

April 2022

Operational resilience discussion paper

Ofwat

About this document

This discussion paper sets out how we propose to evolve our approach to regulating operational resilience to achieve the best outcomes for customers, society and the environment. Alongside our current thinking on asset health performance commitments for the 2024 price review (PR24), this paper also sets out our proposal to use an iterative three stage process to achieve our longer-term ambition to develop an integrated monitoring framework for operational resilience. We propose first to target reporting of a small number of additional water and wastewater measures; then gain further insight through the collaborative development and refinement of enhanced monitoring and finally consolidate each element into an integrated monitoring framework. This will enable us to form a holistic and more complete view of asset health and wider operational resilience in the sector.

This discussion paper follows two recent consultations: '[Assessing base costs at PR24](#)' and '[PR24 and beyond: Performance commitments for future price reviews](#)' and engagement with the sector. We welcome responses to this paper which we will review and consider.

Responding to this discussion paper

We would welcome any comments on this discussion paper by **26 May 2022**. Please email your comments to operational.resilience@ofwat.gov.uk

For the wider water and wastewater measures we outline in this paper as part of the 2021–22 voluntary data and information request, we ask companies to report these by **15 July 2022** as part of their annual performance report submissions. We provide an operational resilience information request pro forma alongside this paper for companies to complete.

We will publish responses to this discussion paper on our website at www.ofwat.gov.uk, unless you indicate that you would like your response to remain unpublished. Information provided in response to this discussion paper, including personal information, may be published or disclosed in accordance with access to information legislation – primarily the Freedom of Information Act 2000 (FoIA), the General Data Protection Regulation 2016, the Data Protection Act 2018, and the Environmental Information Regulations 2004. For further information on how we process personal data please see our [privacy policy](#).

If you would like the information that you provide to be treated as confidential, please be aware that under the FoIA there is a statutory [Code of practice](#) which deals, among other things, with obligations of confidence. In view of this, it would be helpful if you could explain to us why you regard the information you have provided as confidential. If we receive a request for disclosure of the information, we will take full account of your explanation, but we cannot give an assurance that we can maintain confidentiality in all circumstances. An automatic confidentiality disclaimer generated by your IT system will not, of itself, be regarded as binding on Ofwat.

Executive summary

Securing resilient water and wastewater services is fundamental to the sector delivering great performance and meeting the longer-term needs of customers, society and the environment. The operational, financial and corporate resilience of companies affects all current and future customers' water and wastewater services. It is critical that water companies have assets that are well maintained and operate as intended so that they meet the requirements of their statutory obligations¹ and the expectations and needs of customers, the environment and wider society. Companies should be able to demonstrate a clear understanding of the health of their assets over the long term and how this impacts the resilience of their services.

Maintaining and improving operational resilience requires companies to identify and manage a complex range of risks to make sure their assets operate effectively to meet current and future service needs. This includes the successful management of long-life assets and operational systems on a day-to-day basis while also ensuring mitigations are in place to manage the impact of low probability, high impact events. These core company activities are vital to customers but may not be visible to them or to wider stakeholders. Around 80% of companies' total expenditure relate to routine, year-on-year base costs, which companies incur in the normal running of their business to provide a base level of good service to customers and the environment and maintain the long-term capability of assets.² Therefore, it is important for companies to demonstrate to their customers that their money is being used efficiently and effectively. We have also highlighted the importance of open data and transparency for building trust with customers and wider stakeholders.³ The operational resilience challenges facing the sector and the impact on customers have been highlighted recently with water supply disruptions during hot weather and freeze thaw events.⁴

Current approach to operational resilience

We expect companies to fully understand their assets and act appropriately to deliver short- and longer-term operational resilience. A key part of our current approach to operational resilience is the outcomes regime in the price control, which holds companies to account for delivering outcomes for customers and the environment. We focus on a range of service performance measures complemented by a small number of asset health performance commitments that provide some information on operational resilience. While the outcomes regime does capture a company's failure to mitigate risks when they have an impact on service, it focuses on performance at a point in time. Therefore, it may not always provide the

¹ Section 37 and 94 [Water Industry Act 1991](#)

² Ofwat, '[Assessing base costs at PR24](#)', page 2, December 2021

³ Ofwat, '[H2Open – Open data in the water industry: a case for change](#)', October 2021

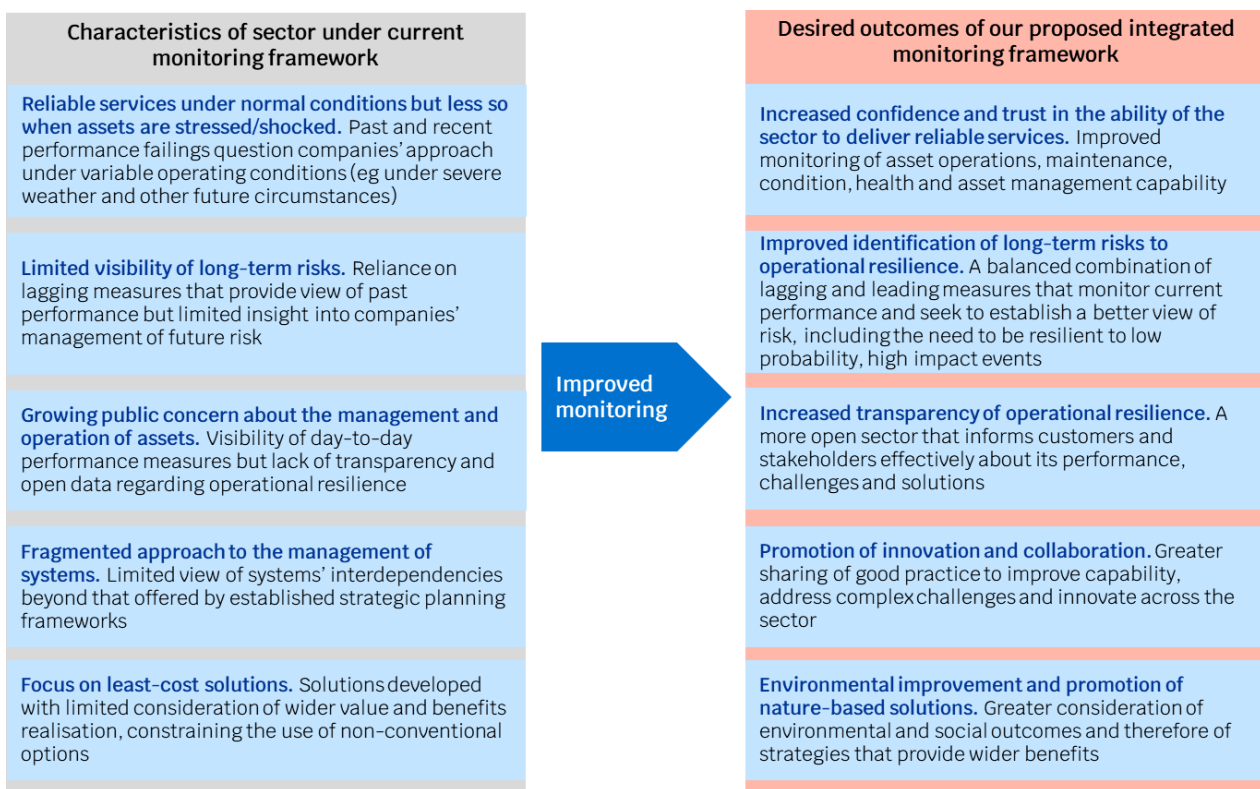
⁴ Ofwat, '[Out in the cold](#)', June 2018

breadth and depth of information needed to gain insight into the effectiveness of a company's approach to maintaining assets or managing current and future risks.

Evolution of our approach to operational resilience

Our longer-term ambition is to help the sector to adapt to future challenges and continue to deliver better outcomes for customers and the environment. To achieve this, we need to evolve our monitoring approach to provide a richer picture of operational resilience for customers and stakeholders. We propose to develop an **integrated monitoring framework** that is informed by the outcomes regime and complemented by wider monitoring activities. Figure 0.1 outlines the outcomes we aim to achieve through the integrated monitoring framework.

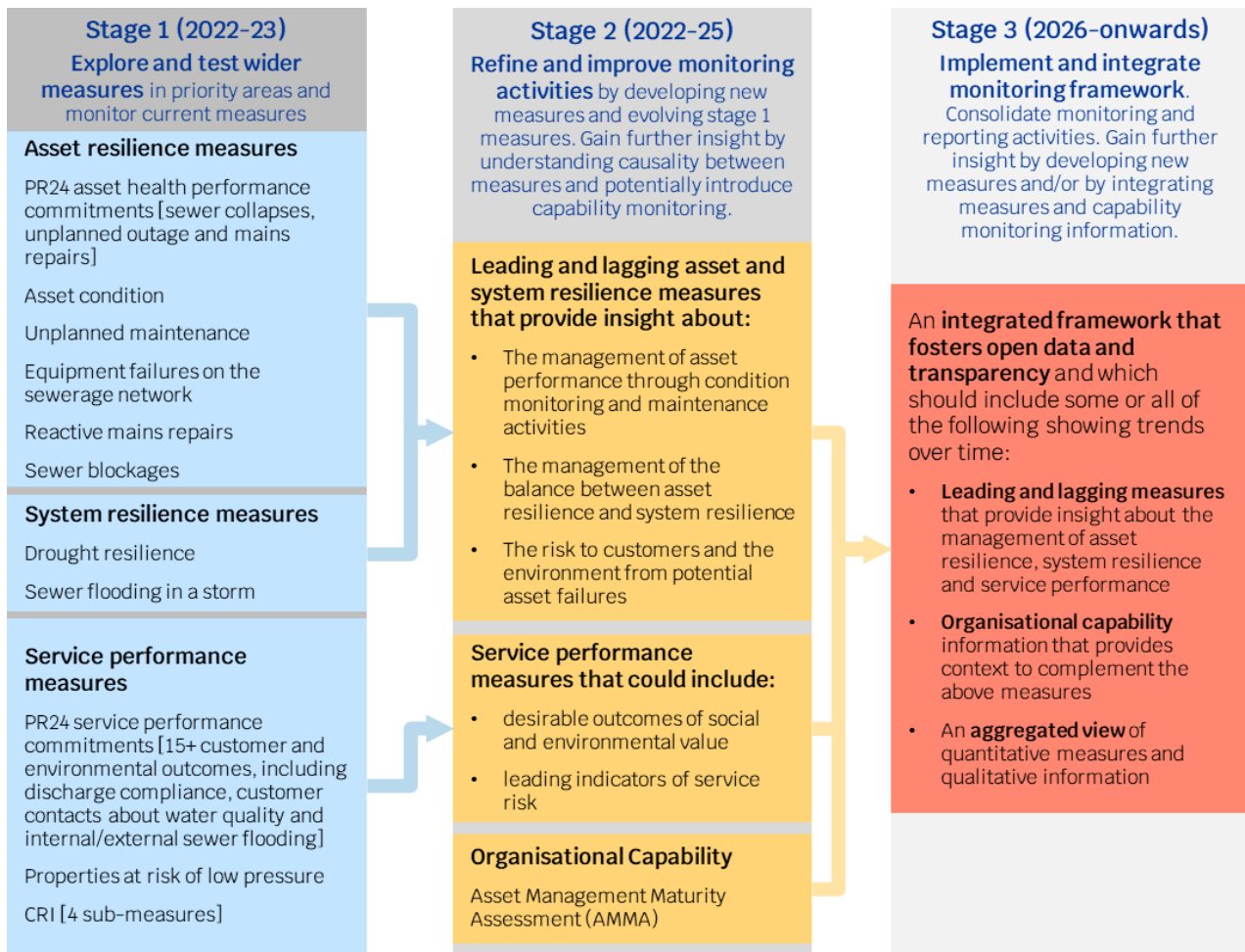
Figure 0.1 Improved monitoring can potentially deliver better outcomes



Performance commitments remain valuable tools for the sector in managing asset health. We propose to focus on three key asset health performance commitments at the 2024 price review (PR24) that, while relatively narrow in focus, help to provide strong incentives to maintain asset health. We will complement these with wider monitoring of information outside of the price review. This will provide a richer picture of the large, complex and diverse asset base our sector is responsible for managing on behalf of its customers, society and the environment.

To form a holistic and more complete view of asset health and wider operational resilience in the sector we propose to explore, test, develop, refine and consolidate our approach through an iterative three stage process. We provide a summary of each stage in figure 0.2.

Figure 0.2 Proposed process to evolve our monitoring of operational resilience



Stage 1 (2022-23): Targeted monitoring activities that focus on immediate or emerging priority areas.^{5,6} Alongside deciding on appropriate asset health performance commitments for PR24, we propose to **explore and test wider measures** associated with the health and performance of water and wastewater assets to better understand company asset management practices in this area. Through a voluntary data and information request for 2021-22, we are asking **water and sewerage companies** to report on five measures and **water only companies** to report on two measures (see appendix 2). We provide an operational resilience information request pro forma alongside this paper. We will engage with companies on these measures to refine our data request for 2022-23.

⁵ Ofwat, '[Letter from David Black to water companies: Company compliance with environmental permits](#)', November 2021

⁶ Environmental Audit Committee, '[Environmental Audit Committee - Water quality in rivers Fourth Report of Session 2021-22](#)', January 2022

We will further consult on performance commitments as part of our PR24 draft methodology in July 2022. We will continue to monitor any operational resilience measures already reported through the annual performance report or otherwise publicly reported (eg sewer blockages, reactive mains repairs, properties at risk of low pressure) and measures reported to other regulators (eg compliance risk index, CRI sub-measures). As part of stages 2 and 3 we will consider how we can share the current picture of operational resilience with customers and stakeholders.

Stage 2 (2022–25): Enhanced monitoring activities to develop wider measures (both leading and lagging) in collaboration with the sector to help us to gain further insight into sector operational resilience by increasing our understanding of the causal relationships between asset and system resilience. We propose to **refine and improve monitoring activities** including wider measures proposed in stage 1, the development of new measures and capability monitoring to collect more diverse information to develop a better understanding of operational resilience in different thematic areas. This stage is critical in enabling us to focus policy development in areas that will challenge companies to horizon scan for future risks and opportunities, better understand the health of their assets and adopt a strategic and long-term approach.

Stage 3 (2026–onwards): Implementation and integration of monitoring framework to drive improvements in longer-term operational resilience. We propose to focus on establishing reporting mechanisms and consolidation of monitoring elements to drive improvement in longer-term resilience and reinforce the long-term focus. Greater transparency and sharing of data will be an important part of the framework to enable customers and wider stakeholders to access comparative information.⁷ We will consider how new ways of working and ongoing technological developments may inform or form part of the future development of the integrated monitoring framework.

⁷ Ofwat, '[H2Open – Open data in the water industry: a case for change](#)', October 2021

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1. Background and context

Securing resilient water and wastewater services is fundamental to the sector delivering great performance and meeting the longer-term needs of customers, society and the environment. The sector will continue to face challenges such as the impacts of climate change, the transition to net zero, population growth, shifting customer expectations and pressure on customers' ability to pay.

These current and future challenges have led us to consider how we can **evolve our current approach** to bring increased focus and challenge to the resilience issues the sector faces.

Resilience has always been part of the water companies' statutory obligations and inherent in the service commitments companies make to their customers. The Water Act 2014 introduced an additional primary duty for us to further the resilience objective⁸ and the UK and Welsh Governments reiterate its importance in the priorities set out in their Strategic Policy Statements.⁹

It is critical that water companies have assets that are well maintained and operate as intended so that they meet the requirements of their statutory obligations¹⁰ and the expectations and needs of customers, the environment and wider society. To make decisions about their operations, maintenance and investment in the short and longer term, companies need the right information, systems, processes, governance and capabilities in place.¹¹

1.1 Expectations and opportunities going forward

The sector needs to do more to ensure that it is:

- managing its current responsibilities on behalf of customers, society and the environment;
- more transparent, open and accountable to customers and stakeholders;
- ready to adapt to future challenges; and
- delivering improvements in areas where gaps or concerns have been identified.

We expect assets and systems to deliver **reliable services for customers and the environment under a range of shocks and stresses** and companies to identify and

⁸ Section 2(2A)(e) and s2(2DA) [Water Industry Act 1991](#)

⁹ Defra, '[UK Government's strategic priorities for Ofwat](#)', February 2022; and '[Strategic Priorities and Objectives Statement to Ofwat](#)', 2017 (we expect the Welsh Government to update this statement in the near future)

¹⁰ Section 37 and 94 [Water Industry Act 1991](#)

¹¹ Ofwat, '[Resilience in the round](#)', September 2017

mitigate a wide range of risks, including those connected with asset health¹² and climate change. We also expect companies to plan for the long term, underpinning short- and medium-term plans with a longer-term strategy that reflects customers' priorities and has the environment at its core. This includes developing a systems-based approach to resilience that accounts for internal and external system interactions and interdependencies.

Resilient ecosystems and biodiversity underpin many of the key services provided by companies.¹³ We expect companies to **demonstrate how they are promoting environmental and ecosystem resilience** and developing nature-based solutions where this is appropriate.

Around 80% of companies' total expenditure relate to routine, year-on-year base costs, which companies incur in the normal running of their business to provide a base level of good service to customers and the environment and maintain the long-term capability of assets.¹⁴ The sector needs to make decisions through the lens of assets, now and in the future to best serve customers, the environment and society. We also consider it is vitally important that companies **collect, monitor, analyse and act on asset health information beyond what is reported to us**. Companies should monitor a wide suite of asset health related information and track any measure that is important for them to manage their assets effectively. Measures considered during the staged process discussed in this paper that are not added to regulatory reporting could therefore still be suitable for companies to report internally. Companies should also consider the benefits of sharing internal information in an open data format.

The opportunity to harness data and information from new technological developments and artificial intelligence will be key in helping the sector to make data on their assets and asset performance open to **improve transparency for wider stakeholders**.^{15,16} Open data and real-time data offer valuable opportunities for companies to improve understanding of their infrastructure and be more transparent and accountable to stakeholders.¹⁷ Companies should foster transparency in this area and be open to publishing and sharing the data they provide as part of our proposal for an **integrated monitoring framework** which we discuss in this paper.

¹² The [Ofwat lexicon](#) developed for the AMMA currently defines asset health as an indicator of a company's ability to continue to perform its functions for the benefit of customers, the environment and wider society now and in the future. In addition, the UKWIR's 'Future Asset Planning' project currently defines asset health as a property of an asset that reflects its ability to perform its function, by considering modes of failure that would affect the value provided. Failure modes associated with inadequate capacity (in terms of storage volume, delivered flow, or pollutant loading rate) are excluded, except where these result from deterioration of the asset.

¹³ Ofwat, '[Delivering Water 2020: Our methodology for the 2019 price review. Appendix 4: Resilience](#)', December 2017

¹⁴ Ofwat, '[Assessing base costs at PR24](#)', page 2, December 2021

¹⁵ Geospatial Commission, '[National Underground Asset Register \(NUAR\)](#)', 2021

¹⁶ Centre for digital built Britain, '[National Digital Twin Programme](#)', 2021

¹⁷ Ofwat, '[H2Open – Open data in the water industry: a case for change](#)', October 2021

1.2 Our work on operational resilience

While companies are responsible for ensuring they deliver operational resilience, we have a role in challenging the sector to do this effectively and efficiently. We are actively engaging and promoting resilience across the sector, developing and disseminating key planning principles and general good practice (see figure 1.1). Since 2015 our work has covered different aspects of operational resilience,¹⁸ from incident investigations, to planning guidance, or themed publications such as the targeted review of asset health¹⁹ and our recent asset management maturity assessment (AMMA).²⁰

Figure 1.1 Key work on operational resilience



Throughout the AMMA, we took a collaborative approach to assess sector asset management capability. We made recommendations for companies to take forward, including to develop and report on a comprehensive suite of leading and lagging asset health measures to monitor asset health risks and trends, as well as the longer-term effectiveness of their asset management plans.²¹ We also indicated that we would consider doing more to monitor companies' asset health and operational resilience. Going forward, we want to keep collaborating with the sector to improve in these and other areas of operational resilience.

¹⁸ The [Ofwat lexicon](#) developed for the AMMA currently defines operational resilience as the ability of an organisation's infrastructure, and the skills which run that infrastructure, to avoid, cope with and recover from, disruption in its performance.

¹⁹ CH2M, '[Targeted review of asset health and resilience in the water industry](#)', September 2017

²⁰ Ofwat, '[Asset management maturity assessment – insights and recommendations](#)', September 2021

²¹ The [Ofwat lexicon](#) developed for the AMMA currently defines leading measures as forward looking measures that are specifically predictors of future performance. The lexicon defines lagging measures as indicators that are based on past performance data and can be used as backward-looking predictors of future performance.

The breadth and depth of information that we collect and monitor on asset health and wider operational resilience has evolved over time. Our current outcomes regime provides monitoring of operational resilience that is focused on service performance measures complemented by a small number of asset health performance commitments. The outcomes regime has used performance commitments that can be financially or reputationally incentivised to deliver short- and longer-term benefits for customers and the environment.

Box 1: Performance commitments and the outcomes regime

Performance commitments measure the service that water companies deliver for customers and the environment as part of the price control. They are the cornerstone of our outcomes regime. The outcomes regime uses performance commitments to focus companies on what really matters to customers. It provides flexibility for companies to innovate and improve their service benefiting both customers and the environment.

Although monitoring and incentivisation through performance commitments does capture the impact of a company's failure to mitigate risks when they have an impact on service, it focuses on performance at a point in time. Therefore, it may not always provide the breadth of information needed to gain insight into the effectiveness of a company's approaches to maintaining assets or managing current and future risks. Recent performance failings and gaps identified in companies' approaches to resilience (reflected in our 2019 price review (PR19)²² and the AMMA²³ work) support the need to evolve our current monitoring approach. We want to gain further clarity and assurance on companies' management of assets and operational resilience, particularly in relation to low probability, high impact events.

²² Ofwat, '[PR19 final determinations: Securing long-term resilience](#)', December 2019

²³ Ofwat, '[Asset management maturity assessment – insights and recommendations](#)', pp 29-31, September 2021

2. Evolving our approach to operational resilience

In this section we set out how we propose to evolve our monitoring approach for operational resilience. We present an iterative process to deliver an integrated monitoring framework informed by parts of the outcomes regime and complemented by wider monitoring activities.

Box 2: How we propose to use our integrated monitoring framework

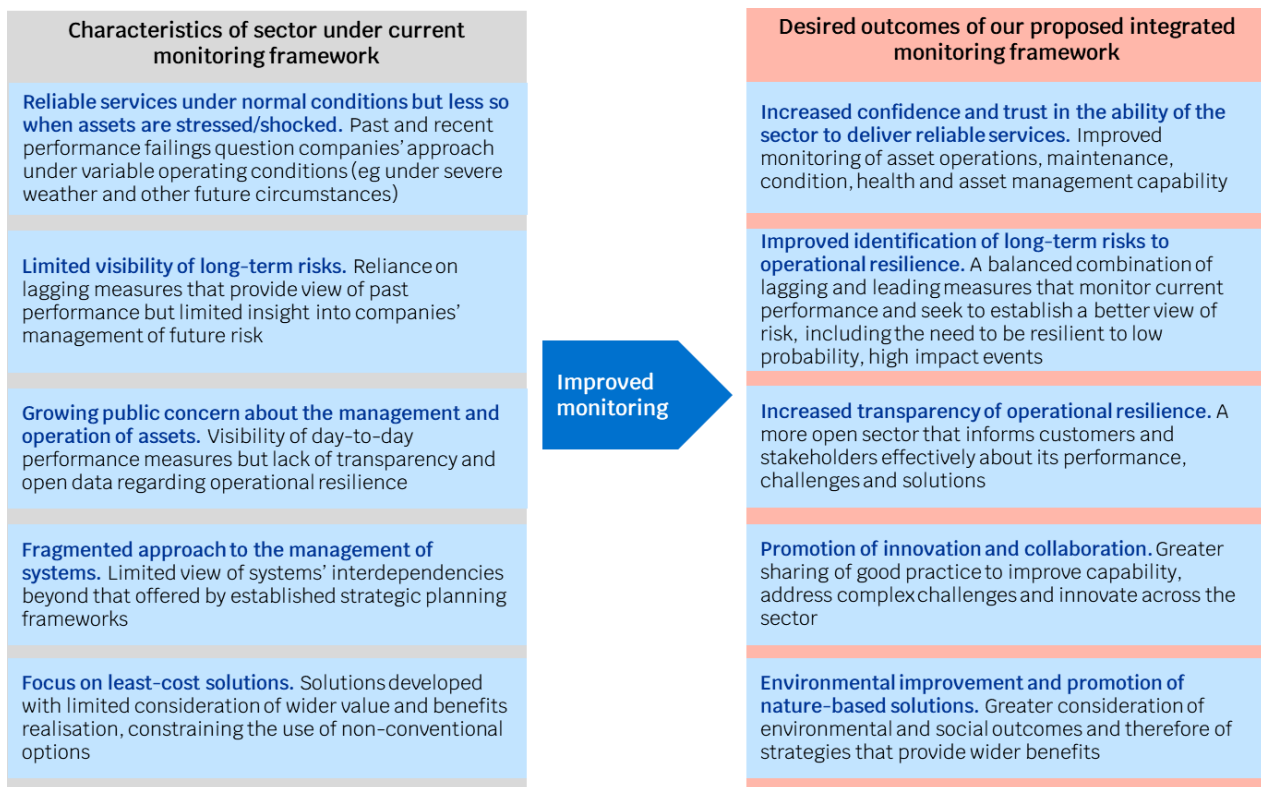
We propose to develop a monitoring framework that integrates selected information from the price review outcomes regime, and wider monitoring activities, to build a more **comprehensive and complete picture** of operational resilience. This will help us to:

- challenge companies to identify immediate and emerging risks to longer-term operational resilience;
- assess when we may need to use other regulatory tools, including enforcement, to take further action;
- identify focus areas for future policy development;
- encourage the sector to innovate, collaborate and showcase by promoting good practice in operational resilience and highlighting challenges;
- challenge companies to improve transparency, openness and accountability of asset health and operational resilience to build trust and legitimacy with customers and wider stakeholders; and
- challenge companies to horizon scan for future risks and opportunities.

We expect the framework to continuously evolve over time reflecting changing priorities, circumstances and challenges. We are still exploring how the framework will work in practice and **we would welcome views on this point**.

2.1 Our longer-term ambition: to deliver better outcomes through improved monitoring

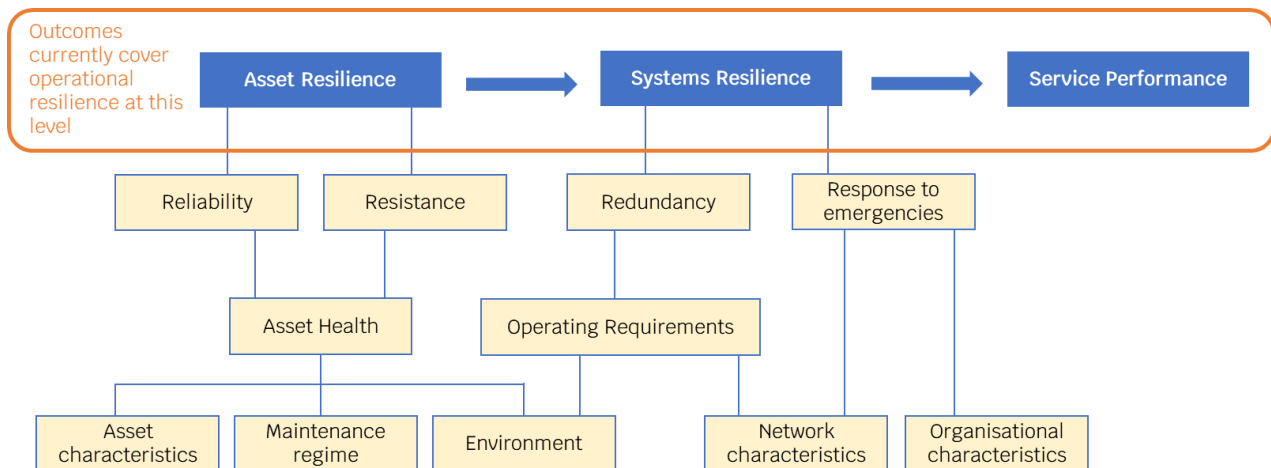
Our longer-term ambition is to use our wider monitoring of operational resilience, alongside the price review outcomes regime, to ensure that our regulatory approach promotes the efficient delivery of companies' obligations, including the sector's ability to adapt to future challenges and continue to deliver better outcomes for customers and the environment (see figure 2.1). We propose to develop a richer understanding of operational resilience through an integrated monitoring framework.

Figure 2.1 Improved monitoring can potentially deliver better outcomes

Our current approach to monitoring operational resilience relies primarily on the outcomes regime (which includes a small number of asset health performance commitments) alongside reporting of some additional measures collected through company annual performance reports (APR), eg blockages, reactive mains repairs.

Performance commitments hold companies to account for delivering outcomes in the key areas most important to customers and the environment. While the outcomes regime does capture the impact of a company's failure to mitigate risks when they have an impact on service, it focuses on performance at a point in time. Therefore, it may not always provide the breadth and depth of information needed to gain insight into the effectiveness of a company's approaches to maintaining assets or managing current and future risks. Wider monitoring, conducted outside of the price review, should provide further insight to form a holistic and more complete view of asset health and wider operational resilience in the sector.

We explore this further in figure 2.2 below. Performance commitments provide some insight into operational resilience, but other aspects could be further explored using wider monitoring. For example, aspects related to asset characteristics (eg asset condition) or to the maintenance regime of assets (eg inspections and other maintenance activities) are less well represented in our current approach. Other areas where there is room for additional monitoring include aspects that reflect the ability of companies' systems to respond to emergencies, endure and recover from asset failures and variable operating conditions (eg redundancy and response under extreme weather conditions).

Figure 2.2 Elements of operational resilience and coverage of outcomes regime²⁴

We are therefore keen to explore wider information for monitoring operational resilience beyond that provided by performance commitments, the price review framework and the additional information we already monitor through the APRs. This could include developing wider measures and monitoring the organisational capability of companies (ie their people, processes, technology, leadership and culture) to ensure they are effective and support their plans for operational resilience. This wider information could inform improvements on priority areas and provide a more holistic and complete view of asset health and wider operational resilience.

The monitoring elements that we propose for our integrated monitoring framework should help deliver this improved picture of operational resilience, with wider information complementing the information already provided by the price review framework, see table 2.1.

The wider measures proposed would not be performance commitments at PR24, but information that we would monitor over time, and outside of the price review process, to gain greater insight into companies' levels of operational resilience. These measures could be: targeted to specific identified issues (eg above ground assets); aimed at gaining further depth on the information that current performance commitments provide (eg a richer picture to anticipate and interpret emerging issues around asset health); or expanding on the value of services delivered to customers and the environment (eg aspects of biodiversity or social wellbeing).

This will produce a richer picture of the large, complex and diverse asset base our sector is responsible for managing on behalf of its customers, society and the environment. These measures will not have financial incentives or specific targets attached to them, and we could make use of measures which reflect some level of judgement. However, some

²⁴ Adapted from CH2M, '[Targeted Review of Asset health and Resilience in the Water Industry](#)', September 2017

measures developed through our integrated monitoring framework may become suitable for consideration as performance commitments in the future.

Table 2.1 Proposed elements of the integrated monitoring framework, within and outside (highlighted) of the price review framework

Monitoring element	Purpose	Monitoring activity within and outside of price review framework
Asset resilience	To monitor the ability of companies' assets to function reliably and resist shocks and stresses. This includes asset health and the ability of assets to withstand variable operating conditions (eg extreme weather)	Asset health performance commitments
		Wider measures that reflect on asset maintenance and inspection regimes
Systems resilience	To monitor the ability of companies' systems to respond to emergencies, endure and recover from asset failures and variable operating conditions (eg extreme weather)	None for PR24. System resilience may be more effectively monitored through wider operational resilience monitoring, but we will keep under review as measures develop
		Wider measures that reflect on redundancy and response aspects of system resilience
Service performance	To monitor the measurable outcomes, in terms of service to customers and the environment, that are delivered by companies as a result of asset and system resilience	Service performance commitments
		Wider measures that reflect on desirable outcomes of wider social/environmental value
Organisational capability	To monitor the ability of companies to deliver their operational resilience objectives (in terms of asset resilience, system resilience, and service performance) through the development of people, processes, technology, leadership and culture	Price review business plan submissions
		Capability assessments

2.2 The process to achieve our ambition

To achieve our longer-term ambition and implement an integrated monitoring framework for operational resilience we are proposing a staged process that allows us to **explore, test, develop, refine, and consolidate** each of the monitoring elements discussed above. We propose to deliver these through an iterative and collaborative process that:

- **improves transparency, openness, and data sharing**, increasing the diversity of information that is available. We propose to seek further information in a targeted and proportionate way from a variety of sources so we can refine our approach to drive further improvements and enable companies to be accountable to customers and stakeholders. This could include capability information, wider operational resilience measures and

closer co-ordination, sharing of data, information and ideas with other regulators,²⁵ as well as encouraging collaboration and sharing of good practice with the sector; and

- **targets priority areas** identified through our work and in line with our longer-term ambition. We will need to identify and assess priority areas to focus on, including those where risks to customers and the environment are larger or where there are opportunities for improvement. These could involve emerging sector wide or company specific issues, or areas where the sector needs to improve its understanding of operational resilience.

We intend to deliver the elements of our proposed integrated monitoring framework through three stages with each stage building on insight gained from previous stages. These activities should be developed in collaboration with the sector (including companies, regulators, industry groups, customer representatives) and be open to bringing in expertise from technical suppliers. To this end we are considering setting up a **collaborative operational resilience working group** to deliver our proposals and serve as a discussion forum for the further development of wider monitoring activities.

- **Stage 1 (2022-2023): Targeted monitoring activities – explore and test wider measures** and additional information that complements the information provided by performance commitments. These wider measures should focus on priority areas (eg where we currently have limited coverage of monitoring information) and provide the initial building blocks for later work. This will help us to better understand strengths and weaknesses across the sector and potentially assess underlying issues where performance and monitoring needs to improve. For example, there is growing concern from customers and wider stakeholders about the use of storm overflows and the impact this may have on local watercourses, biodiversity and communities. We consider that collecting and monitoring additional information on the operation and maintenance of water and wastewater above ground assets should promote transparency and public trust as well as providing early, actionable visibility of any potential issues going forward.

In this stage we are proposing to collect wider asset health measures and exploratory information to better understand company asset management practices in this area, initially through a voluntary data request. In addition, we will continue to monitor any relevant measures already collected through the annual performance report or otherwise publicly reported (eg sewer blockages, reactive mains repairs, properties at risk of low pressure) and measures reported to other regulators (eg the sub-measures of the compliance risk index, CRI). As part of stages 2 and 3 we will consider how we can share the current picture of operational resilience with customers and stakeholders.

- **Stage 2 (2022-2025): Enhanced monitoring activities – refine and improve monitoring activities** in collaboration with the sector. These enhanced activities should provide more diverse information to develop a better understanding of operational resilience in different thematic areas. In this stage we could collect information that goes

²⁵ Defra, '[UK Government's strategic priorities for Ofwat](#)', February 2022

beyond the wider measures proposed in stage 1. Activities could involve the development of capability monitoring and of additional measures in collaboration with the sector, including measures evolved from stage 1. This may include broadening the scope of some measures (eg by expanding reporting to other asset types), more focused definitions for other measures and the development of new measures. In this stage we should gain further insight by increasing our understanding of the causal relationships between asset and system resilience measures.

In this stage we could look to develop measures that have longer lead times (such as some of those included in UKWIR's 'Future Asset Planning' project) or measures that are potentially more leading indicators of service risk. These enhanced monitoring activities could also form the groundwork for the development of more sophisticated approaches to monitoring operational resilience that we may consider in the longer term. All these activities could be used to identify focus areas for future price reviews and policy development which will enable us to ensure that our regulatory approach promotes the efficient delivery of companies' obligations, including the sector's ability to horizon scan for future risks and opportunities. They could also enable better scrutiny of asset health at a sector or company level over time.

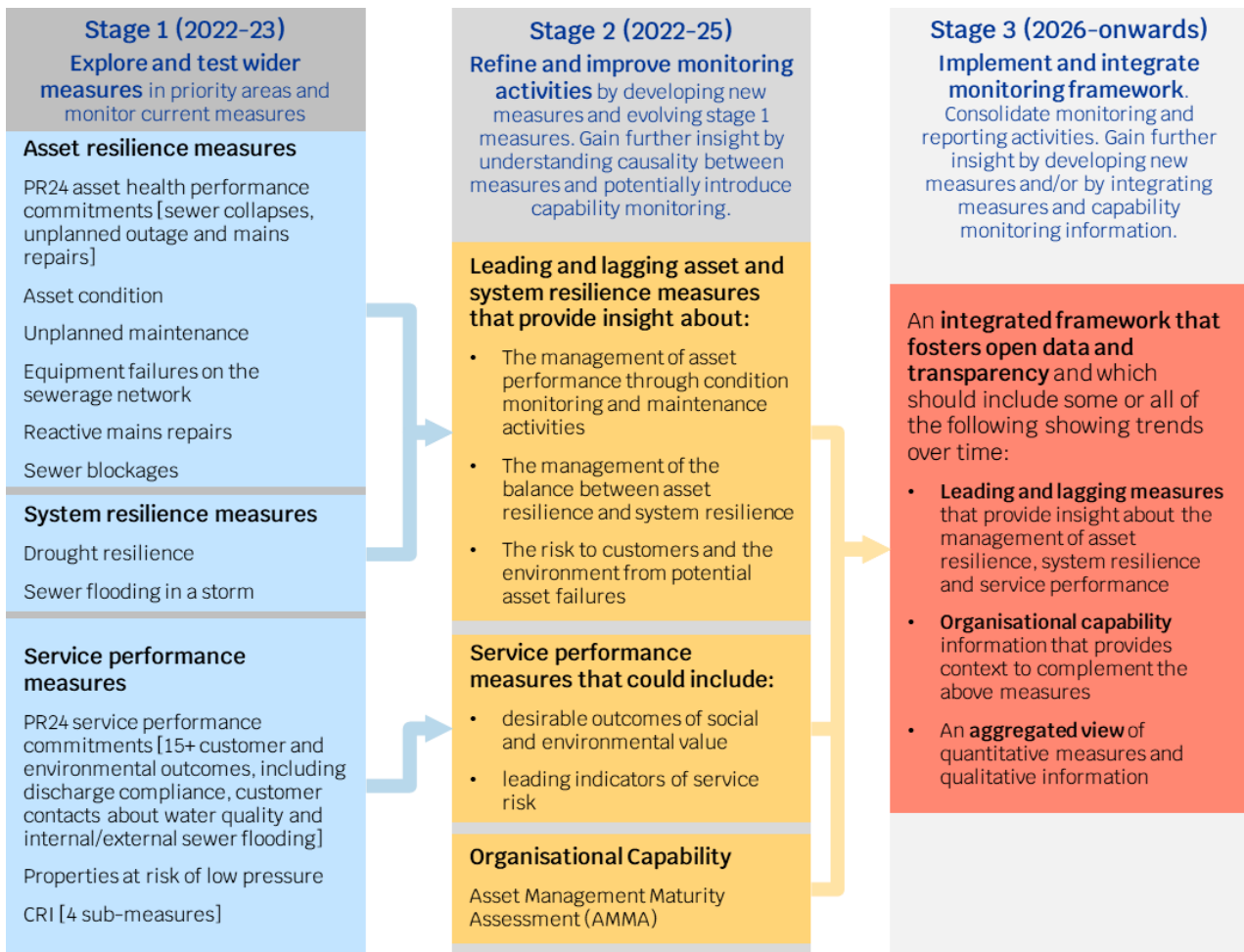
- **Stage 3 (2026-onwards): Integrated monitoring activities - implementation and integration** of any potential monitoring framework that could be used from 2028 onwards. This could consolidate and summarise key reported measures and information gathered from the price review and wider framework. The latter will be information on priority and thematic areas iteratively developed in stages 1 and 2. Activities could involve establishing reporting mechanisms, information sharing and consolidation of monitoring elements to drive improvements in longer-term operational resilience and reinforce the long-term focus. This could also include the further development of more sophisticated measures from stage 2 or the development of approaches for monitoring trends in asset health and wider operational resilience. This could be through a visual sector-wide dashboard, which could include an aggregate or index measure to sit alongside other measures showing trends over time. The development of this type of monitoring approach would need to be done in conjunction with the sector (this could be through the operational resilience working group).

To develop the integrated monitoring framework and reach our longer-term ambition, greater access, transparency and sharing of data will be important to ensure wider accountability to stakeholders.²⁶ Real-time data, the exploitation of telemetry and data science, or web-based applications that map interactive real-time data for customers, or digital twins that help companies innovate and collaborate more efficiently within and outside the sector are examples of this. In addition, the use of monitoring technology and advanced analytics could significantly improve operational resilience by allowing companies to enhance their decision-making (eg decisions that are better informed by more accurate data and deeper analytical insight and which can be enacted in a timely manner). Figure 2.3

²⁶ Ofwat, '[H2Open – Open data in the water industry: a case for change](#)', October 2021

below summarises the dynamics of this process, which is informed by elements inside and outside of the price review.

Figure 2.3 An iterative process to deliver an integrated monitoring framework for operational resilience



3. Proposals for monitoring operational resilience

This section presents our proposals to develop and implement the integrated monitoring framework for operational resilience defined in section 2. Table 3.1 summarises the performance commitments and wider operational resilience monitoring that we discuss in this section. While these measures cover the different monitoring elements of the framework, this is an **initial proposal** that will evolve as stage 1 activities are progressed, information is gathered, and measures refined over time. The proposed monitoring activities mainly consist of performance commitments for PR24 and wider operational resilience measures, which are discussed in section 3.1 and section 3.2, respectively.

Table 3.1 Initial proposal for operational resilience monitoring

Monitoring element	Proposed common performance commitments	Wider operational resilience monitoring ²⁷
Service Performance	Customer service and environmental outcomes proposed for PR24 ²⁸	No wider measures proposed at this time due to proportionate representation via the performance commitment framework
Asset resilience	Sewer collapses Unplanned outage Mains repairs	Unplanned maintenance – water treatment works Unplanned maintenance – wastewater treatment works Equipment failures on the sewerage network Asset condition - water treatment works Asset condition - wastewater treatment works
Systems resilience	None for PR24. System resilience may be more effectively monitored through wider operational resilience monitoring, but we will keep under review as measures develop	Drought resilience Sewer flooding in a storm ²⁹
Organisational capability	N/A	Asset management capability monitoring ³⁰

The wider monitoring activities summarised in table 3.1, with the exception of potential asset management capability monitoring, are only those being proposed for **stage 1**. We consider there is a much broader suite of potential measures we could use in the integrated

²⁷ In addition to the measures presented in this table we will continue to monitor any relevant measures already collected through the APRs or otherwise publicly reported (eg sewer blockages, reactive mains repairs, properties at risk of low pressure) and measures reported to other regulators (eg the components of CRI).

²⁸ Ofwat, '[PR24 and beyond: Performance commitments for future price reviews](#)', November 2021

²⁹ The current reputational, operational resilience performance commitments will continue to be performance commitments until 2025. After 2025 we propose these will no longer be performance commitments, but part of the wider monitoring framework.

³⁰ Potentially part of stage 2 and 3 monitoring activities and not for immediate collection or reporting.

monitoring framework over time³¹ but these will be developed over stage 2 and stage 3 through review and continuous improvement.

3.1 Proposals for PR24 operational resilience performance commitments

In this section we consider what performance commitments are required. We proposed performance commitments focused on service in our discussion paper '[PR24 and beyond: Performance commitments for future price reviews](#)'. We consider below if we should add additional operational resilience performance commitments to incentivise companies to be resilient in both the short and the longer term.

Our **focus on outcomes** gives companies flexibility to innovate while delivering for customers and the environment. But if companies overly focus on the short term, it could lead to resilience issues. For example, there are different options to reduce water supply interruptions. Many supply interruptions are caused by burst pipes. As well as avoiding burst pipes in the first place, companies can develop technology to quickly respond to a supply incident or have an integrated network to supply customers from a different source. A combination of these approaches is likely to provide the best service to customers. We want companies to continue to find better ways of working that reduce interruptions. However, if a company disproportionately focused on responding quickly to incidents it might lead to its assets deteriorating.

Assets deteriorating increases the risk to customers over both the short and longer term. For example, if companies delay or avoid maintenance it could reduce costs but store up problems, leaving a larger maintenance bill for future customers. A significant event, such as the 2017 'Beast from the East' freeze thaw event, could overwhelm their operations and result in poor service to customers. Companies need to ensure they are properly managing their assets and providing appropriate levels of resilience. We propose to monitor this through a mix of performance commitments with financial incentives and a wider set of monitoring measures. While performance commitments can provide strong incentives, they may be too narrow in focus to incentivise all desirable activity. Complementing them with a wider set of monitoring measures could therefore help keep the focus on wider aspects of operational resilience, such as the need to be resilient to low probability, high impact events.

At PR19 the operational resilience common performance commitments were:

- unplanned outage;
- mains repairs;

³¹ For example, measures suggested through the recent UKWIR 'Future Asset Planning' project, other measures from the '[Assessing base costs at PR24](#)' consultation, measures discussed in companies' AMMA submissions, or other measures that are still at early stages of development. These measures all have longer lead times, lack agreed definitions and/or did not target priority areas so were not suitable for inclusion in table 3.1.

- sewer collapses;
- discharge compliance (also known as treatment works compliance);
- drought resilience; and
- sewer flooding in a storm.

Discharge compliance also monitors environmental impact and we have already proposed that this should be a PR24 performance commitment.³² We do not address it further in this paper.

For PR24 we propose that **unplanned outage, mains repairs and sewer collapses continue to be asset health performance commitments**. We recognise that there are limitations with some of these measures, hence the need for a wider monitoring framework. We consider these performance commitments provide useful incentives to **encourage longer-term thinking** and that these are proportionate and targeted measures we can use for PR24.

We consider that measures concerning drought resilience and sewer flooding in a storm system resilience are best used as part of our wider monitoring framework and we are not proposing these as performance commitments at PR24.

In making these proposals we have considered the findings of UKWIR's 'Future Asset Planning' project and also discussed if there were further options at the Outcomes Working Group on 10 March 2022. We will continue to consider adopting new measures at future price reviews where such measures would provide robust insights into levels of operational resilience and address the shortcomings of existing measures.

In the following sections we set out briefly our reasons for these proposals. We provide further explanation including the other metrics we have considered in appendix 1.

3.1.1 Unplanned outage

At PR19 we introduced the unplanned outage common performance commitment. It is designed to incentivise companies to maintain and improve water treatment works. It measures the unplanned loss of peak week production capacity and reports this loss as a percentage of the overall company peak week production capacity. Since the introduction of this measure, we have seen all companies improve their performance.

We consider that **unplanned outage should remain a performance commitment at PR24**. It provides an appropriate incentive for all companies to ensure that treatment works are maintained to reduce the risk that unplanned outage occurs when capacity is required.

³² We proposed this in '[PR24 and beyond: Performance commitments for future price reviews](#)'.

3.1.2 Mains repairs

The number of mains repairs has a long history of being used to understand the asset health of water mains. We included it as a common performance commitment at PR19. It is the number of physical repairs to mains from which water is lost. While all networks need a certain level of ongoing repair works, a trend of increasing amounts of repairs over time may indicate that a company is not managing its network appropriately. To be able to compare companies, the total number of mains repairs is divided by the length of the company's mains.

We consider that the **mains repairs performance commitment continues to be the best available performance commitment for PR24** to provide appropriate incentives for companies to improve the asset resilience of water mains.³³ It provides an appropriate incentive for all companies to manage their water networks, target mains to replace and reline, and ensure work is carried out to high standards to reduce the chance of future bursts occurring. Minimising the number of mains repairs also has a positive impact on vehicle and pedestrian delays, disruption to public and businesses, noise pollution, as well as additional carbon produced during traffic delays.

We are mindful of the links to leakage and how increased leakage control activities could have an impact on mains repairs performance. Therefore, we will consider if we need to revise the assumptions about short-term increases in the number of mains repairs related to leakage activities that we made at PR19 to ensure that water companies are not disincentivised from reducing leakage. At PR24 we expect to have more data to understand the correlation between active leakage reduction and mains repairs building on the experience of companies reducing leakage over recent years. We could also calibrate incentives to prioritise leakage reduction over reducing mains repairs, ie make sure that reducing leakage would lead to a greater increase in revenue from outperformance payments than the reduction in revenue from underperformance payments from proactively repairing more mains than expected.

3.1.3 Sewer collapses

The number of sewer collapses has also long been reported to understand asset health. We included it as a common performance commitment at PR19. A sewer collapse is where a structural failure has occurred to the pipe that results in a service impact to a customer or the environment and where action is taken to replace or repair the pipe to reinstate normal service. To be able to compare companies the total number of sewer collapses is divided by the length of sewers.

³³ In appendix 1 we explain why we do not consider it possible to use an alternative, the repairs of customer reported mains defects, also known as 'reactive mains repairs', as a performance commitment for PR24.

We consider that the **sewer collapses performance commitment should continue to be a performance commitment for PR24**. It provides appropriate incentives for companies to monitor their networks and proactively resolve problems so that sewers have structural integrity. In appendix 1 we explain why we do not consider it appropriate to use sewer blockages as a performance commitment at PR24.

3.1.4 Other operational resilience measures

For PR24 we propose to reduce the number of common operational resilience performance commitments, and to monitor wider measures outside of the price control.

For PR19 we introduced two new, reputational common performance commitments focused on longer-term resilience.

The drought resilience performance commitment is designed to help prevent turning off the supply to customer taps in serious droughts. It measures the percentage of the customer population at risk of experiencing severe restrictions in a 1-in-200 year drought, on average, over 25 years.

The sewer flooding in a storm performance commitment is designed to prevent sewer flooding. It incentivises companies to better understand flood risk in their region and utilise this knowledge to reduce the risk of sewer flooding over the longer-term. It is measured as the percentage of the region's population at risk from internal hydraulic flooding from a 1 in 50-year storm, based on modelled predictions.

At PR24, we want to streamline the outcomes regime. An element of this is to focus the outcomes regime on metrics that can drive incentives through performance payments. As we explain in appendix 1, these two measures are not suitable for financial incentives. These measures can be collected without being specified in the price review and so we propose that these **should not be PR24 performance commitments**. A Water UK group has considered how to improve the flooding in a storm measure and we welcome their suggestions. We plan to work with the sector to revise both the drought resilience and sewer flooding in a storm measures for the 2025-30 period to **be used as wider monitoring measures**.

3.2 Proposals for wider monitoring activities

The staged, iterative process described in section 2.2 provides further detail on why we are proposing to collect this additional information and how it supports our longer-term ambition for evolving our approach to operational resilience to deliver better outcomes for customers and the environment. In this section we further outline our initial proposals for the wider

monitoring activities presented in table 3.1. The proposed measures are detailed in table 3.2. **We invite comments on the wider monitoring activities proposed in this paper by 26 May 2022.**

As part of the proposed activities, in the following sub-sections, we provide detail of our proposals for wider monitoring measures. We have selected a **targeted and proportionate** set of wider measures through a screening and assessment process that included:

- creation of a library of measures from varied sources (legacy measures, UKWIR's 'Future Asset Planning' project, our '[Assessing base costs for PR24](#)' consultation and consultation responses, companies' AMMA submissions, cost/outcomes working groups etc);
- rationalisation of measures that duplicate or overlap with performance commitments;
- rationalisation of measures where information is available from other regulators or sources (eg [Discover Water](#));
- removal of measures that have long lead times, require further development, or are more suitable for later stages of the integrated monitoring framework;
- inclusion of measures focusing on immediate or emerging priority areas;
- inclusion of measures based on key asset management information; and
- assessment of suitability using key criteria from the '[Assessing base costs for PR24](#)' consultation, including quantifiability, objectivity, diagnostic capacity, availability of historical information, and transparency.

We are also proposing to focus the information on measures based on previously reported information where possible, so that companies should have the relevant processes and functionality to report it, and on the above ground elements of the asset base given increased public concern in this area.

We have proposed two types of information request. An immediate data request that focuses on tabulated data, and an exploratory request (shaded in the table below) where we are interested in more descriptive responses to key questions (companies can also provide data if they wish for any of the exploratory requests). We have proposed detailed definitions in appendix 2 and have issued an operational resilience information request pro forma alongside this publication. Companies should return this information alongside their 2021-22 APRs by 15 July 2022.

Given collaboration will be key in the development of the integrated monitoring framework for operational resilience proposed above, **we welcome support from companies in helping us achieve the ambitions set out in this paper by providing as much of the information requested as possible.**

Table 3.2 Summary of proposed measures and activities

Stage	Measure/Activity	Priority area	Reporting timescale ³⁴	Request type
Stage 1 Explore and test	Unplanned maintenance - water treatment works	Operation and management of above ground assets	Voluntary 2021-22 request and/or potentially report in 2022-23 APR	Immediate data request for 2021-22
	Unplanned maintenance - wastewater treatment works	Operation and management of above ground assets	Voluntary 2021-22 request and/or potentially report in 2022-23 APR	
	Equipment failures on the sewerage network	Operation and management of below ground assets	Voluntary 2021-22 request and/or potentially report in 2022-23 APR	
	Asset condition – water treatment works	Monitoring the condition of above ground assets	Voluntary 2021-22 request and/or potentially report in 2022-23 APR	Exploratory request for 2021-22 ³⁵
	Asset condition – wastewater treatment works	Monitoring the condition of above ground assets	Voluntary 2021-22 request and/or potentially report in 2022-23 APR	
Stage 2 Refine and improve	Evolved measures from stage 1	TBC	2022-2025	TBC
	Additional operational resilience measures	TBC	2022-2025	TBC
	AMMA	Monitoring asset management capability	2022-2025	TBC
Stage 3 Implement and integrate	Integrated monitoring	NA	2026 onwards	TBC

3.2.1 Stage 1 - Targeted monitoring activities

Our proposals for stage 1 focus on reporting **five wider measures for water and sewerage companies** (three measures as immediate data requests and two measures as an exploratory request) **and two wider measures for water only companies** (one measure

³⁴ We outlined our intention to collect additional information in relation to operational resilience in our '[Assessing base costs at PR24](#)' consultation and the recent information notice ([IN 22/01](#)). Most companies were supportive of our intention to collect further information in this regard. We intend that this information will be submitted, on a voluntary basis in the first instance, alongside companies' 2021-22 APRs. We propose to review this information in July 2022 and consider how to refine and improve the information requirements for standardised collection and reporting in the 2022-23 APR.

³⁵ Once we have assessed this exploratory information, we will consider whether or not to further develop these measures and if any further definitional information is required to facilitate reporting in 2022-23.

as immediate data request and another as an exploratory request). Details of each measure are discussed below.

Unplanned maintenance – water and wastewater treatment works (two separate immediate data requests)

We consider unplanned maintenance is a valuable and feasible measure to collect as part of our targeted stage 1 activities. The detailed definition is based on the previous serviceability definition but modified to focus on treatment works assets only, increase the granularity of reporting and enable reporting of the measure as a percentage of total jobs.

Maintenance activity measures can provide information on asset health relevant to the management of assets at water and wastewater treatment works. The unplanned maintenance of assets may be the result of assets and/or systems not performing their intended function. This could result in a reduction in treatment capacity or increased risk of asset/system failure, customer impact or environmental harm. Assessing trends for these measures over time can provide insight about asset health. We also consider that the proposed measures can complement the information provided by the unplanned outage and discharge compliance performance commitments because they partially reveal the potential risk associated with any deterioration of assets at water and wastewater treatment works, respectively.

In our consultation '[Assessing base costs at PR24](#)' we received a variety of feedback from companies with regards to maintenance activity measures. Some respondents considered that these measures could provide a good view of asset health and operational resilience issues, while others indicated that these reflected maintenance strategies and not asset health. Unplanned maintenance received the most support. We also received feedback through the outcomes and cost assessment working groups that companies either still collected this type of legacy information, or that legacy-based information may be an appropriate place to focus initial efforts on widening our monitoring framework.

This measure was reported previously through the serviceability framework so companies should have the relevant processes and functionality to report it. We also note that the recent UKWIR 'Future Asset Planning' report considered a variation of this measure (time spent on unplanned maintenance) as a high priority for further development and ready for implementation. While time spent on unplanned maintenance could provide insight for companies in scheduling and resourcing maintenance activities, it might be more valuable in the short term as an internal measure for companies to use given this focus. As a regulator, we consider that unplanned maintenance (based on the legacy serviceability definition) potentially provides insight more broadly indicative of the issues associated with asset failures and asset health. We also consider reporting of maintenance jobs and work orders to be valuable and accessible asset management information while time spent may require additional processing of maintenance data.

We recognise that unplanned maintenance is an appropriate approach to take for some assets as part of an effective, blended, strategy alongside more proactive approaches. We consider though that trends in this type of data can provide insight when viewed alongside other key information (eg performance information). While we also recognise there are some limitations with this measure (for example the distinction between planned and unplanned), on balance, we consider there is value in collecting this information in the near term to help support our longer-term aims and ambition as we progress through the stages outlined above.

We provide a detailed definition for this measure in appendix 2 and in the operational resilience information request pro forma issued alongside this publication.

Equipment failures on the sewerage network (immediate data request)

We consider equipment failures is a valuable and feasible measure to consider as part of our targeted stage 1 activities. The detailed definition is based on the previous serviceability definition but slightly modified (in terms of normalisation and the assets we consider in the measure) to provide more consistent information.

We consider that equipment failures focused on the sewer network can provide key root cause information to inform immediate or emerging sector wide issues around wastewater assets. This is because equipment failures on the sewerage network (eg pumping station failures) can directly lead to customer impact and/or environmental harm through pollution events. Further, wastewater network equipment assets are less represented in the package of asset health performance commitments proposed in section 3.1 so this could provide useful complementary information.

In our consultation '[Assessing base costs at PR24](#)' respondents generally supported asset performance measures such as equipment failures. There was recognition that, while these measures are not direct indicators of asset health, they can be useful proxies for tracking overall asset performance. We also received feedback through the outcomes and cost assessment working groups that companies either still collected this type of legacy information, or that legacy-based information may be an appropriate place to focus initial efforts on widening our monitoring framework.

We provide a detailed definition for this measure in appendix 2 and in the operational resilience information request pro forma issued alongside this publication.

Asset condition – water and wastewater treatment works (two separate exploratory requests)

In our consultation '[Assessing base costs at PR24](#)' respondents generally supported asset condition monitoring as a useful way to assess asset health and track how it changes over time. However, almost all companies indicated it should only be collected for critical, or the

most important, assets. We also consider that asset condition could provide some useful additional insight into asset health, but perhaps only when used in conjunction with other information (for example performance). We expect companies to understand the condition of their assets and be able to report asset condition information,³⁶ therefore we would like to understand what type of condition information is currently collected.

Given we have not collected this type of information for some time, we are requesting companies provide a free-form, or descriptive, response in the operational resilience information request pro forma we have published alongside this paper and discussed in the recent information notice ([IN 22/01](#)). We consider this exploratory information will be useful in the potential development of future measures and welcome companies' support of our voluntary request. Companies should return this exploratory information, supported by data if they wish, alongside their 2021–22 APRs. We provide an example definition and exploratory questions for this measure in appendix 2 and in the operational resilience information request pro forma issued alongside this publication.

3.2.2 Stage 2 – Enhanced monitoring activities

For stage 2 we are focusing our proposals on monitoring elements that are less represented in the performance commitment framework, ie the monitoring of asset resilience, system resilience and potentially organisational capability. We propose to collaborate with the sector to develop some, or all, of the following: asset management capability monitoring; wider measures that are refined and improved from those tested and explored in stage 1; and additional operational resilience measures. In this stage we should also gain further insight by increasing our understanding of the causal relationships between asset and system resilience measures (eg how companies manage asset performance through condition monitoring and maintenance activities or how they find the right balance between asset resilience and system resilience).

Evolution of stage 1 measures

During stage 2, we propose to incorporate the lessons learnt from our targeted monitoring activities to make sure there is continuous review and improvement of any measures. We will consider whether to evolve any of the stage 1 measures at this point. We would expect to develop these measures in collaboration with the sector, potentially through the operational resilience working group proposed in earlier sections of this paper.

³⁶ Understanding asset condition is important in asset management planning as recognised by the international standard in asset management ISO 55000. The ISO 55000 series provides terminology, requirements and guidance for effective asset management and comprises three elements. ISO 55000 consists of overview, principles and terminology. ISO 55001 details the requirements for the establishment, implementation, maintenance and improvement of an asset management system. ISO 55002 provides guidelines on the application of an asset management system in accordance with the requirements of ISO 55001.

Stage 1 measures could be further enhanced in different ways during stage 2. For example, this may include:

- **Reducing or amplifying the type and scope of the assets** targeted by each measure. For example, by expanding reporting to additional asset types or by focusing reporting on assets that are critical to the functionality of systems. Since there is currently no industry-agreed definition of criticality, we could consider if there is merit in working with the proposed operational resilience working group to develop a common definition for critical assets that all companies can apply.³⁷
- **Refining other aspects of the definition** and/or calculation methodology for each measure. These could include any relevant exclusions and terminology clarifications derived from the initial submissions. We therefore encourage companies to respond to our requests outlined in stage 1 so we can review and continuously improve the measures and definitions through a lessons learnt process.

Additional operational resilience measures

During stage 2 we also propose to continue to review the need for additional wider operational resilience measures. This may include some or all of:

- measures proposed on the long list in the '[Assessing base costs at PR24](#)' consultation;³⁸
- measures proposed in the recent UKWIR 'Future Asset Planning' project;
- measures proposed in companies' consultation responses;
- measures discussed in companies' AMMA submissions; and
- any other emerging measures that may become more important in the future.

Additional measures should contribute to achieving the desired outcomes set out in figure 2.1, these could include:

- measures that reflect on aspects of asset and system resilience;
- measures that reflect on desirable outcomes of social and environmental value; and
- leading measures that provide greater visibility of risk to operational resilience (eg measures based on the likelihood and consequence of asset failures).

Asset management capability monitoring

Going forward we may continue to monitor asset management capability. This will continue to drive improvements in capability across the sector. Some of the potential options for a future approach include:

³⁷ We may also consider how we could further improve the reporting of asset condition information so that it is more directly applicable to monitoring asset health; for example, by focusing the measure on critical assets and/or using in tandem with other forms of information.

³⁸ Ofwat, '[Assessing base costs at PR24](#)', Table 5.2, pp 61-62, December 2021

1. **AMMA** – we could run the AMMA assessment on a regular basis to determine improvements from a baseline assessment.
2. **AMMA revised** – we could run a targeted version of the AMMA focusing in on areas where we consider the greatest improvements or targeted information is required.

3.2.3 Stage 3 – Integrated monitoring activities

In stage 3 we are proposing to integrate and consolidate the monitoring activities developed throughout stage 1 and stage 2. This should include developing a holistic view of qualitative and quantitative information collected through a wide range of measures and organisational capability monitoring. It should allow us to gain further insight and provide customers and wider stakeholders with more transparent and accessible information from companies.

We consider that there may be advantages in developing more sophisticated ways to monitor sector-wide asset health and wider operational resilience, for example through the development of aggregate measures supported by visual dashboards or through the development of more open data reporting mechanisms.

Several companies that responded to our ['Assessing base costs at PR24'](#) consultation indicated support for some form of aggregate or index measure for asset health. Some companies indicated that this type of measure could reduce the potential reliance on single measures to inform operational resilience. However, most companies also felt that such measures would be complex and challenging to define, implement and report on a sector wide comparative basis (at least in the short term). We will continue to assess the potential use of these and other measures in future reporting throughout the development of our staged process.

4. Next steps

We welcome any comments on this discussion paper by **26 May 2022**. Please email your comments to operational.resilience@ofwat.gov.uk

For the wider water and wastewater measures we outline in this paper as part of the 2021–22 voluntary data and information request, we ask companies to report on these by **15 July 2022** as part of their annual performance report submissions. We provide an operational resilience information request pro forma alongside this paper for companies to complete. In appendix 2 we propose five wider measures for water and sewerage companies (three measures as immediate data requests and two measures as an exploratory request) and two wider measures for water only companies (one measure as an immediate data request and another as an exploratory request) to support us as part of stage 1 of our proposed process to evolve our monitoring of operational resilience. For the exploratory measures, we are asking companies to provide more descriptive responses to the key questions we pose in appendix 2.

We will engage further with stakeholders as we develop the proposals discussed in this paper. We will further consult on performance commitments as part of our PR24 draft methodology in July 2022.

Appendix 1 – Assessment of potential operational resilience performance commitments

This appendix sets out further details of the issues we have considered in proposing the asset health performance commitments for PR24. In making these proposals we have considered the findings of UKWIR's 'Future Asset Planning' project and also discussed if there were further options at the Outcomes Working Group on 10 March 2022.

Unplanned outage

We consider unplanned outage should remain a performance commitment. In this section we consider a potential limitation of the measure and our response to this.

A criticism of comparing companies' performance on unplanned outage is that it does not take into account the resilience provided by spare capacity at sites or the overall systems resilience in water networks. Some companies suggest that where there is adequate resilience, it is a cost-effective strategy to allow assets to run to fail. We consider that it is appropriate for all companies to keep assets in repair and that this provides greater resilience to customers. Customers have paid for assets and should receive the benefits that they provide. All companies receive a similar allowance for base maintenance and so we expect similar standards of asset maintenance. Allowing a greater level of unplanned outages would only be in customers' interests if they receive all of the savings from a company's plan to fix assets when they fail.

UKWIR's 'Future Asset Planning' project has also recognised that unplanned outage is a common asset health measure and recommended that it continues. It noted some aspects where companies could improve data recording processes and we will support efforts to ensure that there is common reporting on this measure.

Mains repairs

In response to our performance commitments discussion paper, Affinity Water noted that mains repairs will increase if greater leakage reduction is targeted through increasing resources to proactively repair more leaks. This issue was also raised as part of the PR19 process. Several companies suggested that the performance commitment should be revised to cover just the number of reactive mains repairs, that is repairs of customer reported defects. We decided to explore this issue as part of a joint project with Water UK, but the project concluded that all main repairs should be included for PR19.³⁹

Since then, we have asked companies to report separately the number of reactive and proactive mains repairs in their annual performance reports and they reported data for

³⁹ Ofwat and Water UK, ['Targeted review of common performance commitments'](#) March 2018

2020-21. There is a wide range between companies of what proportion of reactive mains repairs they undertake, from 50% of companies' repairs being reactive to nearly 100%. Because of the size of this range, we need to consider whether companies are reporting consistently. There is also little correlation between how companies perform on leakage and the proportion of proactive and reactive mains repairs. We will look closely at the data for 2021-22 to understand the variations across the industry.

In addition to issues with the reported data on the number of reactive mains repairs, we are also concerned that a financial incentive to reduce this number could lead to a perverse outcome. A company would have a perverse incentive to avoid customers contacting them. This is especially the case as companies can anticipate that there will be increases in mains bursts in cold weather. While they should resource call centres appropriately, having financial incentives on reactive repairs would disincentivise this. On balance we consider that it will not be appropriate to use reactive mains repairs as a performance commitment at PR24, but we will continue to gather data and seek to understand companies' behaviour.

An alternative way to ensure that companies act to reduce mains bursts, could be to monitor the length of mains relined or replaced and claw back money if there was not enough activity. We do not agree that we should rely purely on monitoring lengths of mains relined or replaced because it is essential companies have incentives to target the right sections on their networks. Only focusing on the length of mains relined or replaced could lead to companies replacing those that are cheapest to replace, rather than focusing on those mains that present the biggest risk to customers.

UKWIR's 'Future Asset Planning' project has recognised that mains repairs is an appropriate common asset health measure and recommended that it continues for the 2025-30 period. It also suggested that repairs of customer-reported defects is taken forward as a common asset health measure. We will continue to review the need for additional wider operational resilience measures as part of stage 2, including this measure.

Sewer collapses

In this section we consider additional options to the sewer collapses performance commitment, including a proposal that sewer blockages could also be used as an asset health performance commitment. This proposal was suggested by Severn Trent Water and United Utilities in their responses to ['PR24 and beyond: Performance commitments for future price reviews'](#). We explain below that we do not consider it should be an additional performance commitment because it would not add sufficient value.

The main cause of internal sewer flooding is blockages in the sewer system; blockages can also lead to pollution incidents. It is therefore important for companies to work to reduce the number of sewer blockages. However, companies already have financial incentives to reduce sewer flooding and pollution incidents. We consider that incentivising blockages, sewer flooding and pollution incidents leads to overlaps in the incentive framework without adding

significantly to the incentives. In the absence of a sewer blockage performance commitment, the incentives on sewer flooding and pollution incidents can be strengthened.

Severn Trent Water considers that some blockages lead to customer impacts other than sewer flooding and pollution incidents, such as unpleasant odour. While this may be the case, there would only need to be an incentive on blockages if it led to the company targeting blockage clearance differently. We consider that by focusing on sewer flooding and pollution incidents companies will also reduce blockages and unpleasant odour without a further performance commitment.

We also note that UKWIR's 'Future Asset Planning' project did not propose sewer blockages as a common asset health measure. It has recognised that sewer collapses is a common asset health measure and recommended that it continues. It also suggested a new metric, sewer defect density, that would use the results of CCTV surveys. We do not consider that this new measure could be used as a performance commitment for PR24 because it is unlikely that reporting could be consistent in time. We will continue to review the need for additional wider operational resilience measures as part of stage 2, including this measure.

Existing reputational systems resilience performance commitments

The current PR19 performance commitments on sewer flooding in a storm and drought resilience rely on company modelling. We expect companies to carry out such modelling in line with industry good practice. However, we are aware of that there are issues in comparing companies.

Firstly, approaches and assumptions have varied across companies. For instance, the conclusion of the Outcomes Working Group in April 2021 highlighted doubts that all companies used similar assumptions to calculate the drought resilience performance commitment, such as what water is available from sources in a 1-in-200 year drought. Addressing these issues could require complex and onerous reporting requirements.

Secondly, it is likely that changes in outturn performance for such performance commitments often reflects greater understanding by companies of the risk, rather than a reduction in the level of risk faced by customers. For example, we have seen improvements in the number of people at risk from flooding in a storm, but the overwhelming majority of the improvement is due to a change in company understanding. Customers remain at a similar level of risk.

We consider that there is benefit from the continued reporting of such information, but that these measures are not currently appropriate for financial incentives and should not be PR24 performance commitments. A Water UK group has considered how to improve the flooding in a storm measure and we welcome their suggestions. We plan to work with the sector to revise both the drought resilience and flooding in a storm performance commitments for the 2025-30 period as wider measures that we monitor.

Appendix 2 – Information requests for stage 1 wider measures

A2.1 Unplanned maintenance (immediate data requests)

We provide a definition for unplanned maintenance below. Please provide data for 2021–22 in the operational resilience information request pro forma and, if possible, an additional two years of historical data (ie 2019–20 and 2020–21). The pro forma also contains a space to include commentary, which companies can use to provide contextual information, discuss any issues related to providing the data and for any specific views on the measure (including suggestions for modification and improvement).

Table A2.1 Unplanned maintenance – water treatment works

Measure name	Unplanned maintenance – water treatment works (OR1A in pro forma)
Definition ⁴⁰	<p>Unplanned maintenance jobs occurring at water treatment works split by water treatment work type (SD to W6) and reported as the proportion (in percentage) of all maintenance jobs in each category. A maintenance job is considered to be unplanned if it results from an unexpected asset failure or reduced asset performance. Treatment type categories are set out in RAG 4.10 6A.</p> <p>Inclusions and exclusions</p> <ul style="list-style-type: none"> • The data collected should be a count of all the unplanned jobs completed (with a completed work order), it should not be a count of investigations where nothing was done, or minor jobs carried out as a result of an inspection which are not recorded as a work order. • Jobs should be reported for mechanical, electrical and instrumentation and control assets only. • Unplanned maintenance on all assets should be included in the data regardless of asset criticality. • The data must also include all planned-reactive jobs, that is anything strategically planned for reactive maintenance, ie run to fail assets. • Any proactive work, such as routine planned maintenance or planned renewals/replacement of parts (or the whole asset) should be excluded. • For the avoidance of doubt, if it is necessary to raise multiple (follow-up) maintenance jobs to resolve an individual asset failure or reduction in asset performance then this should be reported as one job.

⁴⁰ This is the same definition as the legacy serviceability measure, except for the focus on water treatment works assets only. Network related non-infrastructure assets (eg pumping stations) should be excluded because these are accounted for in the equipment failures measure.

Table A2.2 Unplanned maintenance – wastewater treatment works

Measure name	Unplanned maintenance – wastewater treatment works (OR1B in pro forma)
Definition⁴¹	<p>Unplanned maintenance jobs occurring at wastewater treatment works split by wastewater treatment work size (size band 1 to size band 6) and reported as the proportion (in percentage) of all maintenance jobs in each category. A maintenance job is considered to be unplanned if it results from an unexpected asset failure or reduced asset performance. Treatment works size bands are set out in RAG 4.10 7A. For large wastewater treatment works in size band 6, unplanned maintenance jobs should also be split by treatment classification as set out in RAG 4.10 7B.2.</p> <p>Inclusions and exclusions</p> <ul style="list-style-type: none"> • The data collected should be a count of all the unplanned jobs completed, (a completed work order), it should not be a count of investigations where nothing was done, or minor jobs carried out as a result of an inspection which are not recorded as a work order. • Jobs should be reported for mechanical, electrical and instrumentation and control assets only. • Unplanned maintenance on all assets should be included in the data regardless of asset criticality. • The data must also include all planned-reactive jobs, that is anything strategically planned for reactive maintenance, ie run to fail assets. • Any proactive work, such as routine planned maintenance or planned renewals/replacement of parts (or the whole asset) should be excluded. • For the avoidance of doubt, if it is necessary to raise multiple (follow-up) maintenance jobs to resolve an individual asset failure or reduction in asset performance then this should be reported as one job.

A2.2 Equipment failures on the sewerage network (immediate data request)

We provide a definition for equipment failures below. Please provide data for 2021–22 in the operational resilience information request pro forma and, if possible, an additional two years of historical data (ie 2019–20 and 2020–21). The pro forma also contains a space to provide commentary, which companies can use to provide contextual information, discuss any issues related to providing the data and for any specific views on the measure (including specific suggestions for modification and improvement).

⁴¹ This is the same definition as the legacy serviceability measure, except for the focus on wastewater treatment works assets only. Network related non-infrastructure assets (eg pumping stations) should be excluded because these are accounted for in the equipment failures measure.

Table A2.3 Equipment failures

Measure name	Equipment failures on the sewerage network (OR1C in pro forma)
Definition	<p>Total number of equipment failures on the sewerage network, split by key equipment type and normalised by the total length of the sewer network (per 10,000km). Total network length should be the same value reported in RAG 4.10 7C.21 – ‘Total length of ‘legacy’ public sewers as at 31 March’.</p> <p>Inclusions and exclusions</p> <ul style="list-style-type: none"> • All plant and equipment at wastewater treatment works should be excluded. • All failures should be reported regardless of impact on service or the environment. • Key equipment types are listed below, the number of assets in each category should also be reported in the table.

Table A2.4 Equipment failures – equipment types

Equipment type	Description
Pumping station (foul, surface water or combined)	The failure ⁴² of a pumping station (ie inability to pump sufficient forward flows) reported as one failure regardless of numbers of failed components contributing to the total failure. ⁴³
Overflows (CSO and Emergency)	The failure of an emergency or combined sewer overflow to operate properly.
Penstocks	The failure of any sewerage infrastructure penstock or flow shut off valve in a fixed position.
Anti-Flood valves	The failure of anti-flood valves protecting customer property from flooding. Include both standard mechanical and pumped anti-flood valves, and report if failed in closed or open positions.
Vacuum sewerage systems	The failure of a vacuum sewerage system, or parts of a system.
Storage tanks	A failure to maintain sufficient capacity of a storage facility. Include failures of any integral return pumping and screening / maceration equipment that impact on required capacity.
Flow control devices (ie hydrobrakes)	The failure of a flow control device to operate properly.
Real time telemetry control systems	The failure of a real time control system to operate properly.
Oil interceptors	Failure of an oil interceptor to operate properly.
Chemical dosing	The total failure of chemical dosing plant over an extended period (ie not breakdowns responded to and resolved promptly)

A2.3 Asset condition (exploratory requests)

We provide an example definition for asset condition below. As this is an exploratory request, we have set out a series of key questions we are interested in exploring with the sector. Responses can be provided in the operational resilience information request pro forma which

⁴² A failure is described as a breakdown or the inability to use the asset for its intended function.

⁴³ Exclude power grid failure events except where the company’s standby generation facility failed.

is published alongside this paper. Companies do not have to provide data for these exploratory requests, but we would welcome any data that helps us to achieve the ambitions set out in this paper.

Table A2.5 Asset condition – water treatment works (exploratory request)

Measure name	Asset condition – water treatment works (OR2A in pro forma)
Exploratory information	<p>Example definition: 'The number of assets at water treatment works within each condition grade category (see table below), split by water treatment works type (SD to W6). Applicable to all mechanical, electrical and civil assets (not to component level). Treatment type categories are set out in RAG 4.10 6A.</p> <p>We would like companies to provide an overview of the items listed below.</p> <ul style="list-style-type: none"> • The type of asset condition information collected, the frequency of collection and how the data is validated. • The asset base coverage of the condition information collected. • How asset condition data is used to inform asset health and operational resilience decision making. • If condition grade (aligned to the condition grade definitions in table A2.7) is still measured. • If the 2009 price review (PR09) condition grade could be reported in the near term and to what level in the asset hierarchy.

Table A2.6 Asset condition – wastewater treatment works (exploratory request)

Measure name	Asset condition – wastewater treatment works (OR2B in pro forma)
Exploratory information	<p>Example definition: 'The number of assets at wastewater treatment works within each condition grade category (see table below), split by wastewater treatment works size. Applicable to all mechanical, electrical and civil assets (not to component level). Treatment works size bands are set out in RAG 4.10 7A. For large wastewater treatment works in size band 6, assets should also be split by treatment classification as set out in RAG 4.10 7B.2.</p> <p>We would like companies to provide an overview of the items listed below</p> <ul style="list-style-type: none"> • The type of asset condition information collected, the frequency of collection and how the data is validated. • The asset base coverage of the condition information collected. • How asset condition data is used to inform asset health and operational resilience decision making. • If condition grade (aligned to the condition grade definitions in table A2.7) is still measured. • If the PR09 condition grade could be reported in the near term and to what level in the asset hierarchy.

Table A2.7 Asset condition grades⁴⁴

Condition grade	General meaning
1	Sound modern structure with modern mechanical and electrical plant and components that are operable and well maintained.
2	As 1 but showing some minor signs of deterioration. Routine refurbishment and maintenance required with review of condition in the medium term.
3	Functionally sound, but appearance significantly affected by deterioration, structure is marginal in its capacity to prevent leakage, mechanical and electrical plant and components function adequately but with some reduced efficiency and minor failures. Review of condition required during the medium term.
4	Deterioration has a significant effect on performance of asset, due to leakage or other structural problems, mechanical and electrical plant and components function but require significant maintenance to remain operational. Will require major overhaul/replacement within medium term.
5	Serious structural problems having a detrimental effect on the performance of the asset. Effective life of mechanical and electrical plant and components exceeded and incurring excessive maintenance costs compared to replacement cost due to unreliability. Will require major overhaul/replacement in short term.

⁴⁴ Condition grade definitions are from [PR09 final business plan reporting requirements, 'Part C3 company guidance v1.0'](#), January 2009

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