September 2018) is published at Water companies: environmental permits for storm overflows and emergency overflows.

256 Professor Peter Hammond (WQR0064)

257 *Ibid.*

258 Q70, Professor Peter Hammond, 21 April 2021

Case study 2: the effect of pollution on the River Windrush

The River Windrush rises as springs from the limestone Cotswold hills and flows through the towns of Bourton-on-the-Water, Burford and Witney to reach the River Thames at Newbridge. The upper part of the catchment lies within the Cotswold Area of Outstanding Natural Beauty.

The river provides a good case study of the impact of underperforming sewerage systems, sewage pollution and the effects of housing growth. Many of the towns and villages within the Windrush catchment are expanding, increasing the pressure on the wastewater treatment works operated by Thames Water both from increased volumes of foul sewage as well as from surface water run-off. In 2014 West Oxfordshire District Council reported that the population of Witney had doubled in the previous 30 years, and that further significant housing growth could be expected.[259]

The Environment Agency has assessed the water management pressures in each of the water bodies that make up the Windrush catchment. Physical modification (such as weirs and channel modifications), point source pollution and diffuse pollution are the main reasons for the water bodies not achieving Good status under the Water Framework Directive classification.[260] Waste water treatment works are said to be a a major point source of phosphate pollution, together with the impact of discharges from combined sewer overflows and private septic tanks. Data from Thames Water for 2020 show that the storm overflow at Witney wastewater treatment works spilled 97 times in that year, for a total of 1563 hours, equivalent to 65 days.[261] Diffuse pollution from farmland and from run-off in urban areas and roads is also believed to be a contributing factor in the failures. Phosphates, nitrates and sediment are the main pollutants identified.

Committee members visited the Windrush as part of this inquiry, and saw first hand the very high turbidity of the water and the blanketing of the riverbed by sediment downstream of Burford at Widford. The Environment Agency has concluded that the turbidity is related either to the suspension of clay particles or to a chemical precipitation of calcite, but this explanation is not accepted by local campaigners and residents. During the visit members also observed the routine monitoring of water quality by trained citizen scientists, and how phosphate, nitrate and ammonia concentrations, as well as micro-plastics, discharged from waste water treatment works can affect water quality downstream of the works.

There has been a significant decline in fish populations in the Windrush in recent years, although some of its tributaries do support excellent and self-sustaining populations of wild brown trout.[262]

Citizen science monitoring has indicated a reduction in invertebrate diversity and abundance, particularly downstream of Burford to the River Thames. By contrast, sampling by the Environment Agency has recorded apparently good results; however, evidence gathered by the campaign group Windrush Against Sewage Pollution (WASP) suggests that there has been a significant negative change at most monitoring points.

259 West Oxfordshire District Council, West Oxfordshire Local Plan Housing Consultation [Date accessed 24 November 2021]

260 [Draft] Windrush Catchment Plan, February 2021 edit – based on partnership discussions and workshops 2018–19

261 EDM Return Thames Water Annual 2020 [Date accessed 24 November 2021]

262 [Draft] Windrush Catchment Plan, February 2021 edit – based on partnership discussions and workshops 2018–19

Various surveys have recorded a decline in the abundance and distribution of aquatic plants in the upper Windrush, attributed to the deposition of increasingly nutrient-rich sediment. Between Burford and Witney there has been a very clear decline in the abundance of all water plants. The Environment Agency's classification for the plant communities shows that only two of the 12 water bodies are at good status, nine are moderate, and one is poor. The decline in the abundance and diversity of water plants is attributed to the linked issues of increased sediment input and nutrient enrichment, potentially exacerbated by lower flows as a result of climate change.

Local campaigners attribute the poor water quality in the River Windrush to discharges of effluent into the catchment.[263] Professor Peter Hammond offered anecdotal first-hand evidence of the decline in quality:

I have […] direct experience of its decline in terms of increases in turbidity, algal growth and riverbed silt; decrease in river weed growth; population decline of invertebrates, fish, watervoles and waterfowl in the river; and complete loss from my riverside garden of common lizards, grass snakes and otters.[264]

The visible decline of the River Windrush prompted Professor Hammond to take an interest in why spills arise, how they are self-reported by water companies, their detection by Event Duration Monitors (EDMs) and how permits to discharge sewage are enforced by the Environment Agency.[265] He says that 'sewage pollution may not be the sole culprit for this ailing ecosystem' but said that 'aquatic and environmental scientists suggest it is affecting flora and fauna at the bottom and middle of the food chain'.[266]

WASP highlight the situation on the Chil and Limb Brooks, which went from achieving good ecological and chemical status in 2012 to 'poor' and a 'fail' respectively in 2019 (although it should be noted that the chemical status definition has become tighter during that time).[267]

141. Asked about the lack of a definition for exceptional rainfall, Sir James Bevan argued that changing the approach of water companies to the use of overflows was more important than tightening the permit definitions:

> [… V]arious people would argue what 'exceptional' meant or even what 'rainfall' meant. The permits are explicit that both rain and snowmelt are factors. They are explicit that there is a set limit that must be exceeded before those CSOs are allowed to spill. That is essentially the limit of the treatment that the particular sewage works can handle at any given moment. They are explicit that water companies need to have monitors on them and that they need to report the data from that monitoring to the Environment Agency. My view is that the permits themselves are okay. They do the job. The big issue is investment by the water companies to make sure there are fewer spills and that the water companies pay more attention to what is happening in those overflows.[268]

263 Professor Peter Hammond (WQR0064)
264 *Ibid.*
265 *Ibid.*
266 *Ibid.*
267 Windrushwasp.org, Investigating the health of our rivers [Date accessed 27 November 2021]
268 Q214, Sir James Bevan, 23 June 2021

Issues with monitoring and reporting overflow events

142. Citizen science analysis of water company data suggests that the true number of sewer overflow discharges may be considerably higher than those reported by the water companies to the Environment Agency. Professor Peter Hammond explained that he had applied big data and machine learning techniques to develop methods to detect unpermitted spills, using data obtained from water companies and from the Environment Agency through Environmental Information Requests.[269] His analysis led him to believe that the number of permit breaches by water companies was 'an order of magnitude greater' than those that are reported: "there are at least 10 times more such breaches of […] permits than the agency has identified and prosecuted.".[270] Feargal Sharkey observed that 'the true extent of the problem may be biblical in proportion'.[271]

143. The Windrush Against Sewage Pollution (WASP) campaign analysed information from the Environment Agency on the number of dry and early spills breaching discharge permits from sewage treatment works across England between 2010 and 2020. WASP also analysed highly granular data received from Thames Water giving the start and stop times of sewage spills for 14 treatment works in the Windrush catchment from 2018 onwards, as well as data on the flows receiving full treatment at these works and their treated effluent flows. WASP explains how this methodology provided them with data which was '100 times finer grained [than that which] the Environment Agency typically analyses':

> Each year, water companies report treatment flow and event duration monitoring of untreated sewage spills to the E[nvironment] A[gency], but only daily total flow and yearly total hours of spilling. In contrast, WASP asks STW [sewage treatment works] operators for flow data recorded every 15 minutes (96 times each day) and start/stop times of each spill. The EA requires this detailed information to be measured and recorded but does not request it unless, as the EA have said, there is suspicion of a permit breach. Unfortunately, [the] daily total of sewage treated masks evidence of unpermitted spills that is detectable from 15-min flow data. Therefore, EA suspicion is less likely to be aroused and spills at STWs are missed. Similarly, annual spilling hours mask the frequency and length of individual spills or groups of STWs spilling for long periods at multiple points along a watercourse.[272]

144. The Environment Agency provided WASP with details relating to 174 permit breaches between 2010 and 2020. The Environment Agency recorded 33 'dry' or 'early' spill related breaches by Thames Water over this eleven-year period.[273] WASP says that it detected 735 'dry' or 'early' spilling days in the period from 2018 to 2020 alone in the data it received from water companies on the sewage treatment works it chose to analyse. WASP therefore concludes that 95% of 'dry' and 'early' unpermitted spills from the Thames Water sewage treatment works that it has studied may have gone unreported by

269 Q65, Professor Peter Hammond, 21 April 2021
270 Q70, Professor Peter Hammond, 21 April 2021
271 Q114, Feargal Sharkey, 21 April 2021
272 Peter Hammond, Windrush Against Sewage Pollution (WASP), WASP review of unpermitted spills from sewage treatment works, Part 1: 735 'illegal' discharges of untreated sewage from 13 Thames Water STWs 2018–2020, October 2021
273 Windrushwasp.org, Investigating the health of our rivers [Date accessed 27 November 2021]; Peter Hammond, Windrush Against Sewage Pollution (WASP), *ibid.*

the company or undetected by the Environment Agency.[274] WASP says that its research provides 'clear evidence that operator self-monitoring by the water industry and regulation by the Environment Agency are not working'.[275] The group is now analysing data from other water companies.

4.2 Public attitudes to sewage pollution

145. When the Sewage (Inland Waters) Bill was introduced in October 2020, levels of public awareness of the extent of sewage pollution in waterways appeared low. Over the course of this inquiry, awareness of the public health and environmental risks of sewage pollution in rivers has risen to become a major issue of public concern, with widespread coverage in national media. Amy Slack from Surfers Against Sewage told us that:

> We have never seen greater awareness and appetite for change as we are now. It is even greater now than we saw in the 1990s when we started as an organisation. People do not want to be swimming and playing in polluted water and are generally shocked when they find out the extent of the problem, particularly with sewage discharge into waterways […] We have seen increased concern around the transmission of bacteria and viruses in water and in the news around testing of sewage treatment plants for Covid. We have seen an increased awareness and I would stress that the risk of Covid is seen to be very low or non-existent from swimming in the sea or rivers.[276]

Water company responses to concerns over sewage pollution

146. Most of the water company chief executives who gave evidence to us acknowledged that the public found the spilling of untreated sewage unacceptable. Sarah Bentley of Thames Water commented that:

> What I have heard in the year that I have been running Thames is that our customers just find spills unacceptable. We find them unacceptable and I am really committed to working out how we can eliminate storm discharges so that people can swim confidently in the river.[277]

147. The chief executive of Severn Trent repeatedly claimed that the company did not discharge raw sewage.[278] She said that, because storm overflows discharged a mix of sewage 'heavily diluted' with rainwater, the contents of any discharge were 'pretty much already rainwater'.[279]

148. While this claim may have been intended to reassure us about the discharges from overflows on the Severn Trent network, we do not find it convincing. Levels of pollution in combined sewer overflows are not routinely monitored. As Dr Rob Collins of the Rivers Trust told us, and as we observed above, discharges from combined sewer overflows "combine raw sewage with what runs off the urban environment", potentially comprising

274 Peter Hammond, Windrush Against Sewage Pollution (WASP), *ibid.*
275 Peter Hammond, Windrush Against Sewage Pollution (WASP), *ibid.*
276 Q46, Amy Slack, 10 March 2021
277 Q406, Sarah Bentley 13 October
278 Q408, Q521, Q524, Liv Garfield, 13 October
279 *Ibid*

"a huge chemical cocktail: faecal microbes, hydrocarbons, industrial chemicals, plastics, pharmaceuticals [and] personal care products" with unknown effects on human health if swallowed.[280] In December 2021 Severn Trent was itself fined £1.5 million for illegal sewage discharges: the sentencing judge observed that the company had been "in no great hurry to carry out maintenance" in respect of one of the incidents.[281]

149. The mounting public concern about sewage pollution was reflected in backbench proposals in the House of Lords for amendments to the Environment Bill which would place a duty on water companies in England to demonstrate progressive reductions in the harm caused by discharges of untreated sewage. Both Houses eventually agreed on a provision which requires water companies in England to secure progressive reductions in the adverse impacts on the environment and on public health of discharges from storm overflows.[282] Ministers are also required to publish, by September 2022, a plan to reduce sewage discharges from sewer overflows and their adverse impacts, including on public health,[283] and a report on the actions required to eliminate discharges from storm overflows of water companies in England, and the costs and benefits of those actions.[284]

Our view

150. **The public are rightly shocked when they discover that untreated or partially treated sewage is regularly dumped into rivers and streams in England. We have heard that the rainwater washing into storm sewers can contain microplastics, industrial chemicals and hydrocarbons. It will then mix with human waste from homes and businesses containing harmful bacteria. In some cases, the only 'treatment' that such discharges will have received will have been to pass through a mesh grill.**

151. **We therefore found the claim made by the chief executive of Severn Trent that its sewer overflow discharges were 'pretty much already rainwater' to be disingenuous. As water companies do not routinely test the quality of the discharges from storm overflows, they are in no position to make this claim. Discharges from overflows can be highly contaminated with raw sewage and other pollutants. To claim otherwise shows a disregard for the public's concern about water quality in rivers.**

4.3 Monitoring

152. The increase in the recorded number of discharges from sewer overflows, and the allegation that the number of actual discharges may be much greater, raises questions about the monitoring of discharges by water companies in the monitoring of their networks; the Environment Agency's oversight of this monitoring; and the effectiveness of the Environment Agency in detecting the impact on water quality of these discharges. In this section we examine the evidence taken relating to the monitoring currently undertaken by water companies and the Environment Agency, and the potential for continuous monitoring of water quality in rivers.

280 Q54, Dr Rob Collins, 10 March 2021
281 Gov.uk, Severn Trent Water fined £1.5 million for sewage discharges, 8 December 2021
282 Inserted into the Water Industry Act 1991 as section 141DC by section 83 of the Environment Act 2021.
283 Inserted into the Water Industry Act 1991 as section 141A by section 80 of the Environment Act 2021.
284 Section 84 of the Environment Act 2021.

Event Duration Monitors

153. The monitoring of discharges from sewage overflows and wastewater treatment plants has improved since 2015 as Event Duration Monitors (EDMs) have been rolled out over the majority of the sewerage network. We saw an example of these basic monitors at the Thames Water wastewater treatment works in Burford. The Environment Agency expects to have a complete picture of sewer overflow spill event durations by 2023.[285] The Environment Act 2021 requires water companies to publish near-real time information (within 1 hour) of the commencement of an overflow, its location and when it ceases.[286] The Environment Agency will compile this data into an annual report accessible to the public to enable progress to be tracked.[287]

Fitting volume sensors to sewer overflows

154. EDMs record the frequency and duration of a discharge, but not its volume or quality. We heard that EDMs sometimes fail to detect spills even when they are operation. Professor Hammond told us that the event duration monitors at Thames Water's Mogden wastewater treatment works in Isleworth had failed to detect discharges from the site into the River Thames.[288] Mogden is the third largest sewage treatment works in the UK and one of the few treatment works that has a separate device to monitor the volume of untreated sewage discharged: data from that monitor is published online.

155. Professor Hammond documented incidents where the EDM device had failed to detect discharges recorded by the separate volume meter. He highlighted the volume and scale of contaminated water discharged into the Thames on 3rd and 4th October 2020:

> Five years ago [Mogden] spilled 0.5 billion litres of untreated sewage. That has steadily increased over the last five years, and last year it was 3.5 billion litres. On each of two days in October [2020] they spilled 1 billion litres-plus, which is the equivalent of 400 Olympic-sized swimming pools of sewage each day. That is 16 Olympic swimming pools an hour for two days.[289]

Sarah Bentley, chief executive of Thames Water, sought to set the events at Mogden in context. She explained that the works had been 'inundated':

> … they were the wettest days on record and we struggled to treat both the permitted amount, but also just struggled to treat the sewage. On that day there was enough rainfall to fill Loch Ness.[290] In order to deal with that at Mogden, we have eight storm tanks at the moment that currently hold about 40 Olympic-sized swimming pools of storm water contaminated with sewage. We would have needed either another treatment works the same size as Mogden treating another 1 billion litres or we would have needed 150 more storm tanks.[291]

285 Environment Agency (WQR0029)
286 Department for Environment, Food and Rural Affairs (WQR0105); the provision was inserted into the Water Industry Act 1991 as section 141DA by section 81 of the Environment Act 2021.
287 Environment Agency (WQR0029)
288 Professor Peter Hammond (WQR0064)
289 Q81, Professor Peter Hammond, 21 April 2021
290 See Rmets.org, Wettest Day on Record [Date accessed 15 December 2021]
291 Q444, Sarah Bentley, 13 October

Measuring the volume of spills

156. In evidence submitted before the Environment Act 2021 received Royal Assent, South West Water indicated that there were difficulties in measuring the volume and load of discharges:

> In terms of technology, whilst storm discharge operations can be measured in terms of duration, it is much more difficult to measure the volume and load—these are vital considerations in determining where improvements in performance will deliver worthwhile environmental benefits, and technology to do this simply and at scale should be explored. This would also assist with the transparency need and making the best societal decisions.[292]

The Environment Act now requires water companies to produce annual reports on discharges from storm overflows from wastewater treatment works. The first such reports, relating to the calendar year 2021, are to be published by 1 April 2022.[293] Companies are required to include information on the volume of discharges, but only "where that information is available.".[294] It is not clear how long it will take for volume meters to be fitted to the storm overflows at each wastewater treatment works.

Operator Self-Monitoring

157. Water companies are required to monitor the quality of the treated effluent discharged from wastewater treatment works, under arrangements introduced in 2009 known as Operator Self-Monitoring (OSM). OSM requires water and sewerage companies to sample their own treated effluent discharges, in line with specific monitoring and analytical requirements, and to report the results to the Environment Agency, flagging any breaches that occur.

158. The Environment Agency undertakes audits and inspections of water company OSM operations:

> Our Operator Monitoring Assessment audits and inspections reinforce the OSM requirement; all breaches are followed up and, where required, lead to formal investigations and enforcement action. This is in line with other industries we regulate. We are confident in the effectiveness of our regulation and our ability to hold the water companies to account.[295]

As part of its auditing of OSM the Environment Agency occasionally samples the chemical quality of effluent being discharged from sewage treatment plants to ensure that discharges are meeting their permit requirement. The Agency reports that industry compliance with OSM requirements, as determined by its audits, is high, at "around 98%".[296] Peter Lloyd, a retired Environment Agency scientist, alleged that the Agency did not have "any proper method of auditing the sewage works and the results they obtain from self-monitoring.".[297]

292 Pennon/South West Water (WQR0041)
293 Section 141C(2) of the Water Industry Act 1991, inserted by section 80 of the Environment Act 2021
294 Section 141C(2)(d) of the Water Industry Act 1991.
295 Environment Agency (WQR0029)
296 *Ibid.*
297 Q89, Peter Lloyd, 21 April 2021

Environment Agency spot sampling

159. The Environment Agency also monitors the chemical quality of rivers, focusing on levels of phosphates, nitrogen, ammonia and dissolved oxygen. We received evidence which challenged the effectiveness of these arrangements.

160. Peter Lloyd argued that the Agency's method of river quality monitoring was misleading, ineffective and a 'waste of money.'[298] The existing system of surveillance monitoring of rivers and effluents consisted, he said, almost exclusively of taking small numbers of random individual samples during the working day, a method known as 'spot sampling'. He told us:

> The problem is that the agency does monitor rivers and will monitor rivers downstream of sewage works, known problem areas, but will do it on a random basis. It will normally take one sample a month, say, but that sample will be taken randomly. The chances of that sample coinciding with a rainfall event [when sewage spills are more likely to occur] are very slim. It might be a one in-100 chance that any single sample will coincide with the sort of events that we need to know more about.[299]

> [… I]n many sewage works the effluent quality is worse out of hours, during the evening and overnight, yet the Environment Agency's method of monitoring is random samples during working hours. They will never tell you the true quality of the effluent.[300]

161. This was echoed by the Rivers Trust, which suggested that Environment Agency monitoring of treated sewage discharges from sewage treatment works 'has been shown to be entirely inadequate':

> Spot samples of water quality in rivers downstream of discharges are taken during daytime working hours, yet the main pollutant load from sewage treatment works is discharged overnight or early in the morning, so most of the polluting load to the environment is missed by regulatory monitoring. Continuous monitoring technology is widely available which could automatically record water quality levels 24 hours a day and effectively regulate the diurnal load from WWTWs.[301]

162. The Centre for Hydrology and Ecology told us that the Environment Agency's sampling of river water 'dissolved phosphate, dissolved oxygen, pH and ammonium is sensible and should continue.'[302] The Centre also observed that the frequency of Agency sampling was unlikely to be adequate to detect failures at sewage treatment works which affected water quality:

298 Q78, Peter Lloyd, 21 April 2021
299 Q75, Peter Lloyd, 21 April 2021
300 Q88, Peter Lloyd, 21 April 2021
301 The Rivers Trust (WQR0082)
302 UK Centre for Ecology and Hydrogeology (WQR0013)

> The routine regulatory testing of sewage treatment works effluents is very intermittent, and a monthly sampling interval is very unlikely to detect sewage treatment works failures. The sampling of combined sewer overflows is even less frequent.[303]

Continuous water quality monitoring

163. Several witnesses urged the introduction of continuous real time monitoring of water quality.[304] Salmon and Trout Conservation observed that technological developments in monitoring meant that "continuous monitoring should now be both practical and affordable for the Environment Agency to use widely", especially at potentially high-risk locations such as sewage treatment works.[305] The Centre for Hydrology and Ecology concurred:

> The use of multi-probe Sondes with telemetry to detect ammonium, turbidity and dissolved oxygen concentrations in effluents at hourly frequencies, alongside flow gauging, could provide an accurate estimate of pollution loadings coming from sewage treatment works, an early warning system to detect sewage treatment works failures and provide the key data for researchers to evaluate the impact of combined sewer overflows on downstream river water quality and ecology.[306]

164. Peter Lloyd raised concerns about the Strategic Monitoring Review undertaken by the Environment Agency over the last 5 years, at a cost of 'well over £1 million'.[307] The Agency 'claims to be fully aware of the constraints of chemical monitoring', but was proposing to introduce a monitoring scheme that continued to utilise a random sampling method called the GRTS (Generalised Random Tessellation Stratified) system. He contended that the proposed scheme 'completely ignores the basic scientific facts' about the flaws in random monitoring:

> The new GRTS monitoring sites have been selected randomly, taking no account of any existing knowledge, and many will be at locations that do not provide worthwhile and relevant information. The proposed new system has, therefore, ignored all of the knowledge that has been acquired over the last 40 years on the factors that affect water quality. For example, areas that are known to be at risk from diffuse pollution might no longer have monitoring sites in key locations.[308]

He called for the Environment Agency to move to a system of continuous monitoring, which he said would provide data that provides a high level of certainty of the condition of a river and the causes of pollution, thus alleviating the need to apply complex statistical processes.[309] The Environment Agency had itself developed continuous monitoring technology that it used on an ad hoc basis and which was being used two decades ago.[310]

303 *Ibid.*
304 Q79, Peter Lloyd, 21 April 2021
305 Salmon and Trout Conservation (WQR0002)
306 UK Centre for Ecology and Hydrogeology (WQR0013)
307 Peter Lloyd (WQR0026)
308 Peter Lloyd (WQR0026)
309 *Ibid.*
310 Q79, Peter Lloyd, 21 April 2021

Data obtained via continuous monitoring could provide a high level of certainty as to the condition of a river and the causes of pollution, thus alleviating the need to apply complex statistical processes to data analysis.[311] The technique could be cost-effective if used in a targeted way:

> If there is a particular problem that you want to investigate, you can find out more from continuous monitoring in two weeks than you would probably find in many, many years of random sampling.[312]

165. Salmon and Trout Conservation also recommended the use of continuous monitoring, especially with the 'spikey' nature of discharges from such industries as watercress and trout farming. It said that the technology has progressed so markedly 'that continuous monitoring should now be both practical and affordable for the Environment Agency to use widely', especially for potentially high-risk polluters such as sewage treatment works.[313] The Environment Agency told us in its submission that it would like to explore the use of continuous monitors for quality of effluent that could 'trigger early warning if effluents were starting to deteriorate' for regulatory purposes.[314]

166. Professor Peter Hammond's thorough analysis of monitoring data had been achieved through the application of machine learning techniques, which he told us "could be applied automatically to sewage treatment and EDM monitoring data to help identify which of the thousands of [sewage treatment works] in England and Wales have been, and are, underperforming." He recommended that the Environment Agency develop expertise in data analysis to cope with the volume of sewage treatment and monitoring data so that it could more effectively enforce permit conditions.[315]

167. We will examine issues of resourcing for Environment Agency data analysis in Chapter Six below.

Our view

168. **Independent analysis of publicly available monitoring data, using machine learning techniques, has produced insights into the performance of the sewerage network which appears to have been beyond the current capacity of the Environment Agency to achieve, let alone water companies. The Environment Agency must improve its capacity to handle the very large volumes of data which will be provided in the course of automated monitoring of water quality and of storm overflows.**

169. ***We recommend that the Environment Agency either develop the in-house capacity or tender for external assistance necessary for the analysis of the volume of data generated by EDMs and for the establishment of techniques to identify discharges which are likely to breach permit conditions.***

311 Peter Lloyd (WQR0026)
312 Q80, Peter Lloyd, 21 April 2021
313 Salmon and Trout Conservation (WQR0002)
314 Environment Agency (WQR0029)
315 Professor Peter Hammond (WQR0064)

170. ***The technology for continuous monitoring of water quality is evolving rapidly. We recommend that the Environment Agency invite manufacturers to submit products for evaluation so that the Agency can rapidly introduce cost-efficient and effective sensors at an increased number of locations.***

171. **We note with concern the evidence we have received which suggests that Environment Agency sampling practice at wastewater treatment works may not adequately take into account regular variations in the composition of effluent.**

172. **We welcome the statutory provisions in the Environment Act 2021 to monitor water quality upstream and downstream of sewer outflows, and for annual reporting on storm overflow discharges. We also welcome the requirement for water companies to report on the volume where information is available, but we regret that there is as yet no timetable for the roll-out of volume monitors across wastewater treatment works, especially to those works which have a history of spills.**

173. ***We recommend that water companies take immediate steps to install volume monitors at all points where overflows may discharge from their sewerage networks, so as to provide continuous real-time monitoring of the volume of discharges consistent with the provisions of the Environment Act 2021. Drainage and sewerage management plans should include a clear plan for volume monitoring and a clear timetable for its implementation, and water companies should publish regular reports on progress towards full implementation.***

4.4 Transparency

174. Water companies are public authorities for the purposes of the Environmental Information Regulations 2004. Regulation 4 places a duty on public authorities to make environmental information they hold available to the public by electronic means, which are easily accessible.[316] EDM data is submitted to the Environment Agency, but not all water companies publish it routinely. The data can be requested by the statutory route described above, but we heard that the Environmental Information Regulations request process often requires a great deal of persistence to secure the data requested.[317]

175. Citizen science campaigners have complained of a lack of transparency in water company practices in publishing discharge permit and monitoring data. Professor Hammond testified that the water companies 'obfuscate and often provide me with incomplete, inconsistent and incorrect data'.[318] Professor Peter Hammond told us that information on discharges was often published in aggregate form so that the exact start and stop times could not be seen. He recommended that discharge data be published with greater granularity, for instance as 15-minute flow data.

176. Professor Hammond made a number of further recommendations which would in his view improve the permit regime, the monitoring of water quality and the transparency of the monitoring system, including:

316 Salmon and Trout Conservation (WQR0085)
317 Professor Peter Hammond (WQR0064)
318 Q86, Professor Peter Hammond, 21 April 2021

- a more precise definition of the terms in Environment Agency permits (for instance, a technical definition of the term 'rainfall', and a definition of 'effluent' which does not extend to a mix of untreated sewage and treated effluent);
- publication by water companies of data on effluent quality, metered flow and spill start and stop times, one month in arrears, and
- routine collection of data on the volume of untreated sewage spills: such data are not only essential to the understanding their impact on river ecosystems, but also required so as to establish financial penalties sufficient to discourage poor maintenance and management of sewage treatment works.[319]

Commitments on transparency and monitoring

177. DEFRA told us at the outset of the inquiry that it intended water companies to publish data from EDMs on an annual basis from 2021, and to require the Environment Agency to publish annual data for all water companies.[320] This has now been given statutory effect in the Environment Act 2021: each water company is required to publish annual reports on its use of storm overflows including, where the information is available, the volume of each discharge in that period.[321] The Water Industry Act 1991 has been amended so as to require each water company in England to undertake continuous monitoring of the quality of water upstream and downstream of each of its treatment works and storm overflow assets.[322]

178. The chief executives of Severn Trent and Southern Water both told us that they had responded to feedback about transparency by making information about spills publicly available online.[323] Liv Garfield, of Severn Trent, claimed that citizen scientists would no longer have to send in requests for EDM data under the Environmental Information Regulations, as all such data was now published online.[324] Thames Water committed to publication of the data by the end of 2022. South West Water said that it shared information on designated coastal bathing waters with Surfers Against Sewage on a real time basis, and also committed to investigating the feasibility of publishing real-time information for rivers.[325]

Our view

179. **We were dismayed to learn that some water companies have been slow to respond to formal requests by campaigners and citizen scientists under the Environmental Information Regulations 2004 to secure information about EDM use and permit conditions on the sewerage network. Given the overwhelming public concern about water quality in rivers in England, greater transparency in this respect should become the norm. We welcome the commitments on improved transparency which we received directly from the chief executives of several water companies.**

319 Professor Peter Hammond (WQR0064)
320 Department for Environment, Food and Rural Affairs (DEFRA) (WQR0028)
321 Section 141C of the Water Industry Act 1991, inserted by section 80 of the Environment Act 2021
322 Section 141DA of the Water Industry Act 1991, inserted by section 82 of the Environment Act 2021
323 Q449, Q551, Liv Garfield and Ian McAulay, 13 October 2021
324 Q451, Liv Garfield, 13 October 2021
325 Q455, Susan Davy, 13 October 2021

180. **The statutory requirements on monitoring and transparency introduced by the Environment Act 2021 establish a welcome baseline. There is nevertheless scope to improve the nature of data which water companies collect about the operation of their sewerage networks, and to make it available to regulators and to the public.** ***We recommend that Ofwat and the Environment Agency require each water and sewerage company in England to publish on its website, by the end of 2022, details of its discharge permits, its permit compliance, and full granular 15-minute data on spill duration, volume and water quality, to a standard format which facilitates easy capture and analysis by members of the public.***

4.5 Governance, enforcement and prosecution

181. The Environment Agency is responsible for the regulation of the environmental activities of water companies which operate in England. The Agency issues permits and licences to the industry and acts to prevent or to control pollution. Where permit conditions are breached, the Agency will either prosecute the offender or agree an enforcement undertaking, whereby the offender voluntarily offers to put right the damage and enters a legally binding agreement with the Agency to do so.[326] Court actions against polluters have fallen in the last decade while the use of enforcement undertakings has risen.[327] Table 3 shows the number of incidents where overflow permit conditions have been found to have been breached between 2015 and 2020, together with figures for the type of enforcement action taken.

Table 3: Number of enforcement actions against water companies by the Environment Agency, 2015–2020

Type of action	2015	2016	2017	2018	2019	2020
Formal caution	22	12	8	1	0	0
Enforcement undertaking	4	4	15	15	11	14
Prosecution (storm overflow breach)	6	3	6	1	2	2
Prosecution (other reason)	0	7	5	4	2	0
Total	**32**	**26**	**34**	**21**	**15**	**16**

Source: National Audit Office (WQR0097), subsequently published by the NAO as *Understanding storm overflows: Exploratory analysis of Environment Agency data*, September 2021, p. 22. Figures for the breakdown of formal cautions and enforcement undertakings featuring storm overflows were not available.

182. Section 94 of the Water Industry Act 1991 places a duty on water companies to provide sewerage systems and establishes obligations to deal effectively with sewage and to treat it. These duties are enforceable by the water industry regulator Ofwat and by the Secretary of State.[328] Guy Linley-Adams, for Salmon and Trout Conservation, argued that adequate enforcement of existing laws would be sufficient to deal with river pollution.[329]

326 Enforcement undertakings accepted by the Environment Agency: 1 June to 30 September 2020

327 DEFRA Press Office statement, 21 July 2020, in response to "Just 3.6% of fly-tipping and pollution complaints lead to penalties", *The Guardian,* 21 July 2020

328 Q233, David Black, 23 June 2021. Ministerial responsibilities under the Act currently fall to be exercised by the Secretary of State for Environment, Food and Rural Affairs.

329 Q49, Guy Linley-Adams, 10 March 2021

The organisations managing water and sewerage services in the UK were taken into private ownership in 1989. Nine **water and sewerage companies** in England (called 'water companies' in this report) that provide clean (drinking) water and waste water (sewerage) services. In Wales services are provided by the not-for-profit Dŵr Cymru Welsh Water. These ten companies are regulated by the economic regulator Ofwat, the Drinking Water Inspectorate and the Environment Agency (or Natural Resources Wales). The Consumer Council for Water is the independent statutory consumer body for the water industry in England and Wales.

Scottish Water is publicly-owned and directly accountable to Scottish ministers. Northern Ireland Water is a Government Owned Company (GoCo), set up in 2007 to provide the water and sewerage services in Northern Ireland.

Ofwat is a non-ministerial government department that regulates the water and wastewater sector in England and Wales. One of its roles as a regulator is ensuring that water companies deliver the responsibilities that are set out in legislation and in company licences. It has the power to take enforcement action where companies are not delivering on certain obligations.

Environmental Performance Assessments

183. The Environment Agency monitors water company performance against environmental objectives including the reduction and reporting of pollution incidents, compliance with permits and delivery of environmental improvement schemes. It publishes an annual Environmental Performance Assessment (EPA). The Agency's chief executive, Sir James Bevan, told us that the annual assessments of water company performance showed improvements 'over the last couple of decades', and gave a preview of the EPA for 2020, published in July 2021:

> The latest environmental performance document… will show the lowest number of serious pollution incidents from water companies that we have yet recorded, down from where it was last year. It will show that more water companies are now at the highest level of performance, what we call four star performance, in terms of complying with the key requirements to protect our waters, and it will show improved performance on most of the metrics that we use to assess whether those water companies are complying with their permits.[330]

184. Northumbrian Water has shown an improvement in environmental performance since 2016, achieving a maximum four-star rating for its performance in 2020. Heidi Mottram, its chief executive, explained the measures put in place to secure improvements:

> … in the last three to four years, we have seen a 61% reduction in the number of pollution [incidents] as a result of a multifaceted plan that has seen activities right the way across our network and has now got us into a leading position in terms of pollution management. Every pollution, as far as we are concerned, is an absolute disaster and we will continue to push those numbers down. We have 30,000 kilometres of network and we are now averaging around 40 to 45 pollutions in a year. It is very challenging to get to that level but we will continue to drive that even further down.

330 Q203, Sir James Bevan, 23 June 2021

> We talk about this regularly at our board meetings. Our board wants to see that get as low as we possibly can to see how we can drive that even further forward.[331]

Pollution incidents

185. The Environment Agency expects companies to monitor the performance of their assets and self-report when a Category 1, 2 or 3 pollution incident occurs. In 2013, the Environment Agency set out its expectations to the water companies for the period 2015 to 2020 in a number of areas, including on serious pollution incidents. It set a target for water companies to achieve a reduction (at least 50% compared to 2012) in serious pollution incidents (category 1 and 2), trending towards zero by 2020. The most recent Environmental Performance Assessment, issued in July 2021, shows that the number of serious pollution incidents (category 1 and 2) has declined over the last twenty years, and in 2020 were at their lowest level recorded, but that progress is slowing (see figure 3 below).[332]

186. The Agency nevertheless observed that 'there is there is still a tendency for some water companies to reach for excuses rather than taking action to reduce serious pollution incidents to zero.'[333] It concludes that the latest 'performance data shows that the sector still needs to make substantial improvements … to reduce the number of incidents so that they reduce their impact on the environment', and called on the sector 'to accelerate to zero serious incidents'.[334]

187. For its part, Ofwat has ordered South West Water and Southern Water to return £13.8 million and £7.7 million respectively to their customers for their underperformance on pollution incidents.[335]

Box 1: Environment Agency categorisation of pollution incidents

Pollution incidents lead to the release of harmful substances into air, land or water, and some can cause significant harm to the environment. The Environment Agency categorises all incidents based on their impact:

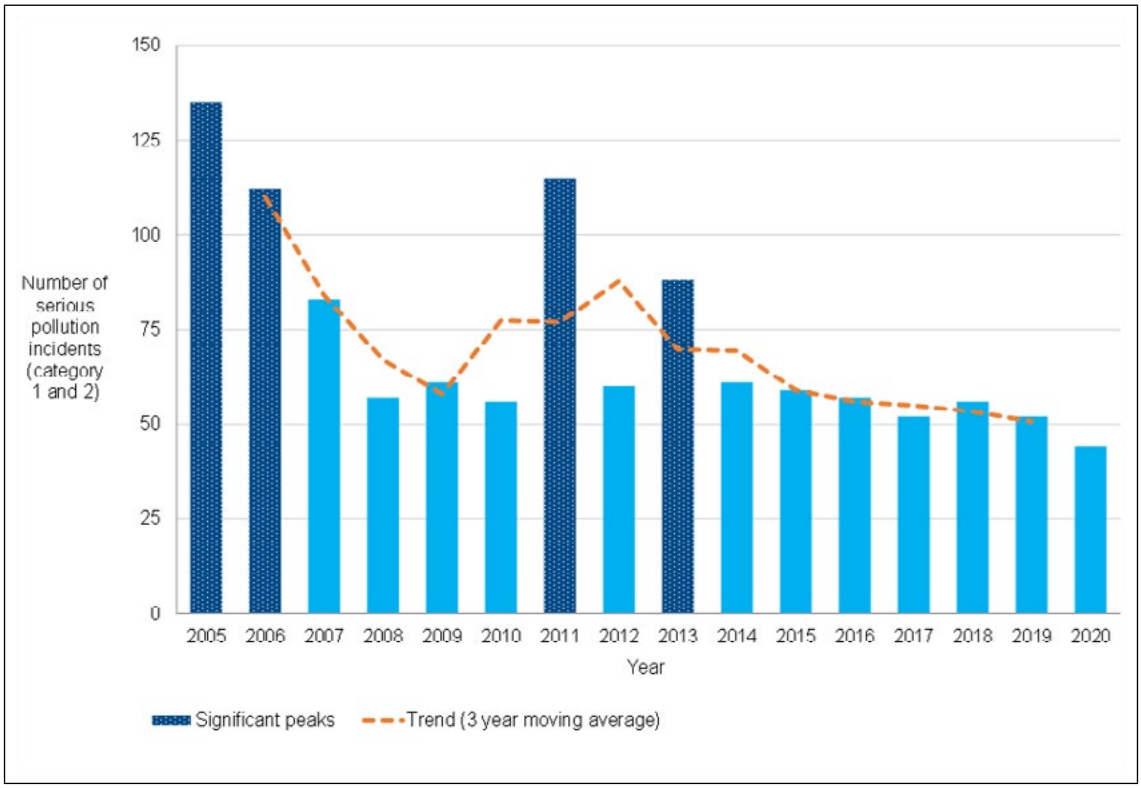
- A **Category 1 pollution incident** has a serious, extensive or persistent impact on the environment, people or property and may, for example, result in a large number of fish deaths.
- **Category 2** incidents have a lesser, yet significant impact. Categories 1 and 2 are considered to be 'Serious' incidents.
- **Category 3** incidents have a minor or minimal impact, with only a limited or localised effect on water quality.

Impact is assessed according to the persistence (time), extent (area affected), and the seriousness of effects.

Source: Environment Agency Water and sewerage companies in England: EPA metric guide for 2020

331 Q425, Heidi Mottram, 13 October 2021
332 Environment Agency (published Gov.uk) Water and sewerage companies in England: environmental performance report for 2020, 23 July 2021
333 *Ibid.*
334 *Ibid.*
335 Ofwat, Service delivery report 2020–21, November 2021

Figure 3: Trends in serious pollution incidents attributable to water companies, 2005–2020



Source: Environment Agency (published Gov.uk) Water and sewerage companies in England: environmental performance report for 2020, 23 July 2021

Table 4: Pollution incidents performance in 2020

Water company	Existing target (incidents per 10,000km of sewer)	Performance (incidents per 10,000km of sewer)
Anglian Water	24.51	27.65
Northumbrian Water	24.51	14.61
Severn Trent Water	24.51	20.60
South West Water	24.51	144.30
Southern Water	24.51	101.52
Thames Water	24.51	26.67
United Utilities	24.51	18.10
Wessex Water	24.51	25.18
Yorkshire Water	24.51	24.00
Sector performance	**-**	**31.91**

Source: Ofwat, Service delivery report 2020–21, November 2021

Our view

188. **The water industry has failed to achieve the target, set by the Environment Agency, of a 50% reduction in serious pollution incidents from their 2012 level by 2020. This is not an acceptable position.**

189. ***We recommend that Ofwat require water companies, as a condition of their continued licensing, to deliver year-on-year reductions in the number of pollution incidents, with a target of zero serious incidents by 2030.***

190. **We nevertheless welcome the reductions in serious pollution incidents which water companies have achieved and which the Environment Agency has acknowledged.**

191. **We note that the Environment Agency does not consider any use of storm overflows to be a pollution incident: discharges from overflows are classed as permitted discharges as long as they comply with the terms of the relevant permit. This is unlikely to incentivise overall reductions in discharges. *We recommend that the Environment Agency reclassify significant sewage spills from storm overflows into watercourses in dry weather as pollution incidents, irrespective of permit compliance.***

Enforcement and prosecution: issues raised by the Southern Water case

192. Southern Water was heavily penalised by Ofwat in 2019 for instances where it had misreported performance. The company was also successfully prosecuted by the Environment Agency for discharges which breached the conditions of permits issued. These regulatory actions have highlighted serious historic failures at the company.

193. In October 2019, Ofwat levied a £126m financial penalty on Southern Water for 'deliberately misreporting' the performance of its wastewater treatment works. Of this, £123 million was returned to customers. The failings occurred between 2010 and 2017 at several of the company's 300 treatment sites.[336]

194. Separately, the Environment Agency prosecuted Southern Water for breaches of the conditions of its permits which had resulted in the dumping billions of litres of raw sewage into the sea over several years. The company admitted 6,971 unpermitted spills from 17 sites in Hampshire, Kent and West Sussex between 2010 and 2015.[337] The £90 million fine for the spills was the highest ever awarded by a court for a sewage discharge permit breach. At sentencing in July 2021, Mr Justice Jeremy Johnson observed that the company had discharged between 16 billion and 21 billion litres of raw sewage—the equivalent of between 6,400 and 8,400 Olympic-sized swimming pools. In his view the offences showed

> a shocking and wholesale disregard for the environment, for precious and delicate ecosystems and coastlines, for human health, and for fisheries and other legitimate businesses that operate in the coastal waters.[338]

While the company had been fined substantial amounts for similar offences between 2013 and 2016, there was 'no evidence that the Defendant took any notice of the penalty

336 *Ofwat's final decision to impose a financial penalty on Southern Water Services Limited*, Ofwat, 10 October 2019.

337 BBC News, Southern Water fined record £90m for dumping raw sewage, 9 July 2021

338 'Southern Water fined record £90m for deliberately pouring sewage into sea', *The Guardian*, 9 July 2021

imposed or the court's remarks. Its offending simply continued', and 'history shows that fines of hundreds of thousands or low millions of pounds have not had any effect on the Defendant's offending behaviour.'[339]

195. Questioned by us on these issues, Ian McAulay, chief executive of Southern Water, said that there had been 'deliberate acts' of wrongdoing at the company which had come a shock to him when he joined in January 2017 and continued to anger him.[340] He told us that 'there was an instruction given to some members of staff under duress not to hand over documents when an inspection occurred.'[341] Significant changes had been made as a result:

> … putting in place proper lines of defence, proper measurement, which I think is germane to this inquiry. […] We have made very sure that we now measure all of our storm flows. We are at 98% with EDMs. We have a three lines of defence model, a director of risk and compliance. We have independent audit as well to make sure that we cannot do it again. The behaviours were inexcusable.[342]

196. Ofwat told us that customer trust in water companies was essential if they were to 'accept advice and respond to calls for behaviour change'.[343] Southern Water acknowledged that it needed to rebuild trust with customers and stakeholders.[344]

Financial penalties for breaches

197. Witnesses argued that financial penalties for water company failures ought to be increased.[345] Surfers Against Sewage complained that 'financial penalties do not reflect the true environmental damage caused by the systematic discharging of untreated sewage'.[346] Sir James Bevan, speaking to us a month before Southern Water was sentenced, said that he would like to see increased sanctions on environmental offenders, to ensure that pollution incidents became a boardroom issue:

> … the fines are not big enough. Even the biggest one, which we secured against Thames Water of about £20 million, is peanuts compared with the daily turnover of a company like Thames Water. We don't control the amount fined, which is a matter for the sentencing guidelines. It is good that courts have started to impose higher fines than they were a few years ago, but we would still like to see, frankly, eye-watering fines for water companies. Until they are big enough to concentrate the minds of boards, we will not have the effect that we want.[347]

339 Freshlawblog.com, Record £90 Million Fine for a 'Flagrant Disregard' of UK Environmental Law Calls for Boards of Directors to Take Note, 1 October 2021
340 Q427,Q429, Ian McAulay, 13 October 2021
341 Q432, Ian McAulay, 13 October 2021
342 Q427, Ian McAulay, 13 October 2021
343 Ofwat (WQR0078)
344 Southern Water (WQR0059)
345 The relevant sentencing guideline, effective from July 2014, is that for organisations convicted of offences of unauthorised or harmful deposit, treatment or disposal etc of waste and/or Illegal discharges to air, land and water, under regulations 12 and 38(1), (2) and (3) of the Environmental Permitting (England and Wales) Regulations 2010, regulations 12 and 38(1), (2) and (3), of the Environmental Permitting (England and Wales) Regulations 2016, or section 33 of the Environmental Protection Act 1990.
346 Surfers against Sewage (WQR0031)
347 Q229, Sir James Bevan, 23 June 2021

Implications for monitoring and enforcement

198. The Rivers Trust argued that the Southern Water case demonstrated flaws in the current arrangements for monitoring and inspection:

> Operator self-monitoring (OSM) of wastewater treatment works [WWTWs] effluent quality is open to widespread corruption as visits are never random, so poor performance of WWTWs can be mitigated by operators for the 1–2 times a month they need to pass, but will fail for the rest of the time. It is clear that in an industry which is driven by profit and regulated by an underfunded and understaffed EA, OSM is a completely inadequate provision for protecting the environment.[348]

199. Sir James Bevan suspected that there may have been permit breaches and misreporting of which the Environment Agency had been unaware. He said that the regulator would follow up evidence raised by Professor Hammond:

> If we see evidence that a combined sewer overflow has spilled over its permit, we will check that with the company. Last year we identified 50 or 60 cases where we think that happened. I suspect there are more that we do not know about, and maybe that the companies do not know about, which is why we are pressing them to make sure they are satisfied that they are getting their own information from those monitors. […] The Panorama programme [on sewage pollution] made some very specific allegations about certain water companies, and we have followed those up with the water companies. If we find there was nonreporting in contravention of their permit or that they breached their permit, we will take appropriate action.[349]

200. In November 2021, the Environment Agency and Ofwat launched an investigation into more than 2,000 sewage treatment works, after new checks prompted water companies to admit that they could be releasing sewage into rivers and watercourses in breach of their permits. The Chair of the Environment Agency has said that the Agency will prosecute offences "where necessary".[350]

201. David Black, interim chief executive of Ofwat, indicated to us that environmental performance and compliance should be taken into account in relation to executive bonuses and dividend payments:

> Ofwat is immediately looking into this information to understand whether companies across England and Wales have complied with their statutory duties and licence conditions, as well as their management and corporate behaviour. I wrote to all water and wastewater companies […] requesting further information to better understand the scale and extent of any non-compliance, as well as our expectations for immediate remedial action. I

348 Rivers Trust (WQR0043)

349 Q212, Sir James Bevan, 23 June 2021. A BBC Panorama programme, *The River Pollution Scandal*, which examined potential misreporting by water companies, was first broadcast on BBC One on 12 April 2021.

350 'Water companies could face legal action after investigation launched into sewage treatment works', Ofwat, 18 November 2021

> also reiterated our clear expectations that environmental performance and compliance with obligations should be taken into account by companies when deciding on paying out dividends or executive bonuses.[351]

Our view

202. **Public confidence in the regulatory structures currently in force is understandably low. It is vital that the public can trust regulators to ensure that high levels of water quality in rivers are achieved and maintained.**

203. **We have identified multiple potential points of failure in the regulatory arrangements for monitoring, governance and enforcement of water quality. The Southern Water case has given rise to obvious and urgent questions about the system of operator self-monitoring and Environment Agency compliance monitoring. Given the duration of time when misreporting and large spills were routine at Southern Water, we cannot discount the possibility that similar practices have been occurring undetected at other water companies in England.**

204. **We welcome the investigation recently launched by the Environment Agency and Ofwat into permit compliance at sewage treatment works, following evidence presented to us indicating that the numbers of permit breaches may be far higher than disclosed by water companies under self-reporting arrangements. We look forward to examining the findings of the investigation.**

205. ***We recommend that the Environment Agency urgently review its practices in auditing the self-monitoring of wastewater treatment works by water companies. The Agency should also review its approach to enforcement and seek to reduce the interval between detection of permit breaches and prosecution.***

206. ***We further recommend that, in the interests of promoting public confidence in the criminal justice system and reducing the likelihood of reoffending, the Sentencing Council review the sentencing guidelines for water pollution offences. In our view, penalties for such offences should be set at a level that will ensure that the relevant risk assessments are routinely on the agenda of the boards of each water company.***

207. ***We recommend that Ofwat examine the scope of its existing powers in respect of water company remuneration, with a view to limiting the awards of significant annual bonuses to water company senior executives in the event of major or persistent breaches in permit conditions.***

4.6 Infrastructure investment to prevent sewage spills and pollution incidents

208. The chronic pollution problems highlighted above have prompted questions about the adequacy of long-term investment in the upgrading of the sewerage and stormwater network since water companies were taken into private ownership in 1991. Guy Linley-Adams, of Salmon and Trout Conservation, said that regulators and the industry had

351 Letter to the Committee from David Black, Interim Chief Executive of Ofwat, 18 November 2021

missed an opportunity post-privatisation to have started retrofitting and replacing the combined sewerage system. He argued that if this process had been started immediately 'we would be 33 years into it by now and we would be making some very good progress.'[352]

Investment since privatisation

209. Ofwat told us that over £160 billion had been invested overall in the water network since privatisation.[353] Water UK said that over the last 30 years the industry had invested £30 billion specifically on environmental improvements.[354] The Water Industry National Environment Programme (WINEP) has resulted in £1 billion per annum of capital investment, on average, across water companies in England in improvements to water treatment. Water UK indicated an industry programme to enhance 7,500 miles of river over the next five years, together with further investment priorities:

> Our goal is now to further drive down nutrient loading and support the move to increased recreational use of waterways through more freshwater designated bathing areas in rivers and lakes. Storm Overflows will see a further £1.1bn of investment over the next 5 years.[355]

210. Concerns have been raised that some investors in English water companies have been extracting dividends and equity from those companies that could otherwise have been re-invested in infrastructure improvement. Ofwat raised these issues with the Competition and Markets Authority in the context of appeals made by four water companies following its 2019 price review:

> There is no doubt that that some investors in the sector have over-leveraged their structures. And they have extracted large dividends and withdrawn equity, rather than invested to secure the long-term resilience of a vital public service, their businesses and the environment.[356]

The cost of increasing overflow storage capacity

211. One solution to reduce the frequency of overflows is to build bigger storage tanks. Thames Water highlighted its £4.9bn Thames Tideway Tunnel project to build 15 miles of extra sewerage capacity to tackle the largest sewage overflows from London boroughs into the River Thames. When operational by the mid-2020s the tunnel is expected to intercept 'the vast majority of the millions of tonnes of sewage overflowing into the tidal Thames every year from the capital's overloaded Victorian sewer system.'[357] Sarah Bentley explained that the cost of this investment had resulted in an additional £19 added to annual customer bills.[358]

352 Q53, Guy Linley-Adams, 10 March 2021
353 Q272, David Black, 23 June 2021
354 Water UK, *21st Century Rivers: Ten actions for change*, October 2021
355 Water UK (WQR0075)
356 Letter from Jonson Cox, Chair of Ofwat, to Kip Meek, Chair of the PR19 redeterminations panel, Competition and Markets Authority, on cost of capital and role of customers in regulatory proceedings, covering Ofwat's final submission to the CMA on PR19 redeterminations, 9 February 2021.
357 Thames Water (WQR0047)
358 Q498, Sarah Bentley, 13 October 2021

212. The water industry has estimated that it would cost £200 billion to go about eliminating sewer overflow spills with hard infrastructure across the entire network.[359] Ian McAuley, of Southern Water, pointed out the drawbacks of building bigger concrete storage capacity to prevent the need for the use of overflows:

> […] To try to eliminate all CSO sources by building bigger storage has several consequences for customers. It is expensive. It increases carbon footprint enormously, and ultimately we finished up taking that very diluted water into treatment works and treating it, which is an enormous carbon footprint and, effectively, we add more chemicals and more power to dilute water.[360]

Separation of combined sewer systems

213. Increasing the capacity of storage tanks at sewerage treatment works is only part of the solution to deal with surges in water volumes. Sir James Bevan suggested that in the longer term there needed to be a debate about

> whether, and if so how, we want to remove the source of the problem, which is these, frankly, Victorian-era combined sewers, which combine sewage and rainwater. As long as we have that system, we are going to have overflow and there is a debate to be had about whether, and if so how, we want to replace those systems. We can do a lot in the short to medium term to get to a better place.[361]

DEFRA told us at the outset of this inquiry that the cost of separating the country's combined sewage system and widely preventing or reducing surface water entering the system was unknown.[362] It has subsequently been estimated to cost more than £150 billion.[363] A Storm Overflows Taskforce set up by Ministers commissioned research which suggested that the complete separation of the entire wastewater and stormwater network (eliminating the need for storm overflows altogether) would cost between £350 billion and £600 billion.[364] The Environment Act 2021 requires Ministers to prepare a report by September 2022 on the actions required to eliminate discharges from storm overflows in England, and the costs and benefits of those actions.[365]

4.7 Ofwat price reviews and investment in the sewerage network

214. Every five years Ofwat conducts a Price Review of the business plans of water companies, subsequently setting price limits on what water companies can charge their customers and what they can spend in their regulated business plans. When reviewing company prices, Ofwat is expected to balance the interests of water customers—and their presumed preference for lower bills—with the need to make sure the water companies can finance their operations, invest and maintain infrastructure and meet environmental

359 Q486, Ian McAulay, 13 October 2021
360 Q423, Ian McAulay, 13 October 2021
361 Q211, Sir James Bevan, 23 June 2021
362 Department for Environment, Food and Rural Affairs (WQR0028)
363 'DEFRA response to Environment Bill storm overflows amendment coverage', DEFRA Press Office, 25 October 2021
364 Gov.uk, Storm Overflow Evidence Project Final Report, November 2021
365 Section 84 of the Environment Act 2021.

responsibilities.[366] The last price review occurred in 2019 (PR19) setting prices for the period from 1 April 2020 to 31 March 2025. The next price review (PR24) will take place in 2024 and will set prices for 2025 to 2030.

215. We were told that Ofwat's Price Review process had prioritised keeping bills low at the expense of the investment in assets necessary to bear down on the use of storm overflows.[367] Salmon and Trout Conservation argued that infrastructure had not kept pace with population growth because the water industry's asset management plans have not required water firms to do so.[368] Heidi Mottram provided us an example of this, explaining that an £80 million plan to manage surface water and reduce flooding proposed by Northumbrian Water had been refused by the regulator. She said that 'because of the way that Ofwat's methodology currently works' it was 'looking backwards' and in her view ignoring the growing pressure that climate change and more intense rain was putting on the system.[369] Many submissions further argued that there had been insufficient investment in nature-based solutions that use natural processes to slow and filter water entering or leaving the system.[370] We discuss these concerns below.

Capital investment

216. The Angling Trust and Salmon and Trout Conservation argue that there has been a capital funding gap of at least £10 billion for the water industry over the last 10 years. Using data on water pipe replacement rates they have calculated that the typical replacement/renewal rate in the UK is around 0.05% of the network per annum. They claim that this implies Ofwat and the water companies are expecting sewers to last for 2,000 years—10 times longer than the European average. DEFRA calculated in 2012 that the replacement rate for the sewerage network was on average 800 years.[371]

217. Sarah Bentley, chief executive of Thames Water, outlined the scale of the investment challenge facing her water company over the next five-year price review period starting in 2024:

> So £114 million is going to go to upgrade the capacity at 265 sewage treatment works. Some of that is also then keeping up with population growth. Over the 10-year period, London is due to grow by 480,000 people. It is like moving Manchester into London and there are higher growth rates in the Thames Valley where, over the next period of time, it is like moving Birmingham in. Therefore, we need to invest, one, to meet the capacity, and two, to keep up with growth, and three, to keep up with climate change.[372]

366 *Economic regulation of the water industry in England and Wales*, House of Commons Library Briefing Paper 8931, June 2020
367 Colne Valley Fisheries Consultative (WQR0011)
368 ''Conspiracy of silence': DEFRA and regulator subject of sewage complaint to OEP,', ENDs Report, 13 September 2021
369 Q426, Heidi Mottram, 13 October 2021
370 Anglian Water Services Ltd (WQR0038); Chartered Institute of Water and Environmental Management (CIWEM) (WQR0074); Salmon and Trout Conservation (WQR0002);Professor Nigel Watson (Professor of Geography and Environmental Management at Lancaster University) (WQR0007); Albion Water (WQR0016)
371 *Water for Life*, DEFRA, December 2011, Section 4.25, p56
372 Q418, Sarah Bentley, 13 October 2021

Price reviews and environmental impact

218. A number of stakeholders argued that Ofwat's focus on keeping bills low meant that it had not given enough attention to the environmental impact of the industry.[373] Anglian Water told us that the most recent price reviews for the water industry had not supported the 'long-term strategies for nature, water resources and wastewater networks' that are necessary.[374]

> Rather, the focus of the economic regulator has been on reducing bills for customers in the short term at the expense of the long-term investment needed to address the challenges of climate change and population growth. Our customers strongly support more investment, with this considered to be more important than bill reductions.[375]

Anglian was one of four water companies to challenge Ofwat's Final Determination for PR19 with an appeal to the Competition and Markets Authority, arguing that its business plan had been underfunded by nearly £750 million.[376]

219. We heard complaints throughout the inquiry about the effect of price review outcomes on the approach taken by water companies to their existing assets. Guy Linley-Adams said that

> The problem has been that Ofwat has allowed water companies—in fact, encouraged water companies—to sweat their assets, to run their sewage works at near capacity and has not allowed the water companies to invest in the spare capacity that all sewage systems should have, so that when they do become overloaded the CSOs operate, and there is sewage being discharged into rivers.[377]

Water company perspectives on the price review process

220. Southern Water pointed out that while the last two price reviews delivered bill reductions for customers, its own research showed that the priority for most customers was 'stable bills and resilient services'. As water services remained affordable for the majority of its customers, Southern Water's research indicated that many would be willing to pay more for environmental and resilience improvements:

> At the last two price reviews there was scope to deliver significantly more environmental and resilience improvements within a stable or even falling bill environment, but the focus on delivering very large bill reductions meant that this opportunity was lost. More could be done to facilitate discretionary investment for environmental outcomes, where these are affordable.[378]

373 Q51, Dr Rob Collins, 10 March 2021; Q85, Professor Becky Malby, 21 April 2021; Salmon and Trout Conservation (WQR0002); Anglian Water Services Ltd (WQR0038); The Rivers Trust (WQR0043)
374 Anglian Water Services Ltd (WQR0038)
375 *Ibid.*
376 *Ibid.*
377 Q53, Guy Linley-Adams, 10 March 2021
378 Southern Water (WQR0059)

221. Ian McAulay, chief executive of Southern Water, suggested that Ofwat should allow more investment in the forthcoming Price Review 24:

> Many of our assets are older and we believe there should be more money directed towards maintenance, capital maintenance and renewals. That does hold us back a little bit. Clearly, there has to be more investment, and one of the things I am very pleased about is our new investment deal, with £1 billion of equity coming in, which will be directed towards the asset base to build resilience.[379]

222. Thames Water argued that a longer-term approach to regulation was needed to ensure sustainable water and wastewater provision and to encourage the uptake of nature-based solutions, such as integrated constructed wetlands, through the price review process:[380]

> Ofwat's main criteria for evaluating company performance remains efficiency. Nature-based solutions will in some situations cost more but deliver wider benefits. In others they may fail to deliver the required outputs, requiring further investment to meet environmental standards. A long-term perspective will allow the variable effectiveness of nature-based solutions to be fully understood and investment provided to those which show the greatest potential over time.[381]

223. This view was echoed by Dr Rob Collins, of the Rivers Trust, who highlighted Ofwat's 'strong focus on domestic customer bills', but observed that 'the environmental impact of the water industry has not received anywhere near enough attention for some time'.[382] Salmon and Trout Conservation did not believe that Ofwat allowed water companies sufficient investment in infrastructure:

> In particular, we do not support the economic regulator's policy of forcing water companies […] to operate existing sewage works beyond their design capacity, with the result that combined sewer outflows and other discharges of undertreated sewage outside of periods of heavy rainfall have become routine.[383]

224. Since PR14 (which set prices for the period from 2015 to 2020), Ofwat has moved to an 'outcomes based framework'. It now supports a total expenditure ('totex') approach, which means both capital expenditure and operational expenditure such as maintenance are treated equally. Ofwat explained that capital expenditure solutions would now not be unduly incentivised or favoured over non-capital expenditure solutions, an approach which would support companies to adopt nature-based solutions, such as constructed wetlands.[384] The Environment Agency said that the 2020–2025 price review had seen water companies increase the use of nature-based and catchment approaches in their

379 Q486, Ian McAulay, 13 October 2021
380 Thames Water (WQR0047)
381 *Ibid.*
382 Q52, Dr Rob Collins, 10 March 2021
383 Salmon and Trout Conservation (WQR0002)
384 Ofwat (WQR0078)

business plans.[385] Anglian Water welcomed Ofwat's shift towards 'totex' thinking, but cautioned that its approach to allowing investment in nature-based solutions was 'not yet mature' and that regulatory barriers remained.[386]

Nature-based solutions

225. Nature-based solutions provide services that mitigate pollution while also protecting, restoring or creating new wildlife habitats.[387] In this chapter we will be referring chiefly to nature-based solutions in relation to water treatment works. In the following chapter we examine sustainable drainage systems that use nature-based solutions to slow down the rate at which surface water enters sewerage systems.

226. Nature-based solutions can be used as part of the wastewater treatment process to provide extra treatment to effluent before it is discharged into water courses. For example, constructing an adjacent wetland can help to filter nutrient pollution, slow the flow of water and prevent flooding, whilst also providing habitat for birds, fish and invertebrates. Committee members saw an example of this during a visit to Thames Water's Burford wastewater treatment works in July 2021: a constructed wetland is being used to provide a final stage of treatment for wastewater prior to discharge.

Figure 4: A nature-based solution at Burford sewage treatment works

Source: photograph taken by Gabriel Sainhas, House of Commons Committee Online Services

385 Environment Agency (WQR0029)
386 Anglian Water Services Ltd (WQR0038)
387 Nature-Based Solutions Initiative, University of Oxford, *What are Nature-based Solutions?* [Date accessed 16 May 2021]

227. Several submissions pointed out that the regulatory structure of the price review process had historically favoured engineered solutions. Professor Nigel Watson argued that the five-year price review process disadvantaged nature-based solutions that required a longer time frame, such as catchment-sensitive farming, woodland planting and wetland construction. As a result, they had not featured as prominently in water company plans as engineering solutions.[388] Liv Garfield, chief executive of Severn Trent, told us that equipping sewage treatment works with nature-based solutions would be more expensive in the short term but would deliver savings over the long term.[389]

228. David Black, interim chief executive of Ofwat, defended the price review approach, explaining that a lot was demanded of the process.[390] Because companies did not face any threat of competition, consumers depended on Ofwat to set a level of efficiency challenge. It was Ofwat's role to challenge the cost-efficiency of environmental improvements, but the regulator did not challenge the need for such improvements.[391]

229. Ofwat also warned that if the elimination of sewer overflows were to be addressed primarily through water company investment, the costs could be 'economically unacceptable to customers and the public'. There needed to be a 'whole system approach' to eliminating harm from storm overflows, including upstream flood management, behaviour change and sustainable drainage solutions (SuDS) in housing development that could deliver wider environmental outcomes such as net zero and biodiversity:

> Water company infrastructure clearly has a fundamental role to play, but building greater storage tank capacity, for example, cannot solve these issues alone. Not only would the associated costs likely be economically unacceptable to customers and the public, it will never be enough to address the ever-growing pressures and challenges that impact what enters the water companies' infrastructure.[392]

230. The Chartered Institution of Water and Environmental Management (CIWEM) argued that growing incidences of sewage pollution from stormwater overflows was 'a symptom of a far wider mismanagement of water within our urban landscape'.[393] In the next two chapters we will consider the multi-faceted nature of the water governance problem and examine the contribution that better planning, behaviour change and catchment-based approaches can play in improving water quality.

Our view

231. **It is clear that there are no quick fixes to decades of under-investment in the sewerage network in England. Successive administrations, water companies and regulators have grown complacent and have sometimes appeared resigned to maintaining the antiquated practice of dumping sewage in rivers.**

388 Professor Nigel Watson (Professor of Geography and Environmental Management at Lancaster University) (WQR0007)
389 Q487, Liv Garfield, 13 October 2021
390 Q272, David Black, 23 June 2021
391 *Ibid.*
392 Ofwat (WQR0078)
393 Chartered Institute of Water and Environmental Management (CIWEM) (WQR0074)

232. **Ofwat's regulatory approach to date appears to have placed insufficient emphasis on facilitating the investment necessary to ensure that the sewerage system in England is fit for the challenges of the 21st century, and able to cope with housing growth and the impact of climate change while restoring good ecological health to rivers. Investment must be accelerated so that damaging discharges from wastewater treatment assets, including storm overflows, cease and that any spills occur only in genuinely exceptional circumstances.**

233. **The Secretary of State has the opportunity to set strategic direction for Ofwat. Now is the time for the Government to act in encouraging Ofwat to increase materially the proportion of each company's capital investment devoted to improving water quality.**

234. ***We recommend that Ofwat prioritise the long-term investment in wastewater assets as an essential outcome of its price review process. We further recommend that Ofwat incentivise the use of nature-based solutions in wastewater management, including ongoing funding for maintenance and operation.***

235. ***We intend to invite the regulator to appear before this Committee routinely to discuss Ofwat's progress against the objectives of the new Strategic Policy Statement for the regulator which is shortly to be published by Ministers.***

236. **The Government acknowledges that reductions in discharges from the sewerage network will require significant investment across the water estate. The price estimate made by the Storm Overflows Taskforce of the cost of full separation of the entire sewerage network should be carefully scrutinised by the Government as it produces its plan, required by September 2022 under the Environment Act, on the actions required to reduce discharges from storm overflows in England.**

237. **There is nevertheless no reason not to seek rapid and sustained action towards achieving the Act's requirement for progressive reductions in discharges, through incorporating capital projects into a whole-systems approach which seeks to reduce the overall pressures being placed on aging infrastructure. The Thames Tideway demonstrates that substantial capital projects can be secured without unaffordable bill increases. *We recommend that Ministers publish their assessment of every possible option to reduce system pressures on existing infrastructure, while also examining the case for significant capital works, when preparing the statutory report on elimination of storm overflows due by September 2022.***

4.8 The Environment Act 2021 and sewer overflows

238. The Environment Act 2021 received Royal Assent on 9 November 2021. We have already referred to several of its relevant provisions: we summarise below the main provisions which have a bearing on water quality issues.

239. The Act places the following duties on water companies:

- to achieve a progressive reduction in the adverse impacts of discharges from storm overflows;

- to produce drainage and sewerage management plans, setting out how they will manage and develop their drainage and sewerage system over a minimum 25-year planning horizon, including how storm overflows will be addressed through these plans;
- to publish annual data on the operation of sewer overflows;
- to publish near real time information (within 1 hour) of the commencement of an overflow, its location and when it ceases; and
- to monitor the water quality upstream and downstream of a storm overflow or a sewage disposal works.[394]

The Act also places a number of duties on the Secretary of State for Environment, Food and Rural Affairs:

- to produce a report before 1st September 2022 setting out the actions that would be needed to eliminate storm overflows in England and the costs and benefits of those actions;
- to publish a plan before 1st September 2022 to reduce sewage discharges from storm overflows and to reduce their adverse impact including on public health;
- to report to Parliament progress implementing the plan.[395]

240. The Government has told us that it expects action on reducing the adverse impacts of discharges from storm overflows to begin immediately. It says this work will increase in pace and scale from the next water industry Asset Management Period (2025–2030) and continue into the long term. Further detail on what kinds of reductions are expected during PR24 will be set out during Ofwat's price review process.[396]

241. We discuss the governance provisions in the Act, including the appropriate scope of drainage and sewage management plans, in Chapter Six below.

242. **We welcome the duty which the Environment Act 2021 places on water companies in England to secure a progressive reduction in the adverse impact of discharges from their storm overflows. This is a positive first step towards cleaning up the sewage discharges blighting rivers in England.**

243. ***We recommend that Ministers and the Environment Agency should set challenging improvement targets and timetables for this progressive reduction to inform the drainage and sewage management plans to be drawn up by each water company. The first round of these plans should clearly indicate significant ambition, by setting a stretching timetable for progressive reductions in the use of overflows.***

394 Legislation.gov.uk, Environment Act 2021
395 Department for Environment, Food and Rural Affairs (WQR0105)
396 Department for Environment, Food and Rural Affairs (WQR0105)

5 Surface drainage and urban pollution

244. In this chapter we will consider how to manage surface water drainage more effectively to prevent pollution of water courses and to reduce pressures on the sewer system. Urban diffuse pollution from streets, highways, homes, and businesses, both in and between towns and cities, prevents 18% of water bodies from achieving good ecological status.[397]

245. Run-off that enters sewers from roads and urban surfaces carries microplastics, hydrocarbons, and litter into water courses. The incorrect disposal of fats oils and greases, and plastic cleaning wipes and other sanitary products flushed into foul water drains is congealing into blockages that cost companies and customers in the region of £100 million a year.[398] This adds to pressures on the sewerage system that cause sewer overflows to spill more frequently. Sustainable drainage systems have the potential to filter pollutants and slow the flow of water into the system at times of heavy rainfall, and we examine below the potential to incorporate them into the network.

246. DEFRA states that improvements in the sustainability of surface water drainage will require action from a range of bodies. Ownership of surface water drainage features is fragmented across a range of both public and private parties, including local authorities, highway authorities, internal drainage boards, water companies, and private individuals and businesses. DEFRA acknowledges that powers and duties to manage drainage features are often less than clear cut.[399] Regulation, duties and responsibilities in this area are split across government agencies and local authorities.[400]

5.1 Sewer blockages

247. The disposal, via drains and toilets, of waste products that the sewerage system is not designed to take causes costly blockages. These make pollution incidents and flooding more likely. Fats, oils and greases (FOGs) and 'unflushable' items like plastic wet wipes, most of which contain plastic, can block or constrict sewers, reducing their capacity and making them more likely to back up and overflow.[401] Plastic materials also clog up and block the screens fitted to storm overflows to prevent discharge of solid material to the environment: this also increases the risk of flood and pollution.[402] As noted in Chapter One, plastic can cause entanglement risks for wildlife, while the anti-bacterial chemicals coating cleaning wipes can be toxic to aquatic life. Daniel Johns of Anglian Water cited staggering statistics on the scale and impact of the problem:

> It is illegal for households and businesses to put things into sewers that restrict their flow and cause damage, and yet every day 7 million wet wipes, 2.5 million tampons, 1.5 million sanitary pads and 700,000 panty liners are flushed incorrectly down the toilet. For Anglian Water, that means 100 tonnes daily of unflushable material having to be raked out of the wastewater stream when it arrives at our works.[403]

397 HM Government, 25 Year Environment Plan Annual Progress Report: April 2020 to March 2021, October 2021
398 Q179, Daniel Johns , 26 May 2021
399 DEFRA. 2018. Report of a review of the arrangements for determining responsibility for surface water and drainage assets (publishing.service.gov.uk)
400 Department for Environment, Food and Rural Affairs (DEFRA) (WQR0028)
401 Q128, Alastair Chisholm, 26 May 2021
402 Environment Agency (WQR0029)
403 Q170, Daniel Johns, 26 May 2021

Fats, oils and greases

248. Warm fats and grease in a liquid form or waste cooking oil poured down sinks and drains can block sewers or impede wastewater treatment works, leading to discharges of untreated sewage which are more frequent and of longer duration. Plastic products can combine with FOG that has been poured down drains to form congealed blockages in pipes and sewers that have been dubbed 'fatbergs'. Daniel Johns likened the effect that wet wipes and FOG were having clogging up the system to 'arteries being clogged by cholesterol'.[404] He described a recent operation to remove a giant fatberg in Southend:

> … we performed a flush-to treatment, a full overhaul of the 80-kilometre sewerage system in Southend. From that, over the course of several months, we pulled out 200 tonnes of unflushables, fatbergs and wet wipes. Somebody volunteered to do a sewer autopsy on that fatberg material. The chief culprit is always the same, time and time again: wet wipes containing plastic fibres, which are marketed today in supermarkets and high-street chains as flushable and yet they do not degrade in sewers and they cause the kinds of wet-wipe reefs that you saw on the Panorama programme.[405]

In context, 'that is the size of two blue whales pulled out of one town in one part of the country'.[406] The waste extracted is sent to landfill.[407]

Wet wipes

249. Wet wipes containing plastic fibres were identified by multiple stakeholders as a problem product in the inquiry.[408] We heard varying estimates of the percentages of blockages caused by wet wipes, with different figures likely to reflect different locations. Analysis of over 260,000 blockages on the public sewer network across the country, in 2019/2020 water company data, suggests that 40% of pollution incidents were caused by blockages and almost 60% of these incidents are caused by wet wipes.[409]

The cost of unblocking sewers

250. Clearing blocked sewers costs water companies and their customers between £90 million and £100 million annually.[410] Thames Water clears 75,000 blockages annually from its sewers at a cost to the company of around £18 million.[411] It says that approximately 85% of these blockages are caused by items that should go in the bin, with wipes that typically contain plastics making up 90% of blockages' content.[412]

404 Q159, Daniel Johns, 26 May 2021
405 Q170, Daniel Johns, 26 May 2021
406 *Ibid.*
407 *Ibid.*
408 Rivers Trust (WQR0043); Thames Water (WRQ0047); Q170, Daniel Johns, 26 May 2021;
409 Environment Agency (Gov.uk) Water and sewerage companies in England: environmental performance report for 2020, Updated 23 July 2021
410 Anglian Water Services Ltd (WQR0038); Q179, Daniel Johns, 26 May 2021
411 Thames Water (WQR0047)
412 Thames Water (WQR0047)

Preventing blockages

251. It is clear that single use plastic cleaning and hygiene products are causing significant problems, especially when combined with fats, oils and greases. In the sections below we consider policies to prevent the incorrect disposal of these materials and reduce the blockages they cause.

FOG regulation

252. According to Lila Thompson, chief executive of British Water and Chair of the Grease Contractors Association, the boom in take away dining and increasing number of delivery-only 'dark kitchens' springing up in industrial units could exacerbate the problem of FOG entering the sewerage network.[413] She warned that 'there is no legislation in place that says that food service establishments and commercial kitchens should have effective grease management systems'.[414] She stressed that:

> This area is going to grow, so we need to ensure that food service establishments are properly able to manage their fats, oils and grease, which are by-products of food production, food preparation and kitchen-ware washing.[415]

253. She added that there was currently no clear guidance on management of FOG, and where regulations and standards did exist the language was 'very vague':[416]

> We have building regulations, but they are not retrospective. The wording around the management of FOG is weak. It says what commercial kitchens *should* do rather than what commercial kitchens *must* do. It also refers to EN 1825, a standard adopted by the British Standards Institute. It refers only to passive grease traps and does not specify the range of grease management solutions out there for food service establishments.[417]

She provided anecdotal evidence from a blockage investigator that 90% of food service establishments visited do not have any grease management systems in place.[418] She said:

> We need to deal with FOG at source. We need to make sure we have legislation in place and effective standards that go across the whole range of grease management systems, and also that FOG is regarded as part of the food waste hierarchy.[419]

254. Anglian Water pointed out that it is illegal to dispose of anything in a sewer that can block or restrict its flow.[420] Daniel Johns suggested that FOG should be regulated as a trade effluent and a permitting system established, overseen by water companies, to require takeaways and food establishments to install grease management equipment.[421]

413 Q164, Lila Thompson, 26 May 2021
414 Q172, Lila Thompson, 26 May 2021
415 Q164, Lila Thompson, 26 May 2021
416 Q165, Q172, Lila Thompson, 26 May 2021
417 Q165, Lila Thompson, 26 May 2021
418 *Ibid.*
419 *Ibid.*
420 Q173, Daniel Johns, 26 May 2021, citing section 111 of the Water Industry Act 1991
421 Q166, Q173, Daniel Johns, 26 May 2021

Tackling wet wipes and other plastic items

255. Thames Water said its 'Bin it, don't block it' awareness campaign had successfully reduced the incidence of blockages, but 'policy interventions are also needed to ensure manufacturers take responsibility for the impact of their products'.[422] It said manufacturers should not label their items 'flushable' unless they meet the industry's 'Fine to Flush' standard, which indicates whether a wipe will quickly and effectively disintegrate in the sewerage network.[423]

256. Images released to the press by the charity Thames21 were recently published claiming to show a metre tall mound in the River Thames, the size of two tennis courts, formed by an estimated one million wet wipes flushed down toilets and then deposited in the river by sewer overflows.[424] Daniel Johns remarked on recent footage of a 'wet wipe reef' on the bank of the Thames. He said:

> That material just should not be there. Wet wipes need to be tackled at source so that it is not possible to buy from a supermarket or a local drugstore chain wet wipes containing plastic fibres. The same should go for sanitary products.[425]

257. Anglian Water called for the use of plastic in wet wipes to be banned altogether and suggested that new powers in the Environment Act should be used to apply extended producer responsibility to manufacturers of single use sanitary products and cleaning wipes to meet Fine to Flush standards and recover 'the £100 million that water companies have to spend to clear this stuff out of sewers'.[426] Daniel Johns added that:

> In terms of sanitary products, given they do not necessarily degrade if they do go into the sewer, there will still be a role for consumer education, really clear labelling and messaging on the front of packets and education in schools so that these products are not flushed and also to promote plastic-free periods.[427]

258. Fleur Anderson MP recently introduced a Plastics (Wet Wipes) Bill into the House under the ten minute rule.[428] Her bill would prohibit the manufacture and sale of wet wipes containing plastic.[429] Professor Peter Hammond pointed out that it was not just plastic content or physical presence of wet wipes that was problematic:

> … if you use wet wipes to clean your kitchen, you are using cleaning products that have surfactants in them. Those surfactants then get into the sewerage system and, for instance, they damage fish's lungs, the mucous membrane can no longer function properly so they do not get oxygen. It is not just the actual presence of the wipes; it is what is on them.[430]

422 Thames Water (WQR0047)
423 Thames Water (WQR0047); see also Anglian Water Services Ltd (WQR0038)
424 The Times, Mountain of wet wipes formed in the Thames, 25 November 2021
425 Q159, Daniel Johns, 26 May 2021
426 Anglian Water Services Ltd (WQR0038); Q179, Daniel Johns, 26 May 2021
427 Q179, Daniel Johns , 26 May 2021
428 Official Report, 2 November 2021, cols 762–64.
429 Plastics (Wet Wipes) Bill (Bill 182 of Session 2021–22)
430 Q99, Professor Peter Hammond, 21 April 2021

Extended Producer Responsibility

259. The Government's Resources and Waste Strategy for England, issued in 2018, set out its aim to reduce waste and prevent plastic pollution. DEFRA committed in the Strategy to review and consult on Extended Producer Responsibility schemes for five important waste streams by the end of 2025. These are textiles, bulky waste, construction and demolition materials, vehicle tyres and fishing gear.[431] Textiles, vehicle tyres and fishing gear all contribute to plastic pollution of the water environment in rivers and seas around England.

260. At present many of the producers of polluting products do not pay or incorporate the cost of environmental externalities in their prices. The Environment Act 2021 provides a new framework to correct this market failure. It requires Ministers to pay due regard to environmental principles, such as the polluter pays principle when making policy.[432] It grants the Secretary of State the power to introduce Extended Producer Responsibility (EPR) schemes—the first of which will be for producers of plastic packaging—to make producers responsible for the environmental cost of the products they place on the market.

261. CIWEM advocated the use of producer responsibility schemes to recover costs from the manufacturers of problem products in line with the 'polluter pays' principle.[433] David Black, interim chief executive of Ofwat, told us that the regulator would welcome Government examination of the case for recouping the costs of blockages from the manufacturers of products causing the problems.[434]

Our view

262. **Fats, oils and greases and cleaning and hygiene products containing plastic are causing huge problems for drainage systems when they are poured away in sinks or flushed down the toilet. The disposal of FOG by takeaways and other food service establishments is currently unregulated. Grease management solutions exist, but awareness appears to be low. The food service industry needs clear guidance and standards to be established, failing which firmer regulation is likely to be required, to ensure it begins to take responsibility for addressing an issue which is costly for water company customers and detrimental to sewerage systems and the environment. There could be potential circular economy benefits for businesses that can utilise these harmful waste products as biofuels.**

263. ***The water and grease management industry must develop standards for the sectors which use FOG routinely to collect and dispose of such responsibly without it entering the drainage network. We further recommend that Ministers work with the water industry to consider whether fats, oils and greases should be classed as a trade effluent and all takeaways and food outlets required to install grease management systems.***

264. **Wet wipes and other 'unflushables' are a major constituent of sewer blockages. Many householders are unaware that flushing anything other than the '3Ps' ('pee, poo and paper') risks blocking sewers and could lead to a pollution incident. Better product**

431 DEFRA, Waste Prevention Programme for England: Towards a resource efficient economy, March 2021
432 Legislation.gov.uk, Environment Act Section 17 (5) (e)
433 Chartered Institution of Water and Environmental Management (CIWEM) (WQR0074)
434 Q236, David Black, 23 June 2021

labelling, introducing producer responsibility schemes and the use of behavioural science by water companies all have the potential to reduce blockages and the costs of clearing them.

265. ***The use of plastic in single use sanitary products should be prohibited, with exemptions only provided for medical requirements. We urge the Government to adopt the measures outlined in the Plastics (Wet Wipes) Bill to prohibit the manufacture and sale of single use cleaning and hygiene products containing plastic. The Government should further incentivise the reduction of waste and recoup costs by using new powers in the Environment Act to extend Extended Producer Responsibility schemes to cover single use cleaning and hygiene products that cause blockages.***

5.2 Urban pollution and road run-off

266. In built up areas, pollutants accumulate on hard surfaces such as roads and car parks which can then be washed into the sewer network during rainfall.[435] Where this 'urban run-off' enters conventional surface water drainage systems the pollutants are then discharged directly into rivers, streams or estuaries untreated where they can cause acute or chronic problems.[436] For instance, oils and detergents contained in the diffuse pollution from urban areas can be harmful in rivers and streams. The phosphates in detergents can 'overfertilise' the water with nutrients leading to excessive algae growth, consuming oxygen and killing fish, animals and plants.[437] Diffuse pollution from highways, towns and cities can lead to chronic impacts on the quality of aquatic life in rivers as it accumulates in sediments.[438]

267. We heard concerns that National Highways, local authorities and the Environment Agency were not doing enough to prevent this pollution entering rivers.[439] The NFU complained that urban diffuse pollution was 'often overlooked when it comes to addressing water pollution, particularly when compared to the attention agriculture receives.'[440] Jo Bradley of Stormwater Shepherds, an organisation campaigning to stop urban and plastic pollution at source, argued that it was a mistake to allow 'high-profile, headline-catching topics' like sewage spills to dominate the policy debate about water quality:

> I hear and see television programmes and reports … about sewage pollution and agricultural pollution. Although those two pollutant sources are incredibly important, highway run-off sticks out as the poor relation that nobody gives any attention to. […] The Environment Agency pays no attention to it.[441]

435 Department for Environment, Food and Rural Affairs (DEFRA) (WQR0028)
436 *Ibid.*
437 Environmental Audit Committee, *Hand car washes*, Tenth Report of Session 2017–19, HC 981
438 Department for Environment, Food and Rural Affairs (DEFRA) (WQR0028)
439 Stormwater Shepherds UK (WQR0004); National Farmers Union (WQR0042)
440 National Farmers Union (WQR0042)
441 Q162, Jo Bradley, 26 May 2021

Run-off from major roads

268. Road run-off is a significant contributor to pollution in watercourses.[442] The run-off from highways can contain high levels of pollutants including polycyclic aromatic hydrocarbons which are persistent and carcinogenic. Jo Bradley described the three main components of highway run-off:

> One is the suspended solids. The amount of suspended solids in road run-off is immense, comparable to raw sewage, and those particles coat the base of the water course, the bed of the water course, and cause all sorts of problems for spawning grounds for fish but also create a source of pollution that is there all the time, insidiously releasing this pollution into the water column. The suspended solids are the biggest problem [..]. Within that, you have the polyaromatic hydrocarbons, which I have already mentioned because they are carcinogenic, and then you have dissolved metals, which are toxic to fish. You have this cocktail of pollutants.[443]

269. She went on to explain how toxic this 'cocktail' of road run-off could be:

> These organic compounds are identified as compounds of serious concern under REACH [chemical legislation]. They are carcinogenic, mutagenic, bio-accumulative and phytotoxic, which means that they sit within organisms and become more toxic as time goes by. They kill microscopic organisms in the sediment of the water course and therefore affect the entire ecosystem within the water course.[444]

Car wash wastewater

270. A predecessor Committee's 2018 inquiry into *Hand Car Washes* previously identified concerns about the free disposal of car wash waste-water into urban storm drains that either feed into combined sewers or discharge straight into water courses. This can contain phosphates, detergents, surfactants, oils, silts/ sediments, traffic film remover, rubber, copper, plastics and metals from tyres and cars. Similar issues were raised in this inquiry. Many hand car washes do not install interceptors to prevent harmful materials from entering drains from their trade effluent. The concerns raised during the earlier inquiry were largely dismissed by the Environment Agency at the time as being 'indistinguishable from other low-level sources of pollution' and not being serious pollution incidents worth devoting limited Environment Agency time and resources to deal with.[445] Our predecessors nevertheless concluded that 'risk prioritisation and a lack of inspections by the Environment Agency and water companies should not translate into a licence to pollute for hand car washes or any other businesses.'[446]

Microplastics entering rivers

271. Research into microplastic pollution in freshwater and marine environments remains in its infancy and there is a 'lack of a standard sampling and analysis' which hampers

442 .'Regulators ignoring horrific and poisonous road run off say EA insiders', ENDS Report, 3 March 2020
443 Q181, Jo Bradley, 26 May 2021
444 Q162, Jo Bradley, 26 May 2021
445 Environment Agency (HCW0024)
446 Environmental Audit Committee, *Hand car washes*, Tenth Report of Session 2017–19, HC 981

comparison across studies.'[447] However, the International Union for Conservation of Nature states that the overwhelming majority of primary microplastics (98%) are generated from land-based activities with the largest proportion of these particles originating from the laundering of synthetic textiles and from the abrasion of tyres while driving. It estimates that the main pathways of these plastics into the ocean globally are through road run-off (66%), wastewater treatment systems (25%) and wind transfer (7%).[448]

272. It is thought that a significant proportion of the microplastic particles entering the water environment in the UK come from brake and tyre wear from motor vehicles, including from electric vehicles marketed as 'greener'.[449] There are few specific studies providing a quantitative analysis of actual discharges from UK roads. Growing concerns about microplastic pollution prompted Highways England (now National Highways) to commission a literature review which

> … identifies a consensus that sources from (or carried by) road drainage comprise the single most important source of microplastics (plastics in the size range greater than or equal to 100 nanometres and less than 5 millimetres) and that tyre and road wear particle sources, which includes tyre wear and road markings, may make up 40% (though figures vary) of microplastics found in the water environment.[450]

273. A study by Professor Jamie Woodward's team at the University of Manchester suggests that untreated wastewater might be the main supplier of microplastics to river ecosystems.[451] Daniel Johns from Anglian Water contested this at our hearing in May:

> Highway run-off is the primary source of microplastics in rivers. Contrary to recent media reports about water company discharges, every survey points to microplastics, tyre dust, petrochemicals and other nasties entering rivers, often without any treatment, affecting pollution in water courses.[452]

Professor Woodward's research showed that, despite their ban in cosmetic products in the UK, plastic microbeads are still a major component of riverine microplastic contamination.[453] Professor Steve Ormerod, of Cardiff University, told us that it was 'early days' in understanding the full picture and said that research on the sources and composition of types of plastic were producing conflicting evidence:

> It appears that material such as plastic clothing fibres is one of the dominant types of material we find. We expect that that should come from wastewater treatment works, because it is associated with the washing of clothes. However, it is possible to find that material upstream of wastewater

447 Highways England, Task 1–902 Investigation of 'microplastics' from brake and tyre wear in road runoff, Final Project Report, September 2020

448 Boucher, J. and Friot D, Primary Microplastics in the Oceans: A Global Evaluation of Sources. Gland, Switzerland: IUCN, 2017

449 Stormwater Shepherds UK (WQR0004); Department for Environment, Food and Rural Affairs (DEFRA) (WQR0028)

450 Highways England, Task 1–902 Investigation of 'microplastics' from brake and tyre wear in road runoff, Final Project Report, September 2020

451 Woodward, J.C., Li, J., Rothwell, J.J. and Hurley, R.R. (2021) Acute riverine microplastic contamination due to avoidable releases of untreated wastewater. Nature Sustainability 4, 793–802.

452 Q163, Daniel Johns, 26 May 2021

453 Professor Jamie Woodward (Professor of Physical Geography at The University of Manchester) (WQR0095)

> treatment works and that implies that there may be some land-based route as well that makes people question, for example, the disposal of sewage sludge on to land that could then release that material in other ways.[454]

Professor Ormerod made it clear that there were 'other kinds of plastic that we are not fully on top of understanding', including those from road run-off:

> Most of the assessments [of plastic pollution in marine environments] look for visibly identifiable material, fragments, particles, but there may be much more amorphous plastic, things like tyre dust, for example, which is plastic based that we are only starting to get some kind of handle on what the amount present might be and at that stage we cannot know what the effects might be.[455]

Microfibre pollution from clothing

274. In a predecessor Committee's inquiry into *Fixing Fashion: Clothing consumption and sustainability* the issue of synthetic microfibres shedding from textiles and polluting rivers and oceans was raised.[456] The Committee was told that a single domestic wash had the potential to release as many as 700,000 fibres into domestic wastewater.[457] We were partly reassured during the *Fixing Fashion* inquiry when we were told that waste water treatment captured the majority of the fibres, but evidence to this inquiry about the volume of waste water discharged without full treatment raises doubts about the effectiveness of this process. Furthermore fibres captured in wastewater treatment may still be returned to the environment when sewage sludge is spread on the land as fertiliser. Research by the marine biologist Professor Richard Thompson has suggested that interventions by brands at the design stage may be the most effective way to reduce synthetic microfibre pollution.[458] The *Fixing Fashion* report recommended that the next phase of voluntary fashion industry sustainability targets coordinated by the waste charity WRAP should include targets to reduce microplastic shedding.[459] We are disappointed to note that WRAP has not included such targets in its new Textiles 2030 initiative. Alberto Costa MP recently introduced a Microplastic Filters (Washing Machines) Bill under the ten minute rule to require manufacturers to fit microplastic-catching filters to new domestic and commercial washing machines.[460]

Our view

275. **Tyre, motor vehicle and fashion manufacturers, among many others, must take greater responsibility for the contribution their products make to microplastic pollution in waterways. *We recommend that Ministers examine how the proposed Extended Producer Responsibility scheme for tyre manufacturers could contribute to the***

454 Q10, Professor Ormerod, 10 March 2021
455 Q10, Professor Ormerod, 10 March 2021
456 Environmental Audit Committee, *Fixing Fashion: clothing consumption and sustainability*, Sixteenth Report of Session 2017–19, HC 1952
457 Professor Richard Thompson (SFI0007)
458 *Ibid.*
459 Environmental Audit Committee, *Fixing Fashion: clothing consumption and sustainability*, Sixteenth Report of Session 2017–19, HC 1952
460 Microplastic Filters (Washing Machines) Bill, Bill 205 of Session 2021–22

swifter implementation of mitigation measures across the road network. We repeat our call for the Textiles 2030 scheme to incorporate the reduction of microplastic pollution in its targets.

Highway outfalls

276. An outfall is a surface water drain that discharges into a watercourse or directly into the sea.[461] There are estimated to be in the region of 1 million outfalls in England discharging run-off from roads and highways.[462] Unlike sewage works' discharges, highway outfalls have not typically been deemed to require a permit in the Environment Agency's interpretation of the Environment Permitting Regulations. Furthermore, they are not routinely monitored.[463] Responsibility for these is split between local authorities and National Highways (formerly Highways England) which has responsibility for the Strategic Roads Network of motorways and major A-roads.[464] Local authorities are responsible for urban road drainage but have no specific obligation for water quality, according to the Government.[465] National Highways, as a highways authority, is similarly exempt from the need for a permit to discharge its run-off.[466]

Minimising pollution from the strategic road network

277. The strategic road network has developed over 60 years to road design standards that were current at the time each major roads were constructed or improved.[467] Understanding of, and concern about, pollution of water from road run-off was lower during much of this time and as a result many of the drains and outfalls have little or no measures to mitigate the risk of road run-off carrying pollutants into watercourses. Despite increasing concern about pollution from run-off, a permitting system has not yet been introduced.[468]

Permitting outfalls that cause pollution

278. Jo Bradley of Stormwater Shepherds, a former employee of the Environment Agency, pointed out that 'environmental permitting regulations clearly say that discharges from a water discharge activity with poisonous, noxious, polluting matter must be regulated with a permit.'[469] She said that while legislation was in place to provide for regulation, 'it is just not enforced':

> The Environmental Permitting Regulations say that highway authorities can discharge the road run-off to the water environment without the need for a permit as long as it doesn't cause pollution. But all run-off from roads with a traffic density above approximately 15,000 Annual Average

461 Environment.data.gov.uk, Outfall [Date accessed 30 November 2021]
462 Department for Environment, Food and Rural Affairs (DEFRA) (WQR0028)
463 ENDS Report, 2020. Regulators ignoring horrific and poisonous road run off say EA insiders
464 National Highways (formerly Highways England, and before then the Highways Agency) is the government-owned company which plans, builds, operates and maintains England's Strategic Road Network (SRN) which comprises of over 4500 miles of motorways and major A-roads motorways and major A-roads. These account for 3% of roads, but carry 34% of all traffic and 68% of freight (see Highways England, 2020. Strategic Business Plan 2020–2025).
465 Department for Environment, Food and Rural Affairs (DEFRA) (WQR0028)
466 Under the Highways Act 1980 and the Groundwater (England and Wales) Regulations 2009.
467 Letter from Nick Harris to the Environmental Audit Committee, 13 August 2021
468 Stormwater Shepherds UK (WQR0004)
469 Q182, Jo Bradley, 26 May 2021

> Daily Traffic causes pollution every time it rains. Road run-off contains toxic metals, carcinogenic organic compounds and microplastics and these pollutant levels must be reduced to an acceptable level before the run-off is allowed to discharge.[470]

She suggested that the Environment Agency could therefore serve notice on the highway authority to say, 'We think this outfall is causing pollution, we want you to apply for a permit'.[471] The permit could then describe how much treatment was necessary either quantitively or in terms of a Sustainable Drainage System mitigation.[472]

Solutions to capture road run off

279. A number of passive treatment devices can be installed to reduce highways pollution: these include filter drains, vortex flow separators and oil water separators. These can be used on their own or combined with sustainable drainage systems.[473] Anglian Water argued that highways authorities should use natural sustainable drainage features where possible to help slow and clean water before it enters drains.[474]

National Highways performance on water quality

280. National Highways has a target to improve 17.5 linear kilometres of watercourse every year.[475] The organisation's annual report for 2020–21 states that it delivered 25 water quality initiatives, including mitigating 23 outfalls, improving 17km of waterbody.[476] It has one environmental performance indicator on water quality:

> The length (km) of watercourse enhanced through the mitigation of medium, high, and very high-risk outfalls as well as through other enhancements such as river retraining/rewilding.[477]

281. National Highways has an ongoing programme of work to record its existing asset inventory and to identify and mitigate locations verified as posing a potential pollution risk. In March 2019 the agency introduced a contract performance framework water environment metric: the objective of this metric was to ensure that all future road infrastructure improvement schemes would report improvements made to the water environment in line with the organisation's water quality performance indicator. This metric tracks the number of outfalls and soakaways a major project will mitigate.[478]

282. Nick Harris, chief executive of National Highways, told us that out of a total of 18,000 outfalls and 8,000 soakaways on the strategic road network 1,326 were considered high risk.[479] National Highways provided figures for the number of outfalls and soakaways

470 Stormwater Shepherds UK (WQR0004)
471 Q182, Jo Bradley , 26 May 2021
472 *Ibid.*
473 Jo Bradley private communication to Committee staff [18 May 2021]
474 Anglian Water (WQR0038)
475 Q252, Nick Harris, 23 June 2021
476 Highways England, Annual Report and Accounts 2021, HC 344, July 2021
477 Letter from Highways England to the Environmental Audit Committee, 13 August 2021
478 *Ibid.*
479 Q254, Q255, Nick Harris, 23 June 2021

in all risk categories (Tables 5a and 5b). The figures show that, taken together, only 3,991 out of a total of 26,401 outfalls and soakaways across the Strategic Road Network have measures in place to mitigate the risk of pollution to watercourses.[480]

Table 5a: Summary statistics for National Highways outfalls (based on data from June 2021)

Outfall Risk Category	Number		Percentage of total	
Risk Addressed (Category X)	2,515		13.6%	
Very High Risk (Category A)	364	Category A and B combined = 1,194	2.5%	Category A and B combined = 6.5%
High Risk (Category B)	830		4%	
Moderate Risk (Category C)	4,256		23.1%	
Low Risk (Category D)	8,344		45.3%	
Not Determined* (Category ND)	2,123		11.5%	
All categories	**18,432**		**100%**	

Source: Supplementary note from National Highways, dated 15 December 2021

Table 5b: Summary statistics for National Highways soakaways (based on data from June 2021)

Soakaway Risk Category	Number		Percentage of total	
Risk Addressed (Category X)	1,476		18.52%	
Very High Risk (Category A)	53	Category A and B combined = 132	0.7%	Category A and B combined = 1.7%
High Risk (Category B)	79		1.0%	
Moderate Risk (Category C)	248		3.1%	
Low Risk (Category D)	5,390		67.6%	
Not Determined* (Category ND)	723		9.1%	
All categories	**7,969**		**100%**	

Source: Supplementary note from National Highways, dated 15 December 2021

* ***National Highways note to both tables***: "Not Determined outfalls/soakaways are newly identified outfalls/soakaways which have been added to the Drainage Data Management System (DDMS) since the baseline assessment was undertaken. In the vast majority of cases these are not newly constructed outfalls/soakaways but existing outfalls/soakaways which have been recently mapped and added to the digital register following surveys undertaken on the network. We periodically undertake a review of all "not determined" outfalls and soakaways to provide a baseline risk classification. We will be undertaking the next review in 2022."

283. Nick Harris explained the approach taken by National Highways to mitigating the risks of pollution from run-off.[481] The agency designates funds to spend directly or together with other partners to put in place new mitigations, and also includes improvements in its rolling programme of capital maintenance. In the five-year period between 2020 and 2025 the agency expects to spend £10 billion on maintenance and capital maintenance of the strategic road network and £14 billion on enhancements to improve the network. Nick Harris said:

480 Letter from Highways England to the Environmental Audit Committee, 13 August 2021
481 Q254, Nick Harris, 23 June 2021

> When we do all of that work, we either rebuild or, when we are building new outfalls, we build them to our latest standards, which include mitigation measures.[482]

He was careful to clarify the categorisation of 'high risk' outfalls:

> When we call them high-risk outfalls, it does not mean they are polluting; it means we are concerned about them and we monitor them. They do not have in place all of the mitigation measures that we would put in place for newer schemes since 2009. It doesn't mean they are polluting; it means we are monitoring them carefully.[483]

284. National Highways provided figures for the number of outfalls and soakaways addressed in the last five years, showing that the number of recorded mitigations was in single figures before the introduction of the relevant performance metric in 2019. While the number of mitigations has since increased, the rate is still low in comparison to the thousands of outfalls and soakaways considered a risk. National Highways says that the table does not show all mitigation measures undertaken prior to the establishment of the performance metric in 2019 because prior to that date it did not routinely report on outfalls and soakaways that had been mitigated.

Table 6: Mitigations of outfalls and soakaways on the strategic road network since 2015/16

Year	Number of outfalls and soakaways mitigated
2015/16	n/a (*Year 1 recorded no mitigations as HE says this year was focused on development of the metric and implementation*)
2016/17	4
2017/18	5
2018/19	6
2019/20	14
2020/21	23

Source: Letter from Nick Harris to the Committee, 13 August 2021

285. Our inquiry necessarily focused on the risks of watercourse pollution from the strategic road network in England. It is likely that similar risks arise from outfalls on busy urban roads which are the responsibility of local authorities.

Our view

286. **Highways authorities at the national and local level must place a greater priority on preventing pollution from the strategic road network and from major roads maintained by local authorities in England. Solutions are available. These need to be rolled out as rapidly as possible.**

287. **National Highways mitigated risks of pollution from 23 drainage points in 2020/21. At this rate it will take over 55 years to address the 1,326 outfalls and soakaways it has identified as high risk, not to mention the thousands of other potentially polluting drains on the strategic road network. This is unacceptably slow progress. We are**

482 Q254, Nick Harris, 23 June 2021
483 Q257, Nick Harris, 23 June 2021

sceptical that the company will be able to achieve its target of no net loss of biodiversity without working at a much faster rate to neutralise the direct risks to water quality from those outfalls it manages.

288. ***We recommend that National Highways accelerate its programme of installation of improvements to highways drainage in England, particularly at the 1,326 outfalls and soakaways considered to be high risk, to capture and filter polluting run-off before it enters watercourses and groundwater.***

289. ***We recommend that National Highways devote a greater proportion of its environmental budget to the mitigation of outfalls and set a target of eliminating pollution from those outfalls most at risk by 2030, in line with the Government's commitments to halt species decline. It should set out, by the end of 2022, a timetable for eliminating the risks from the outfalls and soakaways it manages.***

290. ***We are disappointed by the apparent lack of regulatory oversight of the risks of water pollution from road run-off. We therefore recommend that the Environment Agency require discharge permits for all outfalls on roads with annual average daily traffic above 15,000 vehicles, establishing strict conditions for their management, so as to minimise pollution from run-off.***

5.3 Sustainable drainage systems

291. We have already examined the potential of nature-based solutions to improve the quality of water discharged from waste water treatment works. Here we examine the potential of nature-based drainage solutions to slow the flow of water into combined sewers, filter pollutants and reduce pressures on sewerage systems.

292. The volume of surface water entering the drainage network is rising, owing to increasing development and more intense rainfall events. These pressures are set to increase. One million homes were built in the last five years in England and the Government is committed to a target of 300,000 homes a year by the mid-2020s.[484] Alastair Chisholm, Director of Policy at the Chartered Institution of Water and Environmental Management (CIWEM) said that the twin pressures of 'urban creep' as towns and cities expand and the 'increasing density of development' were making urban centres more impermeable and placing more pressure on combined sewers:

> This means that rather than CSOs overflowing during extreme events only, far smaller events could bring them to the point where they discharge, and indeed that is what we see. Then we have a potentially big issue—climate change. Climate change projections show that, irrespective of how well we do in meeting zero targets, flood risk will increase.[485]

Reducing the flow of water into sewers

293. Since the report of the Pitt Review, undertaken following the floods of July 2007,[486] policymakers have placed greater emphasis on managing water at the surface, through sustainable drainage systems (SuDS). These systems mimic natural processes and reduced

484 Conservative and Unionist Party Manifesto 2019
485 Q128, Alastair Chisholm, 26 May 2021
486 Pitt Review, Lessons learnt from the July 2007 floods, 2008.

the quantity of water reaching the combined sewer system by managing rainfall at or near the surface.[487] Sustainable drainage solutions include features such as permeable paving, channels, raingardens, green roofs, swales,[488] soakaways or ponds. CIWEM explained that these nature-based solutions could be critical 'in reducing stormwater discharge because one cause of stormwater overflow is progressive addition of new development to existing sewers.'[489]

294. Alastair Chisholm from CIWEM outlined the multiple potential benefits of SuDS. He said that nature-based solutions could be cheaper; they could reduce the pressure on the sewerage network, therefore using less energy and lowering carbon emissions; and they could have a powerful remediating effect on water quality.[490] He argued further that the benefits were 'so multidimensional' that, if done well, they could help deliver against many of the Government's environmental priorities - for instance, on air quality and biodiversity restoration.[491]

The role of the National Planning Policy Framework

295. Since 2012 the National Planning Policy Framework for England (NPPF) has required SuDS to be installed for developments of more than ten homes, unless there is evidence that this would be inappropriate.[492] The NPPF sets out that SuDS incorporated into new major developments should, where possible, provide multifunctional benefits: flood risk management, improvements to water quality, amenity and biodiversity benefits.[493]

Planning guidance

296. CIWEM said that the planning practice guidance accompanying the NPPF had not been updated since 2015 and still contained loopholes around cost and practicality, enabling developers to claim that sustainable drainage systems would be more expensive than conventional systems without having to provide evidence.[494] The Rivers Trust argued that the NPPF and its supporting Planning Policy Guidance should be strengthened, so as to ensure that there were fewer opportunities for developers to argue that SuDS are not appropriate.[495]

297. The Government thought the current approach was working:

> In August 2018, Government published a review of the application and effectiveness of planning policy for SuDS. The review found that almost 90% of the sampled, approved planning applications for major and minor developments, explicitly stated that SuDS would feature in the proposed development.[496]

487 CIWEM, A Place for SuDS, 2018.
488 Swales are shallow, broad and vegetated channels designed to store and/or convey runoff and remove pollutants.
489 Chartered Institute of Water and Environmental Management (CIWEM) (WQR0074)
490 Q136, Q137, Alastair Chisholm, 26 May 2021
491 Q137, Alastair Chisholm, 26 May 2021
492 MHCLG, National Planning Policy Framework, 2019 revision, paragraph 165
493 Department for Environment, Food and Rural Affairs (WQR0028)
494 Chartered Institute of Water and Environmental Management (CIWEM) (WQR0074)
495 Rivers Trust (WQR0043)
496 Department for Environment, Food and Rural Affairs (WQR0028)

The Environment Agency told us that local planning authorities could benefit from 'having powers to require SuDS at smaller as well as major developments, on a risk basis'.[497]

Schedule 3 to the Flood and Water Management Act 2010

298. Different regulatory approaches are taken to sustainable drainage systems (SuDS) in England and in Wales. The Flood and Water Management Act 2010 brought the use of sustainable drainage systems into law by requiring local authorities to approve a drainage system and its subsequent maintenance prior to construction. However, Schedule 3 to the Act, which contains these provisions, was not commenced in England, and therefore does not operate to engage local authorities in England. Bronwyn Buntine, Sustainable Drainage Team leader at Kent Council, explained how the system operated in England as a result:

> After the Flood and Water Management Act, the local flood authorities within England were made a statutory consultee within the planning process. Unlike [councils in Wales], we operate purely within the planning process, and the challenge is that we do not have anything that is compulsory. We undertake our reviews using […] the non-statutory technical standards […] published by DEFRA, very similar to the principles that [councils in Wales] would refer to […] but we cannot compel. If we had an objection, if we found a scheme proposed either did not follow the drainage hierarchy or did not have the best quality of sustainable drainage approach, we could make an objection, but it would be up to the local planning authority to consider that among all the other material considerations they would hold as to the degree that [it] is pushed through.[498]

Sustainable drainage systems in Wales

299. In Wales, Schedule 3 to the 2010 Act has been commenced and SuDS Approving Bodies (SABs) have been established within Lead Local Flood Authorities (as the relevant county councils or unitary authorities are termed for these purposes). Construction work which has drainage implications may not begin unless a drainage system for the work has been agreed by the SAB. Once the system is properly constructed, the SAB becomes responsible for its maintenance.

300. By contrast, in England the maintenance of sustainable drainage systems can fall to a maintenance company, to local residents, the local authority, to NGOs or to the water company. A review for DEFRA found that powers and duties to manage drainage features are often less than clear cut.[499]

301. Ian Titherington, Lead Drainage Officer at Cardiff Council, explained how Schedule 3 runs in parallel with the planning process but sits outside it, providing a SAB with power to control the right to connect and stop developments that did not provide adequate drainage:

497 Environment Agency (WQR0029)
498 Q133, Bronwyn Buntine, 26 May 2021
499 DEFRA, Report of a review of the arrangements for determining responsibility for surface water and drainage assets, 2020

> As SAB officer, it is my decision and not the water authority's, but as a local authority engineer and SAB officer I have a good working relationship with the water companies. We understand the pressures in the system and work with developers at an early stage. […]Above all, it is about putting surface water design at the start of a project and not at the end of a project. […] Prior to this legislation that did not happen. What that enables us to do is to try to keep the development density that the applicant wants with a better design in terms of sustainable drainage […] keeping the water on the surface as long as possible, with new developments creating green-blue corridors so the area is made more use of in terms of amenity and biodiversity.[500]

Standards for sustainable drainage

302. Schedule 3 to the 2010 Act provides for Ministers to publish national standards for the implementation of sustainable drainage for managing rainwater.[501] The standards adopted by Welsh Ministers are broader than those in effect in England, incorporating requirements for surface water run-off destination, water quality, amenity, biodiversity and design for maintenance.[502] Standards in effect in England are more narrowly focused and do not require consideration of the wider potential benefits of such systems. In 2020 DEFRA undertook a research project to examine whether updating the current Non-Statutory Technical Standards (NSTS) could help provide for multiple benefit sustainable drainage systems. The project report recommended replacement of the existing NSTS with a new suite of six standards, including one for water quality.[503]

The right to connect

303. Developments below ten units make up a significant proportion of the total of new houses built. In England developers have the automatic right to connect new developments to the sewerage network, irrespective of whether there is capacity within the sewer system to cope with the additional sewage load.[504] CIWEM argued that the right to connect was itself valid, but should not be automatic. In CIWEM's view, the right should be conditional on developers installing SuDS in new developments.[505] This would accompany

> … a SuDS hierarchy in which [surface water] would be managed as close to source as possible, conveyance minimised, multiple benefits delivered, and the lowest option on the hierarchy would be connection to and discharge into a combined sewer.[506]

304. Southern Water also argued that planning guidance should be strengthened to ensure sustainable drainage was the default position applicable to all developments to mitigate the cumulative impact of large numbers of small housing developments.[507]

500 Q131, Ian Titherington, 26 May 2021
501 The Act gives Welsh Ministers the power to establish their own standards for drainage systems in Wales.
502 Welsh Government, Statutory standards for sustainable drainage systems – designing, constructing, operating and maintaining surface water drainage systems, 2018.
503 DEFRA, Recommendations to Update Non-Statutory Technical Standards for Sustainable Drainage Systems (SuDS) - WT15122, 2021
504 CIWEM, A Place for SuDS, 2018.
505 Chartered Institute of Water and Environmental Management (CIWEM) (WQR0087)
506 Q129, Alastair Chisholm , 26 May 2021
507 Southern Water (WQR0059)

> Preventing surface water entering sewers is the most economical way to safeguard capacity in the network, reduce the amount of storm overflows, delay the need for new investment and reduce the need for carbon intensive treatment of clean surface water. The automatic right to connect to the sewerage network should be removed to increase use of sustainable drainage systems. Water companies should also have powers to enforce private drain maintenance or undertake work and recover costs from the pipe owners. We're also keen to see a review of Part G of Building Regulations in order to prevent the proliferation of more water-inefficient homes.[508]

The right to connect to sewerage networks in Wales

305. In Wales, Welsh Ministers have used their powers under Schedule 3 to the Flood and Water Management Act 2010 to end the automatic right of developments to connect to the sewer. Since January 2019, all construction work with drainage implications, of at least two properties or 100m^2 or more, is now required to have sustainable drainage systems to manage on-site surface water (whether they require planning permission or not). These SuDS must be designed and constructed in accordance with the Welsh Government Standards for Sustainable Drainage.

306. Rebecca Pow MP, Parliamentary Under Secretary of State for Environment, Food and Rural Affairs, told us that the Government was conducting a review of Schedule 3 to consider whether the right to connect should be made conditional on the approval of proposed sustainable urban drainage.[509] She observed that 'what you also have to consider is whether removing that right is a barrier to development.'[510] The review is expected to be completed by Autumn 2022.[511]

Retrofitting sustainable drainage

307. New development only comprises 1% of land use change within urban areas each year.[512] Current planning policy is focused on new build and re-build developments rather than on renovations and permitted development., though in London, for example, new development occurs on only 0.5% of the land area each year.[513] Thames Water has acknowledged that sustainable drainage systems will need to offset over 30 per cent of impermeable areas in the future, even after the construction of the Thames Tideway Tunnel.[514] According to CIWEM, retrofitting has worked well overseas in the US, Sweden and Japan in a variety of urban and rural contexts including housing, schools, community buildings, parks, public open spaces and highways.[515]

508 *Ibid.*
509 Q361, Rebecca Pow MP, 15 September 2021
510 Q360, Rebecca Pow MP, 15 September 2021
511 Official Report (House of Lords), 1 December 2021, col. 1341.
512 Committee on Climate Change Adaptation Sub Committee, Climate change – is the UK preparing for flooding and water scarcity? July 2012
513 Greater London Authority, London Sustainable Drainage Action Plan [Date accessed December 2021]
514 Thames Water, *London's wastewater future. London 2100: The case for change*.
515 CIWEM. 2017. A Place for SuDS and Melville Shreeve et al. 2017. State of SuDS delivery in the United Kingdom, Journal of Flood risk Management

Case study 3: Greener Grangetown

The Greener Grangetown project in Cardiff is an example of SuDS retrofit. The site covers 12 Victorian streets and 550 properties in a multi-cultural area of inner city Cardiff with the River Taff winding its way through the area. The project used 108 raingardens, planting 130 new native trees and plants, to remove surface water from the combined sewer network and improve water quality. The raingardens treat the surface water run-off with both physical and biological treatment before being discharged into the nearby River Taff via a new pipe network. The project cost £3m. Research to date (carried out by Morgan Sindall on behalf of Welsh Water), has confirmed that over 90 per cent of all pollutants are captured by the raingardens. These include hydrocarbons, suspended solids, silt, metals and micro-plastics.

As well as removing surface water from the combined sewer system, the project has delivered the wider benefits of water quality improvements and has improved the public realm with new street furniture and surfacing, 127 new trees, 1,700m² of new green space, bike lanes and safer road junctions. The project has delivered dramatic improvements in water quality and reduced pressure on the sewer system, according to Ian Titherington:

Literally, it is like black soup to clean water in terms of quality. We are picking up 90%–95% of all high-grade pollutants. The soil system and vegetation improves over time. [… I]f at least 50% of the water is evapotranspirated into the air, so it does not even leave the rain garden […]it helps with air pollutants [and] cools the area. […]The electricity demand [at the local substation] plummeted […] a lot more than we thought it would because basically we took out the efficient areas of run-off, so the actual effect on the combined sewer network was astounding. We created a huge capacity in that system.

Ian Titherington described how the project had engaged the local community in the design of the features and that many people now take pride in the installed 'rain gardens', weeding and looking after them. He presented a vision of the wider benefits for community and biodiversity that the project had delivered:

… it has changed people's perceptions of the area. They have greened it up, they have cleaned it up, people are proud of the streets, and it has changed other people's perception of Grangetown; it looks different, it feels different, it even sounds different. A lot of that sounds stupid but when you can hear wind blowing through trees and birds singing it completely changes the perception through what is basically a drainage scheme. […] When you do SuDS work in a community and you involve them, the before and after response is quite astounding. […] the multi-benefits are quite incredible. They have completely changed the community.[516]

516 Q141, Ian Titherington, 26 May 2021

Figure 5: Sample bottles of run-off (L) before and (R) after treatment through a rain garden in the Grangetown SuDS project.

Source: Image provided by Ian Titherington

Departmental approaches to water quality and planning issues

308. In August 2021 the Government announced that it would undertake a review of Schedule 3, and examine 'legislation which would require Sustainable Drainage Systems to be constructed to ministerial standards on new developments, which would reduce the pressure on the sewage system'.[517]

309. We invited a Minister from the then Ministry of Housing, Communities and Local Government to discuss with us the planning issues in relation to surface water management in housing developments and the impact of agricultural unit planning decisions on water quality in rivers, especially relevant given that the Government is considering substantial reform of the planning process in England. The Housing Minister, Rt Hon Christopher Pincher MP, declined to appear, suggesting that DEFRA Ministers were better placed to answer questions on planning issues affecting water quality: he kindly arranged for his department to be represented at the evidence session by its Director of Planning. Responding to the Committee's invitation, the Minister assured us that:

> … we are working closely with DEFRA in progressing our reforms. Where relevant, their expert advice on water quality and water management issues have, and will continue to, influence the policy decisions made.[518]

517 Landmark Environment Bill strengthened to halt biodiversity loss by 2030.GOV.UK. 27th August 2021

518 Letter from the Minister of State for Housing, relating to the Water quality in rivers inquiry, dated 7 September 2021

Our view

310. **We welcome the announcement that Ministers are to review whether Schedule 3 to the Flood and Water Management Act 2010 is to be implemented in England. Implementation would end the current automatic right to connect to sewerage systems, and mitigate the accompanying risks of overloading sewer capacity.**

311. ***We recommend that the review consider the optimum arrangements for maintenance and adoption of sustainable drainage systems, and that it should propose an end to the automatic right to connect to the sewer in new developments as soon as possible and by the end of 2023 at the latest.***

312. ***We further recommend that the Department for Levelling Up, Housing and Communities update its planning practice guidance on sustainable drainage to ensure that sustainable drainage schemes are considered in all developments, including improvements under permitted development rights, and that it takes steps to address existing loopholes concerning the cost and practicality of such schemes.***

313. ***We further recommend that Non-Statutory SuDS Standards should be improved, taking into account the findings of the DEFRA review, so as to include water quality alongside other wider benefits, and should be made mandatory.***

314. **New housing developments must be used to set the standard for the sustainable sewerage networks required in the 21st century. It is unacceptable for developers to increase the pressure on overloaded combined sewerage systems and not to contribute to improvements.** ***We recommend that, in the process of approval of any new development in England, water companies ought to be empowered to require that any Community Infrastructure Levy payable by developers is used to enable separate surface water and foul sewers, in cases where provision has not already been made for such arrangements.***

6 Restoring rivers to good ecological status

315. In this concluding chapter we examine how cross-cutting governance arrangements can be improved at a catchment level to implement the goals of the Environment Act and ensure coordinated and effective action to tackle the complex challenges involved in restoring river water quality across England

6.1 The challenge of improving water quality in rivers

316. Restoring rivers to good ecological status is a complex challenge requiring cross-sector collaboration.[519] The Environment Agency says that:

> There are multiple influences on river water quality in England. To make significant improvements will require investment from the water and farming industries and individual behaviour changes. We must continue to tackle a legacy of Victorian drainage systems, historic lack of capital investment in agriculture, sewerage and road infrastructure, and insufficient maintenance of that infrastructure. […] The changing climate and growing population make targets harder to reach.[520]

317. We began our inquiry focusing scrutiny on the water industry contribution to poor water quality in rivers, but we note that it has limited control over other major sources of pollution, such as agricultural pollution, plastic sanitary products and urban pollution from highway run-off. The industry is also having to deal with increased pressure on their assets from housing developments, population growth and climate change. Severn Trent argued that an examination of the most recent Environment Agency figures on individual Reasons for Not Achieving Good Status (RNAGs) across waterbodies showed that it was feasible to envisage a scenario where improvements made by the water sector were 'more than outweighed by growing problems from other sectors'.[521] In October 2021 Water UK called for a 'National Plan for Rivers' to achieve good ecological status in rivers. It said that other industries are to blame for three quarters of the harm in rivers and called for collaboration ' from river users and customer groups, to environmental NGOs […] on a new approach that responds to these challenges.'[522]

Governance issues

318. Professor Nigel Watson argued that water pollution was 'fundamentally a water governance problem related to the institutional arrangements that are in place and their effectiveness in steering the behaviour of people, firms and other organisations.'[523] Because of the complexity of the water pollution problem, 'often involving multiple diffuse and point

519 Professor Nigel Watson (Professor of Geography and Environmental Management at Lancaster University) (WQR0007)
520 Environment Agency (WQR0029)
521 Letter from the Severn Trent Plc Chief Executive, relating to the 13 October Water quality in rivers evidence session, dated 18 October 2021
522 Water UK, *21st Century Rivers: Ten actions for change*, October 2021
523 Professor Nigel Watson (Professor of Geography and Environmental Management at Lancaster University) (WQR0007)

sources linked to many different types of industrial, agricultural and domestic practices occurring within each catchment system', he considered that a combined approach integrating regulation, incentives and information was most likely to be effective.[524]

319. CIWEM also emphasised the multi-stakeholder nature of the problem and argued that good ecological status in rivers required

> … a multi-faceted, well-integrated suite of measures which require the education, engagement, cooperation and commitment of a wide range of parties. This range includes, but is not limited to: DEFRA and its agencies; MHCLG; Department for Transport; local government including lead local flood authorities, local planning authorities and highways authorities; the water industry; developers; drainage engineers; landscape architects; product manufacturers, and the public. Neither option alone will solve the problem. Focusing too heavily on one over another will most likely result in poor delivery and higher than necessary cost.[525]

Taking catchment-wide perspectives

320. Each river catchment has a different set of pressures, reflected in the reasons it has or has not achieved good ecological status. Dr Michelle Jackson, a freshwater ecologist, argued for a catchment wide perspective on water quality and pollution, taking into account interactions between all stresses in catchment.[526] DEFRA Minister Rebecca Pow MP said that 'each area is different and each solution will be slightly different' with intensive poultry farming being a key pressure on the River Wye for example and development being the main pressure on the River Solent. Her Department was 'working across the board particularly on this idea of nutrient neutrality.'[527]

6.2 The Environment Act 2021 and water quality

321. The Environment Act 2021 provides a new domestic framework for environmental governance following the UK's exit from the European Union. The law requires the Government to set a target to halt the decline in the abundance of species by 2030 and specific legally binding environmental targets for air quality, biodiversity, water, resource efficiency, and waste reduction. It further requires Ministers to pay regard to guidance on five environmental principles (the integration principle, prevention principle, precautionary principle, rectification at source principle, and the polluter pays principle); and establishes a new Office for Environmental Protection.[528] The Act also sets out provisions to create local nature recovery strategies for areas in England.

322. The Act contains a number of measures specifically directed towards reducing the impact of sewer overflows, as we examined in Chapter Four. These include a requirement on water companies to secure a progressive reduction in the adverse impacts of discharges

524 Professor Nigel Watson (Professor of Geography and Environmental Management at Lancaster University) (WQR0007)
525 CIWEM (WQR0074)
526 Q5, Dr Michelle Jackson, 10 March 2021
527 Q373, Minister Rebecca Pow, 15 September 2021
528 Legislation.gov.uk, Environment Act 2021, November 2021

from storm overflows. DEFRA has told us that it will set out the level of ambition expected for these progressive reductions during 2022, including in the statutory government discharge reduction plan.[529]

323. Measures within the Environment Act also provide mechanisms that could be used to deliver the strategic direction needed to restore our rivers to good ecological health. The Act requires Ministers to prepare, by September 2022, a plan for reducing discharges from water company storm overflows in England and reducing the adverse impacts of those discharges.[530]

The role of the Office for Environmental Protection

324. An interim Office for Environmental Protection (OEP) was established on 1 July 2021 in preparation for the establishment of the statutory body following Royal Assent to the Environment Act. Shortly afterwards, we examined the OEP's Chair-designate, Dame Glenys Stacey, and the Chief Executive-designate, Natalie Prosser.[531] Questioned about the OEP's likely approach to issues of water quality and enforcement, Dame Glenys was careful not to pre-empt any decisions which the Office's Board might make on its programme of work. She nevertheless indicated a potentially significant role for the OEP:

> [Water quality] is a very good example of how the OEP needs to think intelligently about how to approach such important issues. […] [I]t is a classic complex wider system problem, isn't it? You have competing responsibilities. You have Ofwat there regulating, including regulating pricing structures, and setting investment requirements at a certain level. You have EA [the Environment Agency] overseeing permitting but, also, it has a significant legacy: that scheme of deemed licences; many thousands of deemed licences at the time EA came into being.
>
> I do not want to pre-empt [any] discussions [in the OEP Board], but this does sound like what I would traditionally call thematic review territory, where you evaluate the problem as a whole and you ask yourself questions […] Why are these things happening? Why is the Environment Agency acting as it is? You soon get to the nub of the issues. […] I can certainly see that it is a strong contender [for examination] and it is a very good case study of the relationship that we must strike, the balance we must strike between individual enforcement and our wider powers that could influence things much more significantly.[532]

325. **The new Office for Environmental Protection, established under the Environment Act 2021, is empowered to make highly significant contributions to the achievement of the Government's environmental objectives in general, and to the improvement of water quality in rivers in particular. We encourage the Office for Environmental Protection to take account of the relevant conclusions and recommendations of this**

529 Department for Environment, Food and Rural Affairs (WQR0105)

530 Section 141A of the Water Industry Act 1991, inserted by section 80 of the Environment Act 2021.

531 *The work of the Interim Office for Environmental Protection*, Oral evidence taken before the Environmental Audit Committee, 7 July 2021, HC 496

532 *Ibid*, Q36.

report when planning the Office's work on water quality, and to use the powers granted by Parliament to drive improvement of the regulation and enforcement regimes which govern the state of England's rivers.

6.3 Strategic direction for regulators

326. Implementation of the goals of the Environment Act and restoration of rivers to good ecological status demands that DEFRA and the Department for Levelling Up, Housing and Communities set a strong strategic direction, providing powers and funding to regulators to implement and enforce all relevant statutory provisions, including those in the Water Industry Act 1991 and the Environment Act 2021.

327. We have heard that there has been a lack of political will from successive administrations to empower regulators to tackle pollution and improve water quality.[533] For example, Daniel Johns from Anglian Water told the Committee that the Government's last Strategic Policy Statement (SPS)—which sets objectives for Ofwat—in 2017 'ducked the hard choices' by describing a process rather than specific outcomes. He said that in this SPS:

> We would very much welcome absolutely explicit, objective measures of success by 2030 that Ofwat can then support companies to achieve.[534]

328. In October we wrote to the DEFRA Secretary of State to contribute to the consultation on the draft Strategic Policy Statement. We were pleased to note that the Government sees 'protecting and enhancing the environment' as one of the four strategic priorities for Ofwat, and proposed to direct Ofwat to 'drive water companies to improve their day-to-day environmental performance'. We were nevertheless concerned that the draft SPS was imprecise in its expectations, with no indication of what specific outcomes are expected, and by when. We called for the SPS to be more specific and measurable in defining the environmental outcomes it wants to achieve.[535]

329. Guy Linley-Adams and Dr Rob Collins identified poor implementation and enforcement of existing plans as a problem. Mr Linley-Adams said:

> What we have seen are a lot of plans drawn up, river-based management plans, diffuse water pollution plans, nitrate reduction plans, phosphate reduction plans. It is the implementation of those plans that has been lacking. No shortage of plans, but it is the implementation and the enforcement against those polluters that has been lacking and I am afraid it is getting worse. It is not the fault of Environment Agency staff. The Environment Agency has been under pressure.[536]

533 Q44 Guy Linley-Adams, 10 March 2021; Q85, Professor Becky Malby, 21 April 2021
534 Q193, Daniel Johns, 26 May 2021
535 Environmental Audit Committee, Letter from the Committee to the DEFRA Secretary of State, 21 October 2021
536 Q49, Guy Linley-Adams, 10 March 2021

Environment Agency funding

330. Witnesses expressed significant concerns over real-terms reductions in Environment Agency funding for enforcement.[537] Guy Linley-Adams argued that the Environment Agency had been starved of funds, hampering monitoring and enforcement:

> [W]e have enough legislation: the Water Resources Act 1991, the Environmental Permitting Regulations, Agricultural Diffuse Pollution Regulations and the regulation of the water industry under the Water Industry Act 1991. The powers are all there. What we have suffered from is that successive Governments have not allowed the Environment Agency to get on with the job. The Agency has […] been starved of funds and, in many respects, it has been chained to its desk.[538]

Sources of Environment Agency funding

331. The Environment Agency's environment work is funded from two main sources. DEFRA is the government department responsible for the Environment Agency's activities and provides most of its funding. Approximately one third of Environment Agency funding comes from the charges that it applies to those it regulates, in the form of permit charges.[539]

332. Grant funding for the Environment Agency has been reduced by around two thirds over the last ten years. Environment Agency funding has been reduced by 63% from £120 million in 2009 to £40 million in 2020.[540] Sir James Bevan explained that the grant had to pay for Environment Agency enforcement, including its prosecution activity, so as the grant has gone down the regulator has been able to undertake fewer prosecutions.[541]

333. Sir James said he would like to see the grant restored to 'something like where we were 10 years ago.'[542] The two thirds cut in the grant that funds much of the Agency's work

> … has had an effect on our capacity to monitor, to enforce the rules and to help improve the environment where we think it needs doing. Honestly, I would like to see that grant restored. I would like to get back to where we were 10 years ago, and I think it would make a massive difference, both in the numbers of people that we could have on this job but also in some of the hardware. We need to reinvest in better and more modern monitoring.[543]

He also said that Ministers needed to consider whether the money the Agency was allowed to charge to those it regulated could be increased:

> There is an issue about both of those, because the income that we receive from the companies that we regulate is supposed to pay the full economic

537 British Canoeing (WQR0023); Swim England (WQR0032); Thame Valley Fisheries Preservation Consultative (WQR0070); Wildlife and Countryside Link (WQR0077); Mr Peter Lloyd (Retired water quality expert at Environment Agency) (WQR0091); Q51, Dr Rob Collins, 10 March 2021; Q232, Sir James Bevan, 23 June 2021;

538 Q49, Guy Linley-Adams, 10 March 2021

539 Environment Agency, Environment Agency Annual report and accounts for the financial year 2020 to 2021, November 2021; Q232, Sir James Bevan, 23 June 2021

540 Wildlife and Countryside Link (WQR0077); Q232, Sir James Bevan, 23 June 2021

541 Q228, Sir James Bevan, 23 June 2021

542 Q232, Sir James Bevan, 23 June 2021

543 Q213, Sir James Bevan, 23 June 2021

> cost of the regulation of those companies, and in practice it doesn't. There is a question about whether we should be able to charge greater fees on those we regulate. That is a matter for Ministers and a discussion that we are having with Ministers.[544]

Closing the monitoring and data analysis gap

334. According to Wildlife and Countryside Link, British Canoeing and others, funding cuts have affected the regulator's ability to monitor water quality.[545] Between 2013 and 2019 the number of water quality samples taken has fallen by 45% and the number of sampling points has been reduced by nearly 40%, according to Wildlife and Countryside Link.[546]

335. According to Stormwater Shepherds, the Environment Agency's monitoring programme could be effective if it was properly resourced, though it had to include monitoring points across catchments and up smaller tributaries so as to provide a complete picture of the health of entire river catchments.[547] Professor Ormerod warned that, given the progressive reduction in biodiversity monitoring locations since the 1990s,

> There is a serious question about how effectively and to what extent of detail we will be able to get an appropriate handle on how good and how rapidly we return … rivers to good ecological status. There is also a question about whether or not monitoring is carried out in locations that are appropriate to assess all of the pressures that impinge on the river environment.[548]

Controlling pollution at source

336. We heard of a 'monitoring gap', with many emerging pollutants simply not being monitored on a regular basis. As discussed in Chapter One, routine monitoring by the Environment Agency is not revealing the full extent of chemical pollution in UK rivers.[549] The CHEM Trust said that routine chemical monitoring assessments mostly account for substances known as Persistent, Bioaccumulative and Toxic (PBT) and overlook substances that are Persistent, Mobile and Toxic (PMT), such as many PFASs, which accumulate in water.[550] It argued that this 'monitoring gap … is a barrier to the regulation of synthetic chemicals polluting the water environment.'[551] The CHEM Trust and Fidra argued that controlling pollution at source, such as by banning harmful chemicals in products, was the most effective way of preventing chemical pollution of UK rivers.[552] The CHEM Trust further argued that the most hazardous chemicals, such as PFAs, should be banned from all non-essential uses.[553]

544 Q232, Sir James Bevan, 23 June 2021
545 British Canoeing (WQR0023)
546 Wildlife and Countryside Link (WQR0077)
547 Stormwater Shepherds UK (WQR0004)
548 Q14, Professor Ormerod, 10 March 2021
549 CHEM Trust (WQR0022)
550 *Ibid*
551 *Ibid.*
552 CHEM Trust (WQR0022); Fidra (WQR0071)
553 CHEM Trust (WQR0022)

Mainstreaming biodiversity in water regulation and policy

337. It is manifestly apparent that the preservation of natural capital stocks—such as the biodiversity in rivers—has not been valued highly enough in decisions by regulators, water companies and successive administrations over recent decades. This appears evident from, for example:

- Ofwat's approach to previous price review capital investment decisions;
- the slow rate at which National Highways is addressing pollution from outfalls across the Strategic Roads Network;[554] and
- the use of amenity value rather than biodiversity protection in prioritisations around monitoring and investment.

Until relatively recently, biodiversity protection has not received priority in any of these regulatory processes, despite the fact that the vast majority of rivers in England are consistently failing to achieve good ecological and chemical status.

Ofwat's price review process

338. As discussed in Chapter Four, multiple stakeholders have argued that Ofwat's five yearly price review process has focused on a combination of water supply and maintaining low consumer bills at the expense of the infrastructure investment needed to keep pace with population growth, climate change and growing pressures on the system.[555]

339. David Black, Ofwat's interim chief executive, told us that the regulator had reformed its methodology since 2015 to remove the capital expenditure bias 'towards using end-of-pipe solutions'. We were encouraged to hear him report that as a result, the most recent price review (PR19) had supported the implementation of 1,200 new nature-based solutions.[556] We are also pleased to note that, in support of the Government's green recovery plans during the pandemic, Ofwat asked companies to bring forward new investment proposals outside the usual price review process and to accelerate the implementation of existing proposals. As a result, Ofwat claims to have has supported £850 million of new investment projects and the acceleration of £1.9 billion of future planned environmental projects to reduce the use of storm overflows, reduce energy and chemical use and protect habitats through better catchment management and nature-based solutions.[557]

340. We were further encouraged to note that, in its initial discussion paper for PR24, Ofwat has proposed that water companies integrate the environment into their operations by developing natural capital frameworks. Ofwat says it wants companies to explore:

554 Letter from Nick Harris to the Environmental Audit Committee, 13 August 2021
555 Q51, Dr Rob Collins, 10 March 2021; Q426, Heidi Mottram, 13 October 2021; Salmon and Trout Conservation (WQR0002); Anglian Water (WQR0038); Salmon and Trout Conservation, Time to Fix the Broken Water Sector, September 2021
556 Q276, David Black, 23 June 2021 ,
557 Ofwat, Water sector to plunge £2.8 billion into the green recovery, May 2021

> … how they can approach their operations in a more catchment-management and systems-based way, avoiding unduly prioritising hard assets over solutions that create wider value, such as nature-based solutions, market platforms or customer behaviour changes.[558]

341. Ofwat is due to publish a draft methodology for PR24 (covering the period from 2025 to 2030) in the summer of 2022.[559] Anglian Water argued that one issue to be addressed in Ofwat's methodology for PR24 was how long-term maintenance costs for catchment-based and nature-based solutions would be dealt with. It warned that at present when a nature-based solution was agreed, its operational expenditure (opex) costs were only allowed to be recovered over the first Asset Management Period, whereas the full capex cost of a scheme could be recovered over the lifetime of an asset.[560]

Pollution from highway outfalls

342. National Highways (formerly Highways England) has a commitment to no net loss of biodiversity across all Highways England activities by the end of the Road Investment Strategy 2 (2020–2025). Nick Harris, its chief executive, even suggested that it was 'now looking at how we may move in the next five-year period to net positive gain.'[561] Yet since 2016/2017, Highways England has reported actions to mitigate the risk from just 52 of the 22,410 outfalls and soakaways across the strategic road network that do not have any measures in place to prevent pollution entering watercourses.[562]

Amenity value

343. The National Audit Office undertook an exploratory analysis of data used by the Environment Agency as part of its regulation of storm overflows. In its paper to us, which contained contextual data to support our inquiry and which set out areas for further consideration, the NAO explained that watercourses had been assigned high, moderate, low or no 'amenity value' by the Environment Agency depending on how they were used and how much they were used by the public.[563] In 2014, water companies were required to assess the amenity value of the watercourse that each storm overflow discharged into. This was then assessed against the estimated number of annual spills to give the significance and monitoring requirements of the overflow, so as to inform the initial rollout of EDM monitors.

344. High-amenity sites might be used regularly for bathing or water sports or have a protected status, while low-amenity sites are those rarely used by the public. The amenity value of a site governs the frequency and nature of the monitoring undertaken. High-significance overflows require monitoring at two-minute intervals plus the provision of telemetry, allowing near real-time monitoring, whereas moderate-significance overflows require monitoring at 15-minute intervals. Initially there were no monitoring

558 Ofwat, PR24 and beyond: Future challenges and opportunities for the water sector, December 2020
559 Ofwat, 2024 price review [Date accessed 7 December 2021]
560 Anglian Water (WQR0038)
561 Q210, Nick Harris, 23 June 2021
562 Letter from Highways England to the Environmental Audit Committee, 13 August 2021
563 National Audit Office (WQR0097)

requirements for low-significance overflows. In January 2021 the Environment Minister, Rebecca Pow MP announced that monitoring would be required for all storm overflows, adding monitoring requirements to low- and non-amenity sites.

Pricing biodiversity into decision making

345. Governments are increasingly acknowledging the requirement to mainstream nature into economic decision making. The report of Professor Partha Dasgupta's review of the economics of biodiversity, undertaken for the Treasury, was clear that a healthy environment is essential to a sustainable economy and must be priced accordingly in business and regulatory decisions. As part of the Kunming declaration that came out of the initial meetings of the 15th Conference of the Parties to the UN Convention of Biological Diversity in October 2021, the UK and other parties to the convention committed to continue to promote the integration, or 'mainstreaming' of the conservation and sustainable use of biodiversity into regulatory decision-making and economic accounting.[564] The Environment Act 2021 requires the Government to set a target to halt the decline in the abundance of species by 2030.[565]

Our view

346. **In the Committee's recent report on biodiversity in the UK we argued that action to protect biodiversity needed to be stepped up in scale, ambition, pace, and detail. Our conclusions from this inquiry show that this step change in approach is vital to protect freshwater biodiversity.**

347. **Changes in regulatory action, cross-catchment collaboration and water company investment are urgently required to restore rivers to good ecological health, protect biodiversity and adapt to a changing climate. We expect to see far more assertive regulation and enforcement from Ofwat and the Environment Agency, with the provision of funding and resources to match.**

348. **The value of biodiversity in rivers in England does not appear to have been priced adequately into the economic decisions made by companies and by regulatory agencies. *If it is to meet the Environment Act's legally binding target to halt the decline in the abundance of species in England by 2030, the Government must make it clear, in strategic guidance to Ofwat and to National Highways, that from now on natural capital needs to be taken into account in all economic decision making, and priced at a level that preserves and enhances it.***

349. **The biodiversity crisis requires public agencies, regulators and water companies to adopt new decision-making methodologies. The idea, for instance, that pollution can be tolerated in areas with low 'amenity value' belongs to a different era. Pollution of rivers must be addressed wherever it occurs because of the impact of such pollution has on freshwater ecosystems and ultimately the health of the oceans.**

350. **Ofwat's economic regulation of the sector through previous price reviews does not appear to have given sufficient priority to the preservation of natural capital. *We***

564 Convention on Biological Diversity, KUNMING DECLARATION "ECOLOGICAL CIVILIZATION: BUILDING A SHARED FUTURE FOR ALL LIFE ON EARTH", 13 October 2021, p.3

565 Legislation.gov.uk, Environment Act 2021, November 2021

recommend that, when it publishes its review methodology in 2022, Ofwat set out how it intends to reflect natural capital fully in its economic regulatory decisions for Price Review 24. PR24 must encourage water companies to make a substantial increase in their investment in nature-based solutions, so as to improve the quality of effluent being discharged from sewage treatment plants.

351. **Delivering the step change in action on water quality that is demanded will require DEFRA to set a strong strategic direction and clear targets. Regulators must be empowered and funded adequately to implement and enforce the relevant provisions of the amended Water Industry Act and the new Environment Act. We note that in 2020 the annual grant support from central government to the Environment Agency was £80 million less than the funding provided in 2009.**

352. ***We recommend that the level of financial support provided to the Environment Agency be reviewed as a matter of urgency in the light of its new statutory responsibilities and the scale of the regulatory task it faces, recognising its continued need for efficiency. We further recommend that the Environment Agency, the Secretary of State for Environment, Food and Rural Affairs and the Treasury review the relevant provisions of the Agency's environmental permitting charging scheme so as to ensure that charges for discharge permits and related activities properly reflect the cost to the Agency for these activities.***

6.4 Improving catchment-wide collaboration and governance

353. To ensure that all of the pressures within each catchment are not exceeding the capacity of the rivers to absorb the nutrients or other pollutants, a properly joined-up approach to catchment governance will be required. In this final section we examine the role of:

- drainage and sewerage management plans
- catchment based approach partnerships
- nutrient neutrality and
- water citizenship.

Drainage and sewerage management plans

354. The Environment Act 2021 places a statutory duty on each water company in England to prepare, publish and maintain a drainage and sewerage management plan, and to review it annually.[566] A drainage and sewerage management plan must address:

a) the capacity of the company's drainage system and sewerage system;

b) an assessment of the current and future demands on it;

c) the resilience of the undertaker's drainage sand sewerage system,

566 Legislation.gov.uk, Environment Act 2021, Part 5, Section 79

d) the measures the undertaker intends to take or continue to manage and develop its drainage system and sewerage system so as to be able, and continue to be able, to meet its obligations in the Water Industry Act 1991;

e) the likely sequence and timing for implementing those measures;

f) relevant environmental risks and how those risks are to be mitigated, and

g) any other matters specified by the Minister in directions.

355. Many of the submissions we received emphasised the importance of ensuring that drainage and sewerage management (DSM) plans were coordinated and delivered with other stakeholders beyond the water industry.[567] South West Water said that DSM plans would be successful only if co-deliverers and co-funders from the other responsible drainage authorities stepped up and played their part in catchment level solutions to complex and sometimes longstanding problems.[568] The Catchment Partnerships in London Group said that better resourced CaBA, private-public-NGO partnership and collaborative working practices would be essential to realising the benefits of the new plans.[569]

356. Anglian Water said that DSM plans were a step forward, but stressed the need to focus them on environmental improvement, to ensure that they were agreed with other stakeholders and to deliver them collectively in a coordinated way. There was a danger of disconnect with local nature recovery strategies operating across similar areas, if those strategies were focused 'solely on supporting wildlife and protected habitats without addressing the root causes of habitat degradation.'[570] Anglian planned to recommend 'creating a system of catchment-based plans spanning drainage, water quality, water resources and environmental improvement created collaboratively with partners and supported by our economic regulator at each price review.'[571]

357. The Catchment-Based Approach Urban Water Group said that DSM plans needed to be set for the medium term (between 5 and 10 years): if genuinely collaborative, and implemented catchment-wide, these plans had the potential to help manage sewer networks and treatment and also improve water quality.[572] It was important that the plans were flexible and allowed the pooling of resources and funds from multiple stakeholders.

DSM plans and nature-based solutions

358. As we discussed in Chapter Five, nature-based solutions such as sustainable drainage systems can realise multiple benefits. Jo Bradley told us that the tools and technologies to manage surface water better and prevent pollution entering water courses were available, but that greater commitment was required to roll them out and maintain them:

> Stormwater treatment is something that we must do better. We have all the technologies. We have devices. We have sustainable drainage systems. We have vegetative systems. All these stormwater treatment systems can remove those microplastics, but they need to be installed, they need to be designed

567 Catchment Partnerships in London Group (WQR0061)
568 Pennon/South West Water (WQR0041)
569 Catchment Partnerships in London Group (WQR0061)
570 Anglian Water (WQR0038)
571 *Ibid.*
572 Catchment-Based Approach Urban Water Group (WQR0037)

> and they need to be maintained. It is a two-pronged approach: dealing with litter at source and dealing with microplastics using stormwater treatment devices and stormwater treatment systems.[573]

Stormwater Shepherds said that DSM plans would be effective if they identified catchments where the installation of retrofitted sustainable drainage systems would be the most appropriate and cost effective way to reduce spills from combined sewer overflows.[574]

359. CIWEM advocated a greater focus on the retrofitting of sustainable drainage systems. Retrofitting was hard to fund through existing funding mechanisms—such as flood defence grant-in-aid—because it was difficult to ascribe the benefits to specific properties. CIWEM called for funding criteria to be changed so that sustainable drainage systems could harness funding streams to deliver flood risk management, air quality, health and wellbeing, nature recovery and water quality outcomes.[575] The Catchment Partnerships in London Group echoed this, adding that the flood defence grants process ought to include water quality, habitat and other beneficial outcomes in its methodology so as to encourage projects to take a multiple benefit approach.[576]

360. Rebecca Pow MP emphasised that the Government was adopting a much more joined-up approach and that the aim of drainage and sewerage management plans was to work 'holistically' to reduce urban diffuse pollution into the sewerage network, and help to tackle flooding.[577] Lord Goldsmith, Minister for the Environment at DEFRA, is reported to have suggested that the Government could use its direction-making powers in water companies' DSM plans to direct companies to take more action if needed: the Government is expected to provide 'a further definition of what that means, and the ambition that we are working to', early in 2022.[578]

Catchment based approaches

361. The Catchment Based Approach (CaBA) partnerships established by DEFRA in 2013 are intended to drive integrated catchment management across England. They provide a forum for communities and civil society to work in partnership with Government, farmers, local authorities, water companies, and other stakeholders to improve water quality in river catchments. Over 2,500 organisations are involved in CaBA, with over 23,000 stakeholders engaged, delivering nearly 1,000 projects a year[579] and are active in each river catchment across England, including those that cross the border with Wales.[580]

362. DEFRA says that the CaBA programme is driven by data and evidence to engage stakeholders and target local action. At the community level, CaBA has had success in increasing public understanding of water pollution issues and involving citizens directly in local projects to improve water quality.[581] The 106 CaBA partnerships encompassing the whole of England have all developed their own Catchment Plan. The Rivers Trust told

573 Q178, Jo Bradley, 26 May 2021
574 Stormwater Shepherds UK (WQR0004)
575 Chartered Institute of Water and Environmental Management (CIWEM) supplementary evidence (WQR0087)
576 Catchment Partnerships in London Group (WQR0061)
577 Q399, Rebecca Pow MP, 15 September 2021
578 ENDs report, Goldsmith: Prison sentences for law-breaking water firm directors a 'good idea', 1 December 2021
579 Environment Agency (WQR0029); Catchmentbasedapproach.org, About the Catchment Based Approach [Date accessed 2 December 2021]
580 Catchmentbasedapproach.org, About the Catchment Based Approach [Date accessed 2 December 2021]
581 Department for Environment, Food and Rural Affairs (DEFRA) (WQR0028)

us that these were developed through a participatory approach whereby the organisations involved within a partnership collectively agree priorities for action.[582] The Trust said that its member trusts had been involved in catchment partnerships: Dr Rob Collins spoke positively of their impact, saying that they had done a 'fantastic job trying to engage local communities, engage all sectors of the water cycle: local authorities, businesses, water companies and others'. He called for greater funding for the initiatives 'because they have the tools, the means, that framework by which we can undertake much more citizen science.'[583]

Nutrient neutrality

363. The presence of excess nutrients in the environments of most English regions[584] has prompted Natural England to develop the policy concept of nutrient neutrality to ensure that development does not add to existing nutrient burdens in protected habitats.[585] Minister Pow told us that the Government was having 'discussions about whether we should potentially be doing nutrient budgets' and was taking advice on it.[586]

> Potentially [nutrient budgets] would have to be looked at on a catchment basis. I know that, for example, in Somerset there is a lot of work going on with the catchment partnership to work on a catchment basis to reduce all of the outputs in terms of the pollutants, whether it is nitrates, phosphates or whatever it is, going on to the Somerset levels, which is a protected site. We have particular concerns where we have these protected sites.[587]

Impact on development

364. Concerns have been raised about the impact of this approach on developments in urban and rural areas. Recent reports claim that problems with 'nutrient neutrality' in UK rivers has meant that thousands of much needed building projects, including self-build are currently stuck in 'planning limbo'.[588] As we indicated in Chapter Three above, Natural England's policy not to approve any Appropriate Assessment made under the Habitats Regulations in support of a planning application unless that particular development could show it was phosphate neutral appears to have had an impact on new development. Herefordshire Council indicates that, as a consequence, it has not been able to approve any housing, industrial commercial or agricultural planning applications impacting upon the Lugg catchment since October 2019, unless the development meets tight guidelines in relation to neutrality.[589] The council says that this 'is incredibly difficult for most developers to meet and currently we have about 1650 houses caught up in applications that cannot

582 The Rivers Trust (WQR0082)
583 Q48, Dr Rob Collins, 10 March 2021
584 DEFRA, Soil Nutrient Balances Regional Estimates for England, 2019 (Provisional), May 2021
585 Natural England, ADVICE ON ACHIEVING NUTRIENT NEUTRALITY FOR NEW DEVELOPMENT IN THE SOLENT REGION, June 2020
586 Q367, Rebecca Pow MP, 15 September 2021
587 Q376, Rebecca Pow MP, 15 September 2021
588 Homebuilding.co.uk, Nutrient neutrality concerns leave self builders in planning limbo, 26th July 2021
589 Letter to the Chair from the Leader of Herefordshire Council, concerning water quality in rivers, dated 5 October 2021

be determined until a way forward can be found.' The 'effective moratorium' is claimed to have had a negative effect on local communities and the economy: Herefordshire Council estimates that the investment losses equate to between £100 and £120 million.[590]

365. To achieve the goal of restoring rivers to good ecological status will require greater efforts from both the water industry and agriculture to reduce nutrient levels entering the water environment.

The role of local authorities in promoting good water quality

366. Given the importance of planning decisions—whether for housing developments or agricultural units—on pollution loads and the run-off from roads, local authorities have a role to play in tackling the problems outlined in this inquiry. Professor Nigel Watson argued that local authorities were not sufficiently engaged in water quality governance under the current institutional arrangements in England:

> [L]ocal authorities were strongly represented in [the regional water authorities of the 1960s and 1970s] and they had a major input into decision-making. That no longer seems to happen. Local authorities are starting to take a very keen interest in flooding, understandably so. However, from my experience, local authorities are not so engaged in matters around water quality. Some of the catchment partnerships have local authority representation, but many do not and that is particularly unfortunate. Potentially, local authorities could be a major player in terms of protecting water quality and rivers in the future, particularly around highways, non-point pollution inputs and more localised sources.[591]

'Water citizenship'

367. Citizen engagement is important in the drive to monitor and improve river water quality and to deliver the goal of a progressive reduction in discharges from the storm overflows. Professor Nigel Watson pointed out that water citizenship was not as well-developed in the UK as in other countries he had studied, despite increasing levels of environmental awareness: water was often taken for granted as a utility and that there was 'both a need and a potential for organisations such as the Environment Agency, water companies, and environmental NGOs to promote a civics approach to water and pollution'.[592]

368. Dr Rob Collins from the Rivers Trust provided an example, when discussing the importance of raising awareness of what can and cannot go down the drain: 'not that many people' are aware of medicine take back schemes and 'we end up with antibiotics being flushed down the toilet'. Similarly, he indicated the importance of raising awareness of the sustainable disposal of household and garden chemicals, so that paints, oils and

590 *Ibid.*
591 Q31, Professor Nigel Watson, 10 March 2021
592 Professor Nigel Watson (Professor of Geography and Environmental Management at Lancaster University) (WQR0007)

pesticides were not tipped down the drain.[593] Ian McAulay, chief executive of Southern Water, observed that water efficiency in homes ought to be mainstreamed in the same way that thinking about energy efficiency is now the norm.[594]

Citizen science

369. There are encouraging signs that a sense of water citizenship is growing across the country. The important role that citizen scientists have played in bringing the issue of poor water quality in rivers to national attention has been striking. Relatively inexpensive field kits are now available that can provide real-time information on pollutants such as phosphorus and ammonia in on samples taken from rivers.[595] We heard from a number of groups—including Windrush Against Sewage Pollution, the Friends of the Upper Wye, Ilkley Clean Rivers Group and the Wiltshire Fishery Association—about how they were using citizen science testing and analysis in their work. Rod Cutler, of Colne Valley Fisheries Consultative, said that citizen science groups could help to provide a faster awareness of pollution events in water bodies, and hence swifter resolution.[596] Dr Michelle Jackson added that 'many of the big pollution incidences that are picked up … are picked up by volunteer groups, because they monitor a lot more regularly than the Environment Agency.[597] Dr Rob Collins, of the Rivers Trust, said that the additional information provided by citizen scientist volunteers was 'invaluable for helping to identify issues and prioritise action.'[598] He observed that:

> Citizen science has really grown over the last few years and it is developing into something that is robust and can be trusted. We heard in the earlier session about some of the limitations of regulatory monitoring both in time and space, and voluntary or citizen science or environmental NGO collection of data can only help improve our understanding of current pollution levels and the current state of our rivers and coastal waters.[599]

He added that people were keen to get involved in citizen science, which provided a sense of involvement in and ownership of river quality issues. There was the danger of disillusionment if regulators then failed to take action:

> It brings a sense of health and wellbeing and an important sense of ownership of local environmental issues, which can lead to behavioural change, which is a great thing, but that goes cold if people understand that there is not enough enforcement or the legislation is non-existent.[600]

Our view

370. **Responsibility for improving water quality in rivers cannot be laid solely at the door of the water industry. The project to restore all rivers in England to good health will require the engagement and collaboration of a wide range of stakeholders—from**

593 Q45, Dr Rob Collins, 10 March 2021
594 Q506, Ian McAulay, 13 October 2021
595 Q47, Dr Rob Collins, 10 March 2021
596 Mr Rod Cutler (WQR0010)
597 Q20, Dr Michelle Jackson, 10 March 2021
598 Q47, Dr Rob Collins, 10 March 2021
599 *Ibid.*
600 Q48, Dr Rob Collins, 10 March 2021

farmers to local authorities, and from product manufacturers to food outlets. At the riverside, it will require concerted action from a range of stakeholders collaborating across each catchment, including farmers, the water industry, housing developers, local authorities and citizen groups. The Catchment Based Approach partnerships provide a useful forum for this coordination: we consider that Ministers should examine means to increase the funding and resources available to them so as to achieve more effective coordination of all stakeholders across each river catchment in measures to improve water quality.

371. **Local authorities have a key role to play in restoring rivers to good ecological status across the country. Their engagement in Catchment Based Approach partnerships is crucial, while their work on Local Nature Recovery Strategies must engage with the development of drainage and sewerage management plans. It is essential that they be given powers sufficient to enable them to retrofit sustainable drainage systems on outfalls from major roads and housing estates.**

372. **Pollution across river catchments must be progressively reduced from all sources in the catchment until it does not exceed the capacity of the land and the rivers to handle the nutrients.** ***We therefore recommend that DEFRA direct the Environment Agency and Natural England to calculate nutrient budgets for each river catchment in England.***

373. **Adequate support needs to be made available for farmers to achieve progressive reductions in those nutrient inputs which risk negatively affecting water quality in a catchment, or to mitigate the risk.** ***We recommend that DEFRA examine how the Environmental Land Management scheme can best be used to achieve this outcome.***

374. **Policymakers across Government should aim to cultivate a culture of water citizenship to foster greater awareness and change behaviour that risks causing blockages in the sewer network and increasing levels of water pollution. Awareness of what should not be disposed of down toilets and drains appears to be low. Many householders are still unaware that flushing anything other than the 'three Ps' ('pee, poo and paper') can create a risk of blocking sewers leading to a pollution incident.**

375. **Citizen science should not be seen as an alternative to adequately funded environmental monitoring by regulators but it should be encouraged and recognised.** ***We recommend that the Environment Agency explore how best to support the contribution of citizen science to environmental regulation and to incorporate citizen science analysis in its work wherever possible and appropriate. The Environment Agency should, for instance, consider how best to provide a publicly-available platform for citizen scientists to enter water quality readings in a way that would allow results to be verified by other users, regulators or companies.***

376. **It is important that communities who engage in citizen science receive a meaningful response to their work.** ***We recommend that the Government consider whether a requirement should be placed on water companies to respond to citizen science research undertaken by CaBA partnerships, where that research demonstrates water quality issues in a specific area, with an action plan to address the issues identified.***

377. **Drainage and sewerage management plans, as currently conceived, appear to be the preserve of the water industry. For these plans to be successful they must be designed so as to ensure active and continued engagement with the full range of stakeholders, including local authorities, highways agencies and developers. These plans must be backed up by measures to prohibit use of the products and chemicals at greatest risk of blocking drainage systems and degrading water quality.**

378. **Retrofitting urban areas with sustainable drainage systems can deliver multiple benefits in terms of nature recovery, air quality and flooding prevention.** ***We recommend that Ministers review and, where appropriate, revise the criteria for the award of funds intended for flooding prevention and nature recovery so as to ensure that they support projects to retrofit sustainable drainage systems. We further recommend that, through its price review process and asset management plans, Ofwat allow adequate funding for water companies to identify areas for the retrofit of sustainable drainage systems.***

Conclusions and recommendations

Assessing water quality in rivers in England

1. Improving the quality of the water in rivers in England should be considered a principal objective through which the Government and public bodies can deliver on the legally binding duty, established in the Environment Act 2021, to halt the decline in domestic species by 2030. (Paragraph 38)

2. A 'chemical cocktail' of sewage, agricultural waste, plastic and persistent chemicals is polluting rivers. River water quality has improved by some measures in recent decades, but in others it appears to be getting worse. The establishment of a complete overview of the health of rivers in England and the pollution affecting them is hampered by outdated, underfunded and inadequate monitoring regimes. Many harmful pollutants are not routinely monitored, and the Environment Agency has reduced the number of monitoring sites. (Paragraph 39)

3. Poor monitoring arrangements mean that river users cannot currently make informed decisions about when it is safe or not to use rivers. The prevalence of plastic pollution, the presence of persistent chemicals and spread of antimicrobial resistant pathogens in rivers in England are all issues of grave concern. Not a single river in England has received a clean bill of health for chemical contamination. (Paragraph 40)

4. The current range of pollutants being monitored is too narrow. The Environment Agency must begin work to extend the number of substances it is regularly monitoring in rivers. Existing datasets do not provide a comprehensive picture of risks to human health, aquatic life nor microplastic contamination in rivers. (Paragraph 41)

5. *We recommend that the Secretary of State for Environment, Food and Rural Affairs commission, in conjunction with the devolved administrations, a UK-wide survey of emerging pollutants and microplastic pollution of river environments, including an assessment of their potential impact on aquatic ecology.* (Paragraph 42)

6. Wild salmon are iconic and important species. It should ring alarm bells that wild salmon are classed as 'at risk' or 'probably at risk' in almost every river in England they traverse. Protecting rivers where important species such as the North Atlantic salmon are known to be in danger must be a priority for the Environment Agency. Pollution levels in these rivers must be reduced as a matter of urgency. (Paragraph 43)

Rivers fit to swim in

7. We have heard disturbing evidence that sewage treatment works and the rivers that they discharge into are becoming breeding grounds for antimicrobial resistance. There will need to be cross-sector collaboration to reduce the growth of antimicrobial resistance genes in rivers. *Following the work streams of the Pathogen Surveillance in Agriculture, Food and the Environment programme on antimicrobial resistance, we*

recommend that the Government bring together farming groups and water companies to decide on a programme of action to reduce opportunities for resistance to develop in the water environment. (Paragraph 54)

8. We welcome the Environment Act's inclusion of a requirement on water companies to reduce the impact on public health of sewage discharges. *We recommend that this includes consideration of antimicrobial resistance.* (Paragraph 55)

9. Every community in the country should have access to waters—whether coastal or inland—that are safe for people to swim in without running the risk of falling ill. Regulators and water companies have made a great deal of progress since the 1990s in cleaning up and monitoring our coastal waters so that they are fit for bathing. This progress must now be extended to rivers. We welcome the efforts made by those water companies that are already working towards designation of river stretches. (Paragraph 68)

10. *We recommend that the Government actively encourage the designation of at least one widely used stretch of river for bathing in each water company area by 2025 at the latest. In their Business Plans for Ofwat's Price Review 24, each water and sewerage company should set out how they intend to work with stakeholders to support further applications for the designation of river bathing waters in their area, and to continue the process in subsequent Price Reviews.* (Paragraph 69)

11. Most river users cannot currently make informed decisions about when it is safe or not to use rivers downstream of storm overflows and wastewater treatment works. *We recommend as a matter of urgency that the Environment Agency work with water companies to ensure that easily accessible information on sewage discharges in waterways in as near to real time as possible is made available to the public, as now required under the Environment Act 2021. Signage should also be provided at commonly frequented bathing sites downstream from wastewater treatment works with information about how to access the data on recent discharges.* (Paragraph 70)

12. When deciding on areas for designation, the costs and benefits for local stakeholders should be carefully assessed, with consideration given to the potential impact on land adjacent to bathing waters. *We recommend that DEFRA ensure its Environmental Land Management Scheme supports action by farmers with land adjacent to designated waters to minimise the risk of any faecal contamination from livestock which might pose a risk to bathing water quality.* (Paragraph 71)

13. Designation of stretches of river as bathing waters will help to drive coordinated action to improve water quality: but achieving rivers safe to swim in is only one aspect of securing an overall improvement in water quality. Designation of bathing waters must therefore go hand in hand with further measures to preserve and improve riverine biodiversity. (Paragraph 72)

Agricultural pollution

14. Intensive livestock and poultry farming appears to be putting enormous pressure on particular catchments, such as those feeding the river Wye running through Wales and the south-west Midlands. The number of chickens being reared there appears

to have increased significantly, and pollution from their waste appears to be finding its way into river waters. The potential impact of intensive agricultural practices on river water quality must be fully acknowledged and the risks mitigated. One means of doing this is through farming which is as sensitive as possible to its effect on water quality in catchments. (Paragraph 106)

15. Development of catchment sensitive farming will require calculations of the overall nitrogen and phosphorous load for farmland and river catchments. *We therefore recommend that DEFRA commission a periodic (five yearly) appraisal of catchment-wide nutrient flows across each of the major river catchments in England. Such appraisals should then be used by local authorities and planning authorities to inform decisions on new housing developments and intensive livestock units, taking into account the cumulative impact of such developments on river catchments.* (Paragraph 107)

16. *We further recommend that planning authorities in England establish a presumption against granting planning permission for new intensive poultry or other intensive livestock units in catchments where the proposed development would exceed the catchment's nutrient budget, unless evidence is presented of robust mitigation plans in place that are demonstrably effective in reducing the accumulation of phosphate and nitrate loads in soils and river sediments within sensitive areas in the catchment.* (Paragraph 108)

17. The agricultural sector has a responsibility for improving water quality in rivers, just as the water industry and other stakeholders do. The Farming Rules for Water ought to be amended over time so as to reduce phosphorus surpluses in land and water and thereby improve water quality. This must be done in a way that promotes cooperation from farmers. The Environment Agency must recognise the impact on the sector of rule changes made with insufficient notice or options for mitigation. (Paragraph 125)

18. In order to drive down further the excess levels of phosphate and nitrates on agricultural land, annual chemical assessments will be required. Where appropriate, farmers ought to be supported to assess the existing phosphorus and nitrogen status of their land before spreading either farmyard manure or sewage sludge from water companies. The new Environmental Land Management Scheme provides an opportunity to provide financial help to farmers for measures to reduce progressively the input of phosphates and nitrates that cannot be taken up by crops. (Paragraph 126)

19. *We recommend that the Environment Agency work with DEFRA to intensify its work in the inspection and, where necessary, remediation of large animal slurry stores. Where remediation is required, funding from the Slurry Investment Fund should be made available to support the work.* (Paragraph 127)

20. The sewage sludge currently spread on agricultural land contains microplastics which have been caught in the wastewater treatment process. It may also contain e-coli, antibiotics, biocides, persistent chemical pollutants and pharmaceuticals. This practice appears to be the principal means of disposal of biosolids from such processes. If it is to continue, a means must be found to ensure that the microplastics

which find their way in to waste water are disposed of safely and not spread over food-growing farmland thereby polluting productive soils. *The Government should commission an independent evaluation of the potential risks to human health and the environment of spreading sewage sludge, with all the pollutants it contains, on farmland.* (Paragraph 128)

21. *We recommend that the water industry work urgently with the Environment Agency and the farming sector to assess and mitigate the clear risk of microplastic pollution from this practice, and to develop a comprehensive plan for the separation of microplastics from biosolids at wastewater treatment works.* (Paragraph 129)

Sewage pollution

22. The public are rightly shocked when they discover that untreated or partially treated sewage is regularly dumped into rivers and streams in England. We have heard that the rainwater washing into storm sewers can contain microplastics, industrial chemicals and hydrocarbons. It will then mix with human waste from homes and businesses containing harmful bacteria. In some cases, the only 'treatment' that such discharges will have received will have been to pass through a mesh grill. (Paragraph 150)

23. We therefore found the claim made by the chief executive of Severn Trent that its sewer overflow discharges were 'pretty much already rainwater' to be disingenuous. As water companies do not routinely test the quality of the discharges from storm overflows, they are in no position to make this claim. Discharges from overflows can be highly contaminated with raw sewage and other pollutants. To claim otherwise shows a disregard for the public's concern about water quality in rivers. (Paragraph 151)

24. Independent analysis of publicly available monitoring data, using machine learning techniques, has produced insights into the performance of the sewerage network which appears to have been beyond the current capacity of the Environment Agency to achieve, let alone water companies. The Environment Agency must improve its capacity to handle the very large volumes of data which will be provided in the course of automated monitoring of water quality and of storm overflows. (Paragraph 168)

25. *We recommend that the Environment Agency either develop the in-house capacity or tender for external assistance necessary for the analysis of the volume of data generated by EDMs and for the establishment of techniques to identify discharges which are likely to breach permit conditions.* (Paragraph 169)

26. *The technology for continuous monitoring of water quality is evolving rapidly. We recommend that the Environment Agency invite manufacturers to submit products for evaluation so that the Agency can rapidly introduce cost-efficient and effective sensors at an increased number of locations.* (Paragraph 170)

27. We note with concern the evidence we have received which suggests that Environment Agency sampling practice at wastewater treatment works may not adequately take into account regular variations in the composition of effluent. (Paragraph 171)

28. We welcome the statutory provisions in the Environment Act 2021 to monitor water quality upstream and downstream of sewer outflows, and for annual reporting on storm overflow discharges. We also welcome the requirement for water companies to report on the volume where information is available, but we regret that there is as yet no timetable for the roll-out of volume monitors across wastewater treatment works, especially to those works which have a history of spills. (Paragraph 172)

29. *We recommend that water companies take immediate steps to install volume monitors at all points where overflows may discharge from their sewerage networks, so as to provide continuous real-time monitoring of the volume of discharges consistent with the provisions of the Environment Act 2021. Drainage and sewerage management plans should include a clear plan for volume monitoring and a clear timetable for its implementation, and water companies should publish regular reports on progress towards full implementation.* (Paragraph 173)

30. We were dismayed to learn that some water companies have been slow to respond to formal requests by campaigners and citizen scientists under the Environmental Information Regulations 2004 to secure information about EDM use and permit conditions on the sewerage network. Given the overwhelming public concern about water quality in rivers in England, greater transparency in this respect should become the norm. We welcome the commitments on improved transparency which we received directly from the chief executives of several water companies. (Paragraph 179)

31. The statutory requirements on monitoring and transparency introduced by the Environment Act 2021 establish a welcome baseline. There is nevertheless scope to improve the nature of data which water companies collect about the operation of their sewerage networks, and to make it available to regulators and to the public. *We recommend that Ofwat and the Environment Agency require each water and sewerage company in England to publish on its website, by the end of 2022, details of its discharge permits, its permit compliance, and full granular 15-minute data on spill duration, volume and water quality, to a standard format which facilitates easy capture and analysis by members of the public.* (Paragraph 180)

32. The water industry has failed to achieve the target, set by the Environment Agency, of a 50% reduction in serious pollution incidents from their 2012 level by 2020. This is not an acceptable position. (Paragraph 188)

33. *We recommend that Ofwat require water companies, as a condition of their continued licensing, to deliver year-on-year reductions in the number of pollution incidents, with a target of zero serious incidents by 2030.* (Paragraph 189)

34. We nevertheless welcome the reductions in serious pollution incidents which water companies have achieved and which the Environment Agency has acknowledged. (Paragraph 190)

35. We note that the Environment Agency does not consider any use of storm overflows to be a pollution incident: discharges from overflows are classed as permitted discharges as long as they comply with the terms of the relevant permit. This is unlikely to incentivise overall reductions in discharges. *We recommend that the*

Environment Agency reclassify significant sewage spills from storm overflows into watercourses in dry weather as pollution incidents, irrespective of permit compliance. (Paragraph 191)

36. Public confidence in the regulatory structures currently in force is understandably low. It is vital that the public can trust regulators to ensure that high levels of water quality in rivers are achieved and maintained. (Paragraph 202)

37. We have identified multiple potential points of failure in the regulatory arrangements for monitoring, governance and enforcement of water quality. The Southern Water case has given rise to obvious and urgent questions about the system of operator self-monitoring and Environment Agency compliance monitoring. Given the duration of time when misreporting and large spills were routine at Southern Water, we cannot discount the possibility that similar practices have been occurring undetected at other water companies in England. (Paragraph 203)

38. We welcome the investigation recently launched by the Environment Agency and Ofwat into permit compliance at sewage treatment works, following evidence presented to us indicating that the numbers of permit breaches may be far higher than disclosed by water companies under self-reporting arrangements. We look forward to examining the findings of the investigation. (Paragraph 204)

39. *We recommend that the Environment Agency urgently review its practices in auditing the self-monitoring of wastewater treatment works by water companies. The Agency should also review its approach to enforcement and seek to reduce the interval between detection of permit breaches and prosecution.* (Paragraph 205)

40. *We further recommend that, in the interests of promoting public confidence in the criminal justice system and reducing the likelihood of reoffending, the Sentencing Council review the sentencing guidelines for water pollution offences. In our view, penalties for such offences should be set at a level that will ensure that the relevant risk assessments are routinely on the agenda of the boards of each water company.* (Paragraph 206)

41. *We recommend that Ofwat examine the scope of its existing powers in respect of water company remuneration, with a view to limiting the awards of significant annual bonuses to water company senior executives in the event of major or persistent breaches in permit conditions.* (Paragraph 207)

42. It is clear that there are no quick fixes to decades of under-investment in the sewerage network in England. Successive administrations, water companies and regulators have grown complacent and have sometimes appeared resigned to maintaining the antiquated practice of dumping sewage in rivers. (Paragraph 231)

43. Ofwat's regulatory approach to date appears to have placed insufficient emphasis on facilitating the investment necessary to ensure that the sewerage system in England is fit for the challenges of the 21st century, and able to cope with housing growth and the impact of climate change while restoring good ecological health to rivers. Investment must be accelerated so that damaging discharges from wastewater treatment assets, including storm overflows, cease and that any spills occur only in genuinely exceptional circumstances. (Paragraph 232)

44. The Secretary of State has the opportunity to set strategic direction for Ofwat. Now is the time for the Government to act in encouraging Ofwat to increase materially the proportion of each company's capital investment devoted to improving water quality. (Paragraph 233)

45. *We recommend that Ofwat prioritise the long-term investment in wastewater assets as an essential outcome of its price review process. We further recommend that Ofwat incentivise the use of nature-based solutions in wastewater management, including ongoing funding for maintenance and operation.* (Paragraph 234)

46. *We intend to invite the regulator to appear before this Committee routinely to discuss Ofwat's progress against the objectives of the new Strategic Policy Statement for the regulator which is shortly to be published by Ministers.* (Paragraph 235)

47. The Government acknowledges that reductions in discharges from the sewerage network will require significant investment across the water estate. The price estimate made by the Storm Overflows Taskforce of the cost of full separation of the entire sewerage network should be carefully scrutinised by the Government as it produces its plan, required by September 2022 under the Environment Act, on the actions required to reduce discharges from storm overflows in England. (Paragraph 236)

48. There is nevertheless no reason not to seek rapid and sustained action towards achieving the Act's requirement for progressive reductions in discharges, through incorporating capital projects into a whole-systems approach which seeks to reduce the overall pressures being placed on aging infrastructure. The Thames Tideway demonstrates that substantial capital projects can be secured without unaffordable bill increases. *We recommend that Ministers publish their assessment of every possible option to reduce system pressures on existing infrastructure, while also examining the case for significant capital works, when preparing the statutory report on elimination of storm overflows due by September 2022.* (Paragraph 237)

49. We welcome the duty which the Environment Act 2021 places on water companies in England to secure a progressive reduction in the adverse impact of discharges from their storm overflows. This is a positive first step towards cleaning up the sewage discharges blighting rivers in England. (Paragraph 242)

50. *We recommend that Ministers and the Environment Agency should set challenging improvement targets and timetables for this progressive reduction to inform the drainage and sewage management plans to be drawn up by each water company. The first round of these plans should clearly indicate significant ambition, by setting a stretching timetable for progressive reductions in the use of overflows.* (Paragraph 243)

Surface drainage and urban pollution

51. Fats, oils and greases and cleaning and hygiene products containing plastic are causing huge problems for drainage systems when they are poured away in sinks or flushed down the toilet. The disposal of FOG by takeaways and other food service establishments is currently unregulated. Grease management solutions exist, but awareness appears to be low. The food service industry needs clear guidance and standards to be established, failing which firmer regulation is likely to be

required, to ensure it begins to take responsibility for addressing an issue which is costly for water company customers and detrimental to sewerage systems and the environment. There could be potential circular economy benefits for businesses that can utilise these harmful waste products as biofuels. (Paragraph 262)

52. *The water and grease management industry must develop standards for the sectors which use FOG routinely to collect and dispose of such responsibly without it entering the drainage network. We further recommend that Ministers work with the water industry to consider whether fats, oils and greases should be classed as a trade effluent and all takeaways and food outlets required to install grease management systems.* (Paragraph 263)

53. Wet wipes and other 'unflushables' are a major constituent of sewer blockages. Many householders are unaware that flushing anything other than the '3Ps' ('pee, poo and paper') risks blocking sewers and could lead to a pollution incident. Better product labelling, introducing producer responsibility schemes and the use of behavioural science by water companies all have the potential to reduce blockages and the costs of clearing them. (Paragraph 264)

54. *The use of plastic in single use sanitary products should be prohibited, with exemptions only provided for medical requirements. We urge the Government to adopt the measures outlined in the Plastics (Wet Wipes) Bill to prohibit the manufacture and sale of single use cleaning and hygiene products containing plastic. The Government should further incentivise the reduction of waste and recoup costs by using new powers in the Environment Act to extend Extended Producer Responsibility schemes to cover single use cleaning and hygiene products that cause blockages.* (Paragraph 265)

55. Tyre, motor vehicle and fashion manufacturers, among many others, must take greater responsibility for the contribution their products make to microplastic pollution in waterways. *We recommend that Ministers examine how the proposed Extended Producer Responsibility scheme for tyre manufacturers could contribute to the swifter implementation of mitigation measures across the road network. We repeat our call for the Textiles 2030 scheme to incorporate the reduction of microplastic pollution in its targets.* (Paragraph 275)

56. Highways authorities at the national and local level must place a greater priority on preventing pollution from the strategic road network and from major roads maintained by local authorities in England. Solutions are available. These need to be rolled out as rapidly as possible. (Paragraph 286)

57. National Highways mitigated risks of pollution from 23 drainage points in 2020/21. At this rate it will take over 55 years to address the 1,326 outfalls and soakaways it has identified as high risk, not to mention the thousands of other potentially polluting drains on the strategic road network. This is unacceptably slow progress. We are sceptical that the company will be able to achieve its target of no net loss of biodiversity without working at a much faster rate to neutralise the direct risks to water quality from those outfalls it manages. (Paragraph 287)

58. *We recommend that National Highways accelerate its programme of installation of improvements to highways drainage in England, particularly at the 1,326 outfalls and soakaways considered to be high risk, to capture and filter polluting run-off before it enters watercourses and groundwater.* (Paragraph 288)

59. *We recommend that National Highways devote a greater proportion of its environmental budget to the mitigation of outfalls and set a target of eliminating pollution from those outfalls most at risk by 2030, in line with the Government's commitments to halt species decline. It should set out, by the end of 2022, a timetable for eliminating the risks from the outfalls and soakaways it manages.* (Paragraph 289)

60. *We are disappointed by the apparent lack of regulatory oversight of the risks of water pollution from road run-off. We therefore recommend that the Environment Agency require discharge permits for all outfalls on roads with annual average daily traffic above 15,000 vehicles, establishing strict conditions for their management, so as to minimise pollution from run-off.* (Paragraph 290)

61. We welcome the announcement that Ministers are to review whether Schedule 3 to the Flood and Water Management Act 2010 is to be implemented in England. Implementation would end the current automatic right to connect to sewerage systems, and mitigate the accompanying risks of overloading sewer capacity. (Paragraph 310)

62. *We recommend that the review consider the optimum arrangements for maintenance and adoption of sustainable drainage systems, and that it should propose an end to the automatic right to connect to the sewer in new developments as soon as possible and by the end of 2023 at the latest.* (Paragraph 311)

63. *We further recommend that the Department for Levelling Up, Housing and Communities update its planning practice guidance on sustainable drainage to ensure that sustainable drainage schemes are considered in all developments, including improvements under permitted development rights, and that it takes steps to address existing loopholes concerning the cost and practicality of such schemes.* (Paragraph 312)

64. *We further recommend that Non-Statutory SuDS Standards should be improved, taking into account the findings of the DEFRA review, so as to include water quality alongside other wider benefits, and should be made mandatory.* (Paragraph 313)

65. New housing developments must be used to set the standard for the sustainable sewerage networks required in the 21st century. It is unacceptable for developers to increase the pressure on overloaded combined sewerage systems and not to contribute to improvements. *We recommend that, in the process of approval of any new development in England, water companies ought to be empowered to require that any Community Infrastructure Levy payable by developers is used to enable separate surface water and foul sewers, in cases where provision has not already been made for such arrangements.* (Paragraph 314)

Restoring rivers to good ecological status

66. The new Office for Environmental Protection, established under the Environment Act 2021, is empowered to make highly significant contributions to the achievement

of the Government's environmental objectives in general, and to the improvement of water quality in rivers in particular. We encourage the Office for Environmental Protection to take account of the relevant conclusions and recommendations of this report when planning the Office's work on water quality, and to use the powers granted by Parliament to drive improvement of the regulation and enforcement regimes which govern the state of England's rivers. (Paragraph 325)

67. In the Committee's recent report on biodiversity in the UK we argued that action to protect biodiversity needed to be stepped up in scale, ambition, pace, and detail. Our conclusions from this inquiry show that this step change in approach is vital to protect freshwater biodiversity. (Paragraph 346)

68. Changes in regulatory action, cross-catchment collaboration and water company investment are urgently required to restore rivers to good ecological health, protect biodiversity and adapt to a changing climate. We expect to see far more assertive regulation and enforcement from Ofwat and the Environment Agency, with the provision of funding and resources to match. (Paragraph 347)

69. The value of biodiversity in rivers in England does not appear to have been priced adequately into the economic decisions made by companies and by regulatory agencies. *If it is to meet the Environment Act's legally binding target to halt the decline in the abundance of species in England by 2030, the Government must make it clear, in strategic guidance to Ofwat and to National Highways, that from now on natural capital needs to be taken into account in all economic decision making, and priced at a level that preserves and enhances it.* (Paragraph 348)

70. The biodiversity crisis requires public agencies, regulators and water companies to adopt new decision-making methodologies. The idea, for instance, that pollution can be tolerated in areas with low 'amenity value' belongs to a different era. Pollution of rivers must be addressed wherever it occurs because of the impact of such pollution has on freshwater ecosystems and ultimately the health of the oceans. (Paragraph 349)

71. Ofwat's economic regulation of the sector through previous price reviews does not appear to have given sufficient priority to the preservation of natural capital. *We recommend that, when it publishes its review methodology in 2022, Ofwat set out how it intends to reflect natural capital fully in its economic regulatory decisions for Price Review 24. PR24 must encourage water companies to make a substantial increase in their investment in nature-based solutions, so as to improve the quality of effluent being discharged from sewage treatment plants.* (Paragraph 350)

72. Delivering the step change in action on water quality that is demanded will require DEFRA to set a strong strategic direction and clear targets. Regulators must be empowered and funded adequately to implement and enforce the relevant provisions of the amended Water Industry Act and the new Environment Act. We note that in 2020 the annual grant support from central government to the Environment Agency was £80 million less than the funding provided in 2009. (Paragraph 351)

73. *We recommend that the level of financial support provided to the Environment Agency be reviewed as a matter of urgency in the light of its new statutory responsibilities and the scale of the regulatory task it faces, recognising its continued need for efficiency.*

We further recommend that the Environment Agency, the Secretary of State for Environment, Food and Rural Affairs and the Treasury review the relevant provisions of the Agency's environmental permitting charging scheme so as to ensure that charges for discharge permits and related activities properly reflect the cost to the Agency for these activities (Paragraph 352)

74. Responsibility for improving water quality in rivers cannot be laid solely at the door of the water industry. The project to restore all rivers in England to good health will require the engagement and collaboration of a wide range of stakeholders—from farmers to local authorities, and from product manufacturers to food outlets. At the riverside, it will require concerted action from a range of stakeholders collaborating across each catchment, including farmers, the water industry, housing developers, local authorities and citizen groups. The Catchment Based Approach partnerships provide a useful forum for this coordination: we consider that Ministers should examine means to increase the funding and resources available to them so as to achieve more effective coordination of all stakeholders across each river catchment in measures to improve water quality. (Paragraph 370)

75. Local authorities have a key role to play in restoring rivers to good ecological status across the country. Their engagement in Catchment Based Approach partnerships is crucial, while their work on Local Nature Recovery Strategies must engage with the development of drainage and sewerage management plans. It is essential that they be given powers sufficient to enable them to retrofit sustainable drainage systems on outfalls from major roads and housing estates. (Paragraph 371)

76. Pollution across river catchments must be progressively reduced from all sources in the catchment until it does not exceed the capacity of the land and the rivers to handle the nutrients. *We therefore recommend that DEFRA direct the Environment Agency and Natural England to calculate nutrient budgets for each river catchment in England.* (Paragraph 372)

77. Adequate support needs to be made available for farmers to achieve progressive reductions in those nutrient inputs which risk negatively affecting water quality in a catchment, or to mitigate the risk. *We recommend that DEFRA examine how the Environmental Land Management scheme can best be used to achieve this outcome.* (Paragraph 373)

78. Policymakers across Government should aim to cultivate a culture of water citizenship to foster greater awareness and change behaviour that risks causing blockages in the sewer network and increasing levels of water pollution. Awareness of what should not be disposed of down toilets and drains appears to be low. Many householders are still unaware that flushing anything other than the 'three Ps' ('pee, poo and paper') can create a risk of blocking sewers leading to a pollution incident. (Paragraph 374)

79. Citizen science should not be seen as an alternative to adequately funded environmental monitoring by regulators but it should be encouraged and recognised. *We recommend that the Environment Agency explore how best to support the contribution of citizen science to environmental regulation and to incorporate citizen science analysis in its work wherever possible and appropriate. The Environment*

Agency should, for instance, consider how best to provide a publicly-available platform for citizen scientists to enter water quality readings in a way that would allow results to be verified by other users, regulators or companies. (Paragraph 375)

80. It is important that communities who engage in citizen science receive a meaningful response to their work. *We recommend that the Government consider whether a requirement should be placed on water companies to respond to citizen science research undertaken by CaBA partnerships, where that research demonstrates water quality issues in a specific area, with an action plan to address the issues identified.* (Paragraph 376)

81. Drainage and sewerage management plans, as currently conceived, appear to be the preserve of the water industry. For these plans to be successful they must be designed so as to ensure active and continued engagement with the full range of stakeholders, including local authorities, highways agencies and developers. These plans must be backed up by measures to prohibit use of the products and chemicals at greatest risk of blocking drainage systems and degrading water quality. (Paragraph 377)

82. Retrofitting urban areas with sustainable drainage systems can deliver multiple benefits in terms of nature recovery, air quality and flooding prevention. *We recommend that Ministers review and, where appropriate, revise the criteria for the award of funds intended for flooding prevention and nature recovery so as to ensure that they support projects to retrofit sustainable drainage systems. We further recommend that, through its price review process and asset management plans, Ofwat allow adequate funding for water companies to identify areas for the retrofit of sustainable drainage systems.* (Paragraph 378)

Formal minutes

Wednesday 5 January 2022

Members present

Philip Dunne, in the Chair

Duncan Baker

Barry Gardiner

Sir Robert Goodwill

Helen Hayes

Ian Levy

Cherilyn Mackrory

Jerome Mayhew

Dr Matthew Offord

Water quality in rivers

The Committee deliberated.

Draft Report (*Water quality in rivers*), proposed by the Chair, brought up and read.

Paragraphs 1 to 378 read and agreed to.

Summary agreed to.

Resolved, That the Report be the Fourth Report of the Committee to the House.

Ordered, That the Chair make the Report to the House.

Ordered, That embargoed copies of the Report be made available, in accordance with the provisions of Standing Order No. 134.

[…]

Adjournment

Adjourned till Wednesday 19 January at 2.00 pm.

Witnesses

The following witnesses gave evidence. Transcripts can be viewed on the inquiry publications page of the Committee's website.

Wednesday 10 March 2021

Professor Nigel Watson, Professor of Geography and Environmental Management at the Lancaster Environment Centre, Lancaster University; **Professor Steve Ormerod**, Professor of Ecology/Co-Director Water Research Institute, Cardiff University; **Dr Michelle Jackson**, Associate Professor of Freshwater/Marine Ecology, University of Oxford — Q1–35

Guy Linley-Adams, Solicitor, Salmon and Trout Conservation; **Amy Slack**, Head of Campaigns and Policy, Surfers against Sewage; **Dr Rob Collins**, Head of Policy and Science, The Rivers Trust — Q36–64

Wednesday 21 April 2021

Professor Peter Hammond, (retired) Professor of Computational Biology, University College London (UCL), Senior Fellow in Medical Image Analysis, University of Oxford Big Data Institute; **Professor Rebecca Malby**, Co-founder, Ilkley Clean River Group; **Pete Lloyd**, Environment Agency (retired) — Q65–100

Ben Seal, Places to Paddle Manager, British Canoeing; **Feargal Sharkey**, Chairman, Amwell Magna Fishery; **Jane Nickerson**, Chief Executive, Swim England — Q101–126

Wednesday 26 May 2021

Alastair Chisholm, Director of Policy, Chartered Institution of Water and Environmental Management; **Bronwyn Buntine**, Sustainable Drainage Team Leader, Kent Council; **Ian Titherington**, Lead Drainage Officer, Cardiff Council — Q127–155

Daniel Johns, Head of Public Affairs, Anglian Water Services Ltd; **Lila Thompson**, Chief Executive, British Water; **Jo Bradley**, UK Director of Operations, Stormwater Shepherds — Q156–199

Wednesday 23 June 2021

Sir James Bevan, Chief Executive, Environment Agency; **David Black**, Interim Chief Executive, Ofwat; **Nick Harris**, Acting Chief Executive, Highways England — Q200–285

Wednesday 15 September 2021

Susan Twining, Chief Land Use Policy Adviser, CLA (Country Land and Business Association); **Richard Bramley**, Environment Forum Chair, National Farmers Union — Q286–320

Rebecca Pow MP, Parliamentary Under Secretary of State, Department for Environment, Food and Rural Affairs; **Kirstin Green**, Deputy Director, Water Quality, Department for Environment, Food and Rural Affairs; **Simon Gallagher**, Planning Director, Ministry of Housing, Communities and Local Government — Q321–400

Wednesday 13 October 2021

Sarah Bentley, Chief Executive, Thames Water; **Susan Davy**, Chief Executive, South West Water; **Liv Garfield**, Chief Executive, Severn Trent Water; **Ian McAulay**, Chief Executive, Southern Water; **Heidi Mottram CBE**, Chief Executive, Northumbrian Water Q401–530

Published written evidence

The following written evidence was received and can be viewed on the inquiry publications page of the Committee's website.

WQR numbers are generated by the evidence processing system and so may not be complete.

1 Albion Water (WQR0016)

2 Anglian Water Services Ltd (WQR0038 and WQR0089)

3 Angling Trust and Fish Legal (WQR0048)

4 Anonymous (WQR0009)

5 Aquatic Consultancy Service (WQR0021)

6 British Canoeing (WQR0023)

7 Buglife—The Invertebrate Conservation Trust (WQR0055)

8 CHEM Trust (WQR0022)

9 Cam Valley Forum (WQR0058)

10 Carss, Mr Geoff and Skeffington, Professor Richard (WQR0045)

11 Catchment Partnerships in London (WQR0061)

12 Catchment-Based Approach Urban Water Group (CUWG) (WQR0037)

13 Chartered Institute of Water and Environmental Management (CIWEM) (WQR0074 and WQR0087)

14 Colne Valley Fisheries Consultative (WQR0011)

15 Colne Valley Regional Park (WQR0050)

16 Consumer Council for Water—CCW (WQR0033)

17 Cutler, Mr Rod (WQR0010)

18 Cyster, Mr Gary (Retired former Senior Fisheries Inspector, Environment Agency) (WQR0062)

19 Davis, Alison (WQR0039)

20 Department for Environment, Food and Rural Affairs (WQR0028 and WQR0105)

21 Environment Agency (WQR0029)

22 Fidra (WQR0071)

23 Flusher EU Limited (WQR0090)

24 Friends of the Somerset River Frome (WQR0015)

25 Friends of the Upper Wye (WQR0094)

26 Grease Contractors Association (WQR0083)

27 Hammond, Professor Peter (WQR0064)

28 Ilkley Clean River Group (WQR0084)

29 Jones, Dr John Iwan (Research Leader, Queen Mary University of London) (WQR0034)

30 Langstone Harbour Board (WQR0027)

31 Latimer, Mr Robert (Retired Engineer, Latimer Express Services) (WQR0053)

32 Lloyd, Mr Peter (WQR0026, WQR0091 and WQR0100)
33 London Borough of Hackney (WQR0086)
34 London Waterkeeper (WQR0054)
35 Marinet Limited (WQR0014, WQR0080 and WQR0081)
36 Meteor Communications Limited (WQR0102)
37 National Audit Office (WQR0097)
38 National Farmers Union (WQR0042 and WQR0099)
39 Natural England (WQR0040)
40 Ofwat (WQR0078)
41 Oxford Rivers Improvement Campaign (WQR0103)
42 Pearson, Mrs Rosie (Founder, Better Braintree—Together) (WQR0012)
43 Pennon /South West Water (WQR0056)
44 Policy Connect (WQR0017)
45 Purvis, Mark (Consultant, Self-employed) (WQR0020)
46 River Action (WQR0044 and WQR0096)
47 SDS Limited (WQR0067)
48 SPEL Products (WQR0003)
49 Salmon & Trout Conservation (WQR0002 and WQR0085)
50 Save Our South Coast Alliance (WQR0024)
51 Severn Trent Water (WQR0076)
52 Singer, Dr Andrew C (Senior Scientist, UK Centre for Ecology & Hydrology) (WQR0092)
53 Smart Growth UK (WQR0006)
54 Smith, Ashley (Chairman, Windrush Against Sewage Pollution) (WQR0069)
55 Solent Protection Society (Charity) (WQR0008)
56 South West Rivers Association (WQR0051)
57 Southern Water (WQR0059)
58 Stormwater Shepherds UK (WQR0004 and WQR0088)
59 Surfers against Sewage (WQR0031)
60 Swim England (WQR0032)
61 Thame Valley Fisheries Preservation Consultative (WQR0070)
62 Thames Water (WQR0047)
63 The Food, Farming and Countryside Commission (WQR0098)
64 The Grayling Research Trust (WQR0068)
65 The RePhoKUs project (WQR0101 and WQR0104)
66 The Rivers Trust (WQR0043 and WQR0082)
67 UK Centre for Ecology & Hydrology (WQR0013)
68 United Utilities (WQR0046)

69 Upper Thames Fisheries Consultative committee (WQR0019)

70 WA Consultancy and Technical Development Services (WQR0073)

71 Water UK (WQR0075)

72 Watson, Professor Nigel (Professor of Geography and Environmental Management, Lancaster University) (WQR0007)

73 Wessex Water Services Ltd (WQR0025)

74 Whitewater Valley Preservation Society (WQR0018)

75 Wild, Tom (Research Fellow, University of Sheffield, Department of Landscape Architecture) (WQR0049)

76 Wildlife and Countryside Link (WQR0077)

77 Wilkes, Dr Martin (Assistant Professor, Coventry University); and Mckenzie, Dr Morwenna (Postdoctoral researcher, Coventry University) (WQR0035)

78 Wiltshire Fishery Association (WQR0036)

79 Woodward, Professor Jamie (Professor of Physical Geography, The University of Manchester) (WQR0095)

80 Xylem Water Solutions UK Ltd (WQR0052)

81 Yorkshire Water (WQR0072)

82 Zoological Society of London (WQR0057)

List of Reports from the Committee during the current Parliament

All publications from the Committee are available on the publications page of the Committee's website.

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Number	Title	Reference
1st	Biodiversity in the UK: bloom or bust?	HC 136
2nd	The UK's footprint on global biodiversity	HC 674
3rd	Green Jobs	HC 75
1st Special	Energy efficiency of existing homes: Government Response to the Committee's Fourth Report of Session 2019–21	HC 135
2nd Special	Growing back better: putting nature and net zero at the heart of the economic recovery: Government and Bank of England Responses to the Committee's Third Report of Session 2019–21	HC 327
3rd Special	Biodiversity in the UK: bloom or bust?: Government Response to the Committee's First Report	HC 727

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Number	Title	Reference
1st	Electronic Waste and the Circular Economy	HC 220
2nd	Pre-appointment hearing for the Chair-Designate of the Office for Environmental Protection (OEP)	HC 1042
3rd	Growing back better: putting nature and net zero at the heart of the economic recovery	HC 347
4th	Energy Efficiency of Existing Homes	HC 346
1st Special	Invasive species: Government Response to the Committee's First Report of Session 2019	HC 332
2nd Special	Our Planet, Our Health: Government Response to the Committee's Twenty-First Report of Session 2017–19	HC 467
3rd Special	Electronic Waste and the Circular Economy: Government Response to the Committee's First Report	HC 1268