

**IAP Response** 

Ref B2.7.WSH.LR

# Resilience measures and systems approach

1 April 2019



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### 1. Introduction

#### 1.1 Ofwat IAP assessment

Ofwat's assessment in relation to the IAP test questions on securing long-term resilience found that:

- We presented insufficient or unconvincing evidence of how we assessed risks and consequences to our systems. In particular, the explanation of how we use our asset resilience scorecards was unclear.
- Welsh Water 2050 and our Resilience Wheel presented a qualitative and strategic view of resilience. However, we did not present a robust approach to system interdependencies in the round and a detailed assessment of risk exposure to our systems.
- We provided evidence of a wide range of mitigation options, covering both hard and soft infrastructure, covering all of the 4 Rs, and linking to the Strategic Responses and future trends highlighted in Welsh Water 2050.

**Error! Reference source not found.** below shows how we have addressed Ofwat's IAP actions on long-term resilience.

Action	Action	Reference in our IAP
reference		response
WSH.LR.A1	The company should ensure that its common and	B2.WSH.OC.A1 Asset
	bespoke performance commitments associated	resilience
	with operational resilience are clearly defined,	B2.4.WSH.OC Outcome
	sufficiently demanding for AMP7 and the long	Delivery Incentives
	term, and supported by the right incentives.	
	We expect the company to satisfy the relevant	This document Section
	actions set out in relation in the outcomes areas	2.4 and Table 2.
	ensuring a line of sight between risks to resilience	
	and package of outcomes.	
WSH.LR.A2	The company should provide a commitment that	This document Section
	it will, by 22 August 2019, prepare and provide to	3 provides a preliminary
	us an action plan to develop and implement a	view of our plans. We
	systems based approach to Resilience in the	will provide a complete
	Round and ensure that the company can	action plan by 22
	demonstrate in the future an integrated resilience	August.
	framework that underpins the company's	
	operations and future plans showing a line of sight	
	between risks to resilience, planned mitigations,	
	package of outcomes and corporate governance	
	framework	

Table 1: Relationship between IAP actions and this document



#### 1.2 Structure and purpose of this document

This document supports our response to two of the IAP actions as set out above.

It also provides more information relation more generally to Ofwat's IAP tests LR1 and LR2, to better explain our approach to

- Risk identification, system impacts and risk prioritisation (LR1) section 2.2
- Development and selection of mitigation options (LR2) section 2.3

The document is structured as follows:

Section 2 covers our current approach from risk management to risk identification through to monitoring and review.

- Section 2.1 provides an overview of our approach, Resilience in the Round.
- Section 2.2 provides further detail on our current approach to risk identification, understanding system impacts and risk prioritisation, (responding to Ofwat's IAP Test LR1).
- Section 2.3 provides further detail on our current approach to development and prioritisation of mitigation options, (relating to Ofwat's IAP Test LR2).
- Section 2.4 covers our current approach to monitoring and review of risks including the rationale behind our Performance Commitments (relating to Ofwat's IAP action WSH.LR.A1).
  - ----
- Section 2.5 covers the customer and stakeholder engagement that underpins our decisions with regard to the prioritisation of risks and mitigation options.
- Section 2.6 covers the good corporate governance that oversees the identification and prioritisation of risks.

Section 3 covers our plans for the development and integration of a systems-based approach to resilience in the round into our business. This will be set out in more detail in our Action Plan on 22<sup>nd</sup> August as required in the IAP Actions.

- Section 3.1 describes our future plans for the ongoing assessment and prioritisation of risk (relating to Ofwat's IAP action WSH.LR.A2).
- Section 3.2 describes our future plans for the development of planned mitigations and packages of outcomes.



### 2. Our approach

#### 2.1 Overview - Resilience in the Round

We have been developing our approach to resilience throughout AMP6. We have carried out horizon scanning to identify how we can improve our long-term planning, and we have also set out our approach to building 'Resilience in the Round'. Increasing our resilience in this way will improve service for our customers both now and in the long-term.

We are at the forefront of implementing resilience in the industry and were one of the first water companies in the UK to create a bespoke resilience framework - our Resilience Wheel. This underpinned the development of our long-term strategy 'Welsh Water 2050' and drove our resilience improvement plans.

To provide our customers with a robust and reliable service, resilience must encompass all aspects of our business, including assets, systems, people, finances and governance, as well as considering social, cultural and environmental perspectives. Our September 2018 Business Plan submission detailed the approaches we are taking to build our resilience across our Resilience Wheel.

Our approach to resilience operates at three levels. Our Business Plan highlighted our <u>strategic</u> approach to Resilience in the Round in particular (see document ref 4.1). Further detail was set out separately on how we embed risk and resilience into our approach to investment planning (document Ref 5.1). However, we did not include detailed descriptions of our <u>tactical</u> and <u>operational</u> approaches to Resilience in the Round. This was highlighted by Ofwat in the IAP publication, and this document aims to address that gap.



*Figure 1: Our three-tiered approach to Resilience in the Round* 

Our approach to building Resilience in the Round can be broadly described under a series of stages. As shown in Figure 2, these stages are:

- **Risk identification** –Acute shocks which may impact our business immediately and the future trends, which will impact of business in the longer-term, are identified.
- **System impacts** The impacts that these shocks and future trends have on our systems from source to sea are understood. From this, we assess the impact on other systems, on our customers and on the environment.
- **Risk prioritisation** The risks are prioritised based on their likelihood of occurrence and the impact. This prioritisation is undertaken both within programmes of work and across programmes.
- Low likelihood, high impact risks The high likelihood, high impact risks are prioritised and addressed under business as usual investment. The low likelihood, high impact risks are prioritised in a separate stream and addressed under resilience investment.



 Mitigation options – Options to mitigate the risk are developed. In order to develop these options, we follow an efficiency hierarchy; first removing the root cause through upstream management or encouraging customer-led actions, secondly considering changes to operation of the or leveraging the existing capabilities of the system to reduce risk and finally building smart solutions to address our risks. We consider innovation and best practice research in determining possible options.

Across the hierarchy, we consider how we can work with other stakeholders who have an interest in improving resilience across systems.

- **Optioneering** These options are firstly screened on feasibility and then valued using our service measure framework and a whole-life cost calculated using our unit-cost database and a cost-benefit ratio calculated to prioritise the options.
- **Preferred options** The preferred option will be progressed to implementation through the Operations Team, In-house Delivery Team, Network Alliance or Capital Delivery Team.
- **Monitor and review** We monitor and review our investment using our Performance Commitments.



*Figure 2: Our Resilience in the Round approach* 

Our decisions at each stage are based on the evidence we obtain from our customer and stakeholder engagement including overarching customer and stakeholder engagement and project-specific engagement. It is also overseen by good corporate governance from risk and value challenge at a project-level to strong Board governance at a company-level.

These processes can be grouped into two stages relating broadly to Ofwat's two IAP test areas, plus an additional monitoring and review stage. Ofwat IAP test area LR1 covers risk identification, system impacts and risk prioritisation and LR2 covers mitigation options, optioneering and preferred options. The stages, and the individual processes within each stage, are described in more detail below.



#### 2.2 Risk prioritisation

The processes for risk identification, understanding system impacts and risk prioritisation align with Ofwat IAP Test LR1:

How well has the company used the best available evidence to objectively assess and prioritise the diverse range of risks and consequences of disruptions to its systems and services, and engaged effectively with customers on its assessment of these risks and consequences?

Welsh Water's approach to risk prioritisation, understanding system impacts and risk prioritisation operates at three levels as shown in figure 4:



Figure 3 Our risk identification aspects of the 'resilience in the round' approach – LR1 in detail

- <u>Strategic</u> risk prioritisation is managed at a Board level.
- <u>Tactical</u> risk prioritisation is managed at a Director of Service level and focuses on risk prioritisation across catchments or asset portfolios.
- <u>Operational</u> risk prioritisation is managed at a Head of Service level. It focuses on risk identification at an asset level and is facilitated through the asset resilience scorecards (for risks to critical assets) and investment manager (for risks to other assets).

The risk identification and prioritisation approaches are explained in further detail below.



#### 2.2.1 Strategic

#### Future trends – Welsh Water 2050

In 2018, we worked with Cardiff University and Arup to carry out a thorough assessment of the long-term trends that may impact our business, as the basis of our long-term strategy 'Welsh Water 2050'. The work identified eight key trends that we need to respond to in our long-term planning. These are provided in Appendix A. We have committed to reviewing and updating this work every five years.

In early 2017, we commissioned Arup to work with us to create the Welsh Water Resilience Wheel, shown in Figure 4. The work drew on global best practice in understanding the vulnerabilities of systems to shocks and stresses. We used this as part of Welsh Water 2050 to identify the resilience strengths and gaps of our systems, and to understand the system capability we need to respond to shock and stress events.



Figure 4: Welsh Water Resilience Wheel showing resilience themes and indicators

#### Corporate risk management

Our corporate risk management approach uses the 'Three Lines of Defence' model to provide robust governance:

- The first line of defence is clear ownership and management of risk. This is centred around the corporate risk register and is fulfilled by clear allocation of ownership to operational teams and managers.
- The second line of defence is risk management and risk control. This is fulfilled by the functions carried out by the compliance team and internal committees.



• The third line of defence is independent review and oversight. This is fulfilled by internal and external auditors, including our technical adviser on regulatory reporting issues (Jacobs Engineering Group).

The process for identified and managing corporate risks can be summarised as follows:

- The executive team's view of the strategic risks affecting the business is reviewed at every board meeting. The board carries out an in-depth review of strategic risks, and an assessment of the current and target 'risk appetite', twice a year.
- The audit committee has accountability for overseeing the risk management processes and procedures and reports to the board.
- Our external auditor and reporter review our approach to risk and request evidence of risk review in the business.



#### 2.2.2 Tactical

#### **Business risk register**

At a business unit level, risks are assessed and reviewed quarterly. The latest risks for the water and wastewater asset risk register are provided for illustrative purposes as Appendix B. These are fed into the corporate risk register (see above). The process works as follows:

- Individual teams within the business take ownership for managing risks within their area of responsibility.
- All teams record risks in a risk register which is held at the business unit level.
- Risks are discussed at team meetings and escalated via team managers as appropriate. The route of escalation is aligned to the risk assurance map.
- Senior management and chairs of committees are responsible for confirming that they have adequately discussed, reviewed and managed risk in the annual risk and compliance statement declaration each year, which is overseen by the compliance function.
- The compliance team monitors that risk registers are updated quarterly and report this to a senior manager where this is not happening.

#### Service Resilience framework

At a tactical level, we have developed a 'Service Resilience' approach to resilience at a catchment scale.

The Service Resilience approach process is outlined in Figure 5 and explained in more detail below.





#### Figure 5 Flow process of the Service Resilience approach

The Service Resilience approach allows us to set operational level resilience within the context of strategic, forward-looking context, by starting with catchment-scale reviews to give a broader view of risks and pressures across systems and geographical areas.



It gives us the ability to aggregate our operational and asset-level assessments of risk to different geographical scales, enabling a systems-view and wider perspective on trends and issues, including potential cascading risks that may require additional resilience.

The 'structured assessments of vulnerability' indicated by the pale blue central section in the diagram above involved input from key stakeholders from across our catchment and water resources staff as well as ensuring representation from both operations and regulation and strategy colleagues. These reviews are carried out at a catchment scale to link back to more strategic/long-term pressures and issues.

Our Service Resilience approach also incorporates identification and prioritisation of mitigation actions; this is detailed in section 2.3 relating to IAP LR2.

#### Other methodologies

We use a range of other approaches to assess and prioritise risk across groups of assets. These include:

- Reservoir Portfolio Risk Assessments
- Drinking Water Safety Plans
- Zonal Studies

These have been set out in more detail in the relevant investment cases.

#### 2.2.3 Operational

#### Asset resilience scorecards

At an operational level, we monitor the resilience of critical assets using our asset resilience scorecards. There is a bespoke scorecard for each type of asset, monitoring the risks that are most relevant for that type of asset. Further details are provided in IAP response document B2.WSH.OC.A1. The resilience measures for each asset type are provided in the Performance Commitment Definitions document [Ref 5.3].

We perform an annual review to select our critical sites. The criteria for 'criticality' include the number of customers dependent on the asset in question, any potential for impacting designated sites or receiving waterbodies, and if there are important interdependencies or potential impacts on other systems such as where network assets cross vital infrastructure (strategic road network or rail). The critical sites list is signed off at a senior level.

#### **Investment Manager**

Investment Manager is a single, centralised repository for risks and interventions across our asset base. It is primarily used at an individual asset-level with risk assessed in terms of service impact against a set of output performance measures using the service measure framework.



#### 2.3 Development and prioritisation of mitigation options

The development of mitigation options aligns with the Ofwat IAP Test LR2:

How well has the company objectively assessed the full range of mitigation options and selected the solutions that represent the best value for money over the long-term, and has support from customers?

This stage is informed directly by the preceding resilience assessment and includes planning at all levels – prioritisation of options is carried out at strategic, tactical and operational levels within the business as shown in **Error! Reference source not found.**:

- At a strategic level, the Board developed mitigation options through the development of the Strategic Responses in Welsh Water 2050 which included public and stakeholder consultation.
- At a tactical level, mitigation options are developed and prioritised as part of catchment-based approaches such as Sustainable Drainage Plans and Water Resources Management Plans.
- At an operational level, mitigation options are identified and prioritised through risk and value workshops, which use a service measure framework determine the cost-benefit ratio of each option.

		Over	seen by good corporate gover	mance	
	Mitigation options		Optioneering		Preferred options
gic			Welsh Water 2050 and Resilience Wheel		
Strate	Corporate risk register				
	Business risk registers				
tical	Service resilience approach				
Tac			Water Resources Management Plan		
			Sustainable Drainage Plans		
tional	Asset resilience scorecards				
Opera	Investment Manager		Ri	isk and Value workshop	IŞ
	Underpinned b	y innovatio	n, customer and stakeholder e	engagement a	nd co-creation

Figure 6 Our approach to the development and prioritisation of mitigation options

#### 2.3.1 Strategic

Our Welsh Water 2050 work identified a set of Strategic Responses for the business that would help us prepare for the long-term challenges highlighted in the study. We published this work for public consultation, to help us understand how important or customers perceived each of the proposed Strategic Responses to be. We took on board over 20,000 individual responses to the consultation as well as 17 detailed responses from stakeholder groups.

Taking a long-term view on resilience planning has helped us to specify multi-AMP programmes and adopt a forward-thinking approach to optioneering. This early prioritisation



work is helping us to ensure environment and service provision is secured for future generations, at an affordable pace.

#### 2.3.2 Tactical

At a tactical level we take into account regulatory need and carry out more detailed assessments. Examples include:

- Our Zonal studies for prioritising on acceptability of water
- Sustainable Drainage Plans and Drainage Area Plans, where we have identified four priority whole-catchment solutions to be implemented in partnership with a range of other land users
- Portfolio Risk Assessment tool for reservoirs used to prioritise our dam safety programme.

Our Service Resilience approach involves documenting each risk and identifying what improvements would contribute towards each of the 4Rs (see below). This mapping of options against resilience measures then informs a detailed prioritisation exercise alongside information from customer and stakeholder engagement, and the expertise of key staff.

#### 2.3.3 Operational

Any significant risks that are identified in our resilience scoring of assets are captured in our Investment Manager (IM) system, along with the valuation of impact. The system takes a standard approach to quantifying the different risks requiring investment against all other risks in the system and can generate a prioritised programme of work based on this.

IM records and the more detailed resilience scorecard assessments both feed into mitigation options that are developed for each critical asset.

Outputs from IM are then used to inform Risk and Value workshops, which use the Service Measure framework determine the cost-benefit ratio of each option.

Our approach to prioritisation of solutions includes using the framework of our '5 Rs' (see **Error! Reference source not found.**). The '5 Rs' encompass the cabinet office's 4Rs (Resistance, Reliability, Redundancy, Response & Recovery), adding a fifth 'R' for reflectiveness to specifically address the application of learning from past experience as well as using better data to inform future plans.





Figure 7 Welsh Water's '5Rs' of resilience



#### 2.4 Monitoring and review

We employ a number of systems and processes to continually monitor and review resilience, at a strategic, tactical and operational level, as shown in Figure 7. These are described in further detail in the sections below.



Figure 8 The monitoring and review processes for resilience investment

#### 2.4.1 Strategic

Two principle mechanisms help us to ensure that we stay on track in terms of monitoring our resilience at a strategic level – our Performance Commitments and Welsh Water 2050.

#### **Performance Commitments**

Our Measures of Success, or Performance Commitments, link how the resilience investments we make delivers outcomes for our customers and the environment.

Out of all our Performance Commitments for AMP7, we have identified 10 that are wholly targeting long-term resilience and future performance, and 29 that are partially contributing. To clearly communicate the line of sight between risks, resilience and our package of outcomes, these 39 Performance Commitments are set out in Table 2 below along with the investments we are proposing to achieve them and the risks these investments specifically mitigate against. The Performance Commitments that relate solely to long-term resilience are highlighted in bold.



#### Welsh Water 2050

We have committed to reviewing Welsh Water 2050 every five years. This involves reassessing the long-term trends facing the business, reviewing our progress against our Welsh Water 2050 commitments, and evaluating whether those commitments themselves need to be updated to ensure we will continue to deliver on our customer promises over the short, medium and long term.

#### 2.4.2 Tactical

At a tactical level, we have a robust post-incident review procedure following serious incidents that have tested our resilience. Examples include the Hereford raw water quality incident in 2015, Storm Emma, and the drought of 2018. These post-incident reviews are led by a member of the Executive Leadership Team and bring the operations, emergency management, communications and planning teams together to review the root cause of the incident, the preparedness and emergency response, temporary and permanent mitigation measures put in place and communications to the public.

Any lessons learnt are captured in a register which is circulated to all relevant colleagues. Heads of Service lead the incorporation of operational changes into the business and the asset planning team lead the incorporation of any capital interventions into the business. These lessons learnt may be specific to the asset or to the asset type, or they may be concerned with the way the company responded to the incident.



Table 2 Line of sight linking performance commitment outcomes to specific investments and the risk or trends they mitigate

Perfor Comm	mance itment	End of AMP6 forecast	End of AMP7 target	Rationale for this commitment		ent	Mechanism for risk identification and prioritisation	Risk or trend mitigated
	Tap water	er 0		Drinking water quality is key to the continued wellbeing of our customers. We therefore	WS1	Installation of contact tank cleaning assets at water treatment sites	Drinking Water	Biohazard
Wt1	quality		0	aspire to provide fully compliant water for all our customers at all times and prepare our	WS2	Improving Felindre WTW quality resilience	Safety Plans	
index (CRI)			systems and assets to withstand future changes, such as more frequent extreme	WS3	Capel Curig WTW abandonment		Extreme weather events	
		weather events.	WS7	Hereford water supply resilience	Asset resilience scorecards			
					WS4	Network resilience schemes	Sorvico Posilionco	
		oply ons 12		As extreme weather events, like Storm Emma, become more frequent in the future we must be prepared and improve the reliability of our service. This PC focuses on upgrading the resilience of our network, assets and management processes to reduce the likelihood of our customers experiencing	WS5	Post tensioned concrete tanks replacement	approach	
					WS7	Hereford water supply resilience	Asset resilience	Extreme weather
Wt2	interruptions		8		WS8	Critical trunk mains assessments	scorecards	events Asset failure
					WS9	Additional storage at Llwynpia Quarry tanks	Lessons learnt reviews	
				supply issues in Aivier and beyond.	WS10	Emergency planning capability	Lessons learnt reviews	
Wt3	Acceptability of drinking water	2.4	2.0	We recognise that our performance for acceptability of water is lower than for other water companies in England and Wales. This is due in part to our raw water sources, and will likely be exacerbated by future stresses like extreme weather. Therefore, we wish to address this issue in AMP7 to provide our		Acceptability of water (B2.15.CE.A1) and Network Quality – new legal obligations (B2.16.CE.A1)		Extreme weather events (causing poor raw water quality)



Performance Commitment		End of AMP6 forecast	End of AMP7 target	Rationale for this commitment	Investm	ent	Mechanism for risk identification and prioritisation	Risk or trend mitigated
				customers with water that they feel comfortable is safe to drink. We recognise that reliability of water supply is				
Wt4	Water mains burst	133.2	128.4	key and that we are unable to mitigate burst mains effectively through emergency response alone. As the future becomes increasingly more uncertain we aim to improve our proactive assessment of water mains, to reduce bursts and enable them to be more robust and able to withstand change.	WS8	Critical trunk mains assessments	Asset resilience scorecards	Unknown unknowns <sup>1</sup>
Wt5	Water process unplanned outages	1.57%	1.57%	Our customers expect us to provide reliable service, and they become increasingly less tolerant of outages the longer they last and the more frequent they are. In the future we are likely to encounter more extreme weather, security threats as well as challenges which have yet to be identified. Although outages do	WS1 WS2 WS3	Installation of contact tank cleaning assets at water treatment sites Improving Felindre WTW quality resilience Capel Curig WTW abandonment	Drinking Water Safety Plans	Biohazard Extreme weather Unknown
				not necessarily feed through into customer supply interruptions, we aim to keep the number of outages stable in AMP7.	WS5	Post tensioned concrete tanks replacement SEMD Enhancements	Service Resilience approach Legislation	unknowns
Wt7	Water catchments improved	23	18	Catchment management is the first line of defence to improve our raw water quality and prevent deterioration. We therefore need to improve our catchments to provide a better quality and value service to our customers.	WwS2	Water catchments programme (Water Resources IC, Ref 5.8A) Drainage and Waste	Change in	Climate change Biohazard (Treatment) Land-use change (Treatment)

<sup>&</sup>lt;sup>1</sup> We recognise that we cannot plan for all eventualities, and that events that we cannot predict can occur. Where the impact of such an event is high enough, we wish to mitigate these risks.



Perfor Comm	mance itment	End of AMP6	End of AMP7	Rationale for this commitment	Investm	lent	Mechanism for risk identification	Risk or trend mitigated
		forecast	target				and prioritisation	
BI5	Financial Resilience	High	High	Our target is focused on achieving a strong investment grade credit rating to enable us to obtain low cost capital which can fund our resilience enhancement measures. Our customers have told us securing the long-term resilience and reliability of our service is vital and financial resilience is a pre-requisite for this.		Financial resilience submission (PR19 Financial Resilience, Ref 4.3)		Unknown unknowns
Ft1	Risk of severe restrictions in a drought	4%	0%	Our customers have told us that while they would be comfortable with some 'essential use' restrictions there is significant willingness to pay for improves to reduce the risk of severe restrictions (from 1 in 100 years to 1 in 200 years). As climate change and extreme weather events alter the amount of water available investment is needed to achieve this target.		Drought Plan – Water Resources investment case (5.8A)		Extreme weather events
	Pick of cowor			We recognise that sewer flooding is considered by customers to be the worst service failure to experience. Our modelling identifies that likelihood of sewer flooding is	WwS2	Drainage and Waste Management Plans	Change in legislation	Extreme weather
Ft2	flooding in a severe storm	looding in a 31.00 29.45 evere storm	29.45	ever increasing, mainly due to the effects of climate change and extreme weather, but even in these circumstances customers still	WwS3	Newport Tunnel Resilience	Service Resilience	events (e.g. storm surge, flood)
					find the impact of flooding intolerable. We therefore need to invest to reduce the likelihood.	WwS9	Sewer flooding	Sustainable Drainage Plans



Perfor	mance itment	End of AMP6	End of AMP7	Rationale for this commitment	Investm	ent	Mechanism for risk identification	Risk or trend mitigated
comm		forecast	target				and prioritisation	inigated
Ft3	Energy self- sufficiency	26	35	Our ability to produce a proportion of our own energy provides us with an increased resilience to power failures and reduces our long-term energy costs.		Proposed energy investments (Energy IC, Ref 5.8T)		Climate change Changing economy
Ft4	Surface water removed from sewers (property equivalent)	25,000	47,000	We have taken a pioneering approach to surface water removal through our RainScape programme which has enabled a reduction in sewer flooding and spills at intermittent discharges. Our customers recognise the importance of this initiatives and are highly supportive and willing to pay for further progress. Our focus in AMP7 are schemes that will broadly maintain the current rate of progress while improving our resilience to extreme weather events.	WwS9	Sewer flooding	Sustainable Drainage Plans	Extreme weather events
E+5	Asset Resilience	07.7%	95 5%	We recognise that failures would have a major impact on customers and the environment and		Reservoir safety IC (Reservoir Safety IC, Ref 5.8B)	Reservoirs Portfolio Risk Assessment	Regulation (Welsh Govt 2016 amendment to Reservoirs Act 1975)
115	(reservoirs)	servoirs) 92.2% 95.5% the protection of our critical assets has considerable customer support.	WS11	IS projects to improve systems and provide greater resilience	Corporate risk register	Cyber security		
						SEMD Enhancements	Legislation	Terrorism and vandalism
Ft6	Asset Resilience (water	84.0%	86.5%	We recognise that failures would have a major impact on customers and the environment and the protection of our critical assets has	WS11	IS projects to improve systems and provide greater resilience	Corporate risk register	Cyber attack / control system failure



Perfor Comm	mance itment	End of AMP6	End of AMP7	Rationale for this commitment	Investm	ent	Mechanism for risk identification	Risk or trend mitigated
		forecast	target				and prioritisation	
	network+ above ground)			considerable customer support. This has been balanced with our understanding of risk		SEMD Enhancements	Legislation	Terrorism & vandalism
				tolerance at individual sites, and the development of a programme to provide best value for customers.		Cyber security	Corporate risk register	Cyber attack / control system failure
	Asset Resilience			We recognise that failures would have a major impact on customers and the environment and the protection of our critical assets has considerable customer support. This has been balanced with our understanding of risk tolerance at individual sites, and the development of a programme to provide best value for customers.	WwS5	Condition Surveys and Temporary Works Plans for Critical Sewer Failures	Asset Resilience Scorecards	Unknown unknowns
Ft7	network+ below ground)	47.0%	56.0%		WS11	IS projects to improve systems and provide greater resilience	Corporate risk register	Cyber attack / control system failure
						Cyber security		
				We recognise that failures would have a major impact on customers and the environment and the protection of our critical assets has considerable customer support. This has been balanced with our understanding of risk tolerance at individual sites, and the development of a programme to provide best value for customers.	WwS4	Power resilience at WwTW and SPS	Asset Resilience Scorecards	Power outages and brownouts
Ft8	Asset Resilience (wastewater network+	77.7%	77.7% 80.0%		WwS6	IS Projects to Improve Systems and Provide Greater Resilience	Corporate risk register	Cyber attack
	above ground)					Cyber Security	Corporate Risk Register	Cyber attack
	Asset Resilience (wastewater network+ below ground)			We recognise that failures would have a major impact on customers and the environment and the protection of our critical assets has considerable customer support. This has been balanced with our understanding of risk	WwS5	Condition Surveys and Temporary Works Plans for Critical Sewer Failures	Asset Resilience Scorecards	Unknown unknowns
Ft9		astewater 28.3% twork+ low ground)	8.3% 45% th co bi		WwS6	IS Projects to Improve Systems and Provide Greater Resilience	Resilience Wheel	Control system failure
				tolerance at individual sites, and the		SEMD Enhancements	Legislation	Security



Performance Commitment		End of AMP6	End of AMP7	Rationale for this commitment	Investm	ent	Mechanism for risk identification	Risk or trend mitigated
		Torecast	larget	development of a programme to provide best value for customers.		Cyber Security	Corporate Risk Register	Cyber attack
En1	Water and wastewater compliance	100%	100%	We recognise that positive outcomes for the environment are key, and that our customers support this commitment. As extreme weather events are becoming more frequent we need to improve certain assets to prevent a failure that could degrade the environment and impact public health.	WwS1	Additional strategic storage of sludge	Business Risk Register	Extreme weather Biohazards
					WwS1	Additional strategic storage of sludge	Business risk register	Extreme weather Biohazards
	Pollution incidents from	95	<ul> <li>Protecting our environmin important to our custor environmental degrada tourism and the econor for continual long-term</li> </ul>	Protecting our environment from harm is important to our customers for preventing	WwS2	Drainage and Waste Management Plans	Change in legislation	Legislation
En3				environmental degradation and impacts on tourism and the economy in general. We aim for continual long-term improvements,	WwS3	Newport Tunnel Resilience	Service Resilience	Sea level rise Extreme weather events
	wastewater			reflected by our PC, though it may never be possible to eliminate incidents caused by third parties.	WwS4	Power resilience at WwTW and SPS	Asset Resilience Scorecards	Power outages and brownouts
					WwS5	Condition Surveys and Temporary Works Plans for Critical Sewer Failures	Asset Resilience Scorecards	Unknown unknowns
				Leakage is highly important to our customers as it is regarded as wasteful. Its reduction will		Leakage Improvement IC (ref 5.8J)		Extreme weather
En4	Leakage	171	148.2	help us to be resilient and efficient with our resource use while meeting the expectations of customers.		Project Cartref IC		Extreme weather
En6	km of rivers improved	562	418	Improving and protecting the environment is a key part of our service, which is fully supported by our customers. We therefore need to ensure that we can provide an		Wastewater NEP IC (ref 5.8P)	Change in legislation	Change in legislation



Perfor	mance	End of	End of	Rationale for this commitment	Investm	ent	Mechanism for	Risk or trend	
Comm	itment	AMP6	AMP7				risk identification	mitigated	
	Bioresources			effective water and wastewater service without degrading the natural environment and proactively preparing for future extreme weather changes. We recognise that we must comply with our		Additional strategic storage	Business Risk	Biohazards	
En8	disposal and compliance	100%	100%	legal obligations of 100% compliance so that we do not impact public health.	WwS1	of sludge	Register	Extreme weather events	
	Employee			We recognise that to achieve our stretching		'Employer of Choice' (PR19 corporate resilience submission, ref 4.2)	Welsh Water 2050	Unknown unknowns	
Co2	training and expertise	95%	95% 95%	95%	aims in the long term we need skilled staff that are well prepared for anything that we may inexperience in an uncertain future.		Skills development, flexible working and diverse and adaptive culture (PR19 operational resilience submission, ref 4.4)	Resilience Wheel	Unknown unknowns
SV3	Customer Trust	8.04	Upper Quartile	The trust our customers have in our service is of the utmost importance. As we may experience more extreme and uncertain events in the future and it is vital that we are trusted to work with our communities to keep our service running effectively. By building customer trust, we can co-create new resilient solutions.		Building customer trust and participation across our service area, Building trust in our communities (PR19 operational resilience submission, ref 4.4) Water resilient communities programme (PR19 resilience in the round submission, ref 4.1)	Resilience Wheel Welsh Water 2050	Change in customer expectations	
	Sewer flooding			Internal sewer flooding is one of the worst	WwS2	Drainage and waste management plans	Change in legislation	Change in legislation	
Rt1	property (internal)	280	253	working to reduce the likelihood of this experience, preparing for future weather	WwS3	Newport Tunnel Resilience	Service Resilience	Sea level rise Extreme weather events	



Perfor	mance	End of	End of	Rationale for this commitment	Investm	ent	Mechanism for	Risk or trend	
Comm	itilient	forecast	target				and prioritisation	intigated	
				changes, while providing a good value service		SEMD Enhancements	Legislation	Security	
				for all.	WwS9	Sewer flooding	Sustainable Drainage Plans	Extreme weather events	
					WwS2	Drainage and waste management plans	Change in legislation	Extreme weather Legislative change	
Rt2	Sewer flooding			External sewer causes our customers some	WwS3	Newport Tunnel Resilience	Service Resilience	Sustainable Drainage Plans	
	property (external)	4,121	3,800	We therefore aim to reduce serve incidents	WwS9	Sewer flooding	High customer priority	Extreme weather events	
	(external)				while providing a good value for service for all.	WwS5	Condition Surveys and Temporary Works Plans for Critical Sewer Failures	Asset resilience scorecards	Unknown unknowns
	Total Complaints	76 6	tal mplaints7660We are targeting a rate of improvement which will constitute good performance relative to the rest of the sector. We think there will always be a "hard core" of complaints that will be impossible to eliminate, regardless of how good our services are and could be further exacerbated by an increase in extreme events. Reducing complaints enables us to work with our customers to co-create resilience solutions.		We are targeting a rate of improvement which will constitute good performance relative to the rest of the sector.		PR19 Household Retail Business Plan, (Ref 2.5)		Changing customer expectations
Rt4				WwS9	Sewer flooding	Sustainable Drainage Plans	Extreme weather events		
Rt6	Worst-served customers for wastewater services	368	359	This measure is unique to us and it reflects the principle that no customer should have to put up with a persistently sub-standard service, however expensive it might be to eliminate the most stubborn of service problems. As we see more frequent extreme weather events in the future we will need to invest to reduce the number of customers affected.	WwS9	Sewer flooding	Sustainable Drainage Plans	-Extreme weather events	



Performance		End of	End of	Rationale for this commitment		ent	Mechanism for	Risk or trend
Commitment		AMP6	AMP7				risk identification	mitigated
		forecast	target				and prioritisation	
				Customers' views on this measure are mixed,				
				related to those who directly experience				
				issues. Our target reflects this as well as our				
				belief that it is possible to reduce the figure to				
				zero, as there will always be an issue with				
				flooding caused by third parties.				



#### 2.5 Customers and stakeholders

As shown in Figure 2 and Figure 3 above, our approach to identifying and prioritising the risks that we face, and developing and prioritising mitigation, is underpinned by comprehensive engagement with customers and stakeholders.

We have carried out dedicated customer research from the early stages of our PR19 planning, with the objective to understand how well customers comprehend resilience issues in relation to water services and to what extent customers believe we should be addressing resilience issues in our business. We have also used our customer engagement to test the appeal of different solutions with our customers. This work has helped us to ensure that we are identifying the full range of risks and resilience issues, informing our prioritisation of these issues and understand customers' willingness to invest for future generations, and preferences relating to balancing investment for the future with affordability and immediate risks.

Our customer engagement in the last two years has included:

 Welsh Water 2050 customer and stakeholder engagement – In summer 2017, we published Welsh Water 2050 for consultation. We received over 20,000 responses from customers through the Welsh Water website, public events, an online chat bot; an 'online community' panel, and in-depth interviews, all developed and applied in co-operation with our Customer Challenge Group.

The feedback included:

- Customers and stakeholders felt that Welsh Water had identified the key future trends and supported all of the Strategic Responses.
- Stakeholders and customers welcomed the collaborative approach to addressing the future trends Wales will face.

The feedback from customers and stakeholders was triangulated to map out which of the Strategic Responses were seen as a priority. These included 'Cleaner rivers and beaches', 'Enough water for all' and 'Safeguarding clean drinking water through catchment management', 'Protecting our critical wastewater assets' and 'Protecting our critical water supply assets'.

- Resilience engagement we carried out qualitative engagement with our customers to understand:
  - how customers understand the issue of resilience and how water companies are affected by it;
  - customers views on the extent to which resilience issues should be addressed in its plans; and
  - customer views on the balance between investing for future generations and managing the affordability constraints of the day.

Through this research, customers identified the following 'top of mind' risks to water supply: terrorism, burst pipes, contamination, growing population, drought and



frozen pipes. For waste water, they identified, burst pipes, growing population, blockages, flooding and high tides.

#### 2.6 Good Corporate Governance

We have outlined our processes for the identification and prioritisation of risk and development and prioritisation of mitigation options. These are overseen by good corporate governance as shown in Figure 2 and Figure 3 above.

In terms of risk identification and prioritisation, risks are identified at all levels within the organisation and individual teams within the business take responsibility for managing risks within their areas.

These risks are prioritised using the approaches outlined in section 2.2 and are reviewed regularly at team meetings. The high priority risks are fed in a "bottom-up" approach into the business risk registers for water and wastewater, which are managed by the relevant Directors of Service. The risks on business risk registers are reviewed once a month at the Executive Team meeting.

The Executive Team's update on strategic risks affecting the business is reviewed at every Board Meeting and the Board carries out an in-depth review of strategic risks twice every year. The Board assesses both the current and target level of each risk.

The Audit Committee has accountability for overseeing the risk management processes and procedures and reports to the Board on the adequacy of internal controls.



### 3 Future Approach

Our future plans will be set out in more detail in our action plan, to be submitted by 22 August as per the IAP Actions Table. This section sets out our preliminary thinking on the development of our approach.

We plan to undertake a review of our current processes for risk prioritization based on a gap analysis of key documentation. This review will enable us to clearly define how we can improve our existing processes. Some of the areas for development that we have already identified include the following:

- The Service Resilience approach has been developed and tested but not yet fully integrated into business as usual planning and operation. Embedding the Service Resilience approach into the day to day operation as well as the longer-term planning for our business will enable us to have better oversight of system interdependencies so that we can make good decisions, acting and planning accordingly.
- We have set out above how we have begun to consider systems linkages and interdependencies, but we recognise that there is a need to develop this further and better account for both internal and external system interdependencies and interactions, across corporate, financial and operational aspects.
- Third parties will be critical to delivering a systems-based approach. We will therefore set out how we will work with others to improve overall resilience, and this will be incorporated as an important part of the plan we set out in August.
- We will set out clearly how the different processes, reviews and assessments that take place at different levels within our systems are linked and feed into our overall plan to improve resilience through better, more informed decision making, clear evaluation and prioritisation.
- The plan will clearly set out roles and responsibilities and how the different elements of the system are communicated across the company to ensure that we are taking a robust, systematic approach to improve resilience. It will also be clear about how we use our customer engagement to clearly inform our preferred options for building resilience, and how we effectively communicate our resilience plans back to our customers.



### Appendix A – Long-trends identified in Welsh Water 2050

Table 3 Key long term trends identified in 'Welsh Water 2050'

Long term trend	Description
Demographic change	Population growth will lead to increased water demand in
	certain areas and an ageing population may lead to more
	customers in vulnerable circumstances. However,
	opportunities will emerge to develop a more diverse age
	profile in the workforce.
Climate change	Climate change will result in more extreme rainfall events,
	which could lead to an increased risk of flooding and pollution.
	Drier, hotter summers are projected, which could result in
	water supply deficits and the potential for increased water
	demand.
Change in customer	Customer expectations are likely to change dramatically with a
expectations	desire for a more personalised service and control over their
	use of services and less tolerance of service outages. This will
	particularly be the case for business customers.
Changes to the structure of the	The growth of the digital, knowledge based economy will
economy	create opportunities to provide services in more efficient ways.
	However, it could also have an impact on the nature of society,
	and present a challenge to continuing to meet the needs and
	expectations of our customers.
Environmental change	Invasive species, land use change and an increased risk of
	environmental pollution may lead to a reduction in water
	quality and biodiversity. However, co-operative approaches for
	the delivery of enhanced ecosystems services could lead to
	better environmental outcomes.
Protecting essential	Ageing infrastructure, a limited supply chain and cyber security
infrastructure	are key concerns for future service provision. Technological
	advances could lead to significant efficiencies in the planning,
	delivery and operation of new assets.
Policy & regulatory change	Changes in policy and regulation are expected due to the UK
	leaving the European Union, devolution and changing quality
	standards; this creates uncertainty, but provides the
	opportunity for us to help shape future policy. Improved
	regulatory methods and innovative policy developments could
	lead to more efficient delivery of services to our customers.
Protecting public health	Regulatory standards to protect drinking water quality are
	likely to continue to tighten in the future. We will have a role
	to play in promoting healthier and more sustainable lifestyles
	for our customers.



### Appendix B – Latest risks from asset risk registers

Table 4 Latest risks from wastewater asset risk register (December 2018)

Long term trend	Description
Reputational Impact around	There is a risk that Poor water quality in Llyn Padarn has
Llyn Padarn	resulted in an increased focus on DCWW discharges which
	could lead to prosecution leading to heightened media interest
	around DCWW activities and reputation and the court case
	linked to the Environmental Damage Regulations (EDR) may
	lead to us having to deliver additional remediation work.
Landbank Loss for Biosolids	There is a risk that the DCWW Landbank for Biosolids Disposal
Disposal	could be lost. Leading to increase in disposal costs and
,	potentially not achieving compliance and serviceability
	measures with no alternative means of disposal and limited
	strategic storage capacity. Loss may occur in any of three
	scenarios; Partial Loss (e.g.: Phosphorous restrictions), Short-
	term Loss (e.g.: Foot & Mouth Disease outbreak) or Long-term
	Loss (e.g.: Increase in restrictive clauses of land use).
Lack of Strategic Sludge Storage	There is a risk that the lack of strategic sludge storage in the
	event of a catastrophic occurrence (e.g. foot & mouth
	outbreak) would mean sludge cake having to be stored in ad
	hoc locations causing a risk of odour, pollution and
	contravention of Waste Regulations.
Pass Forward Flow Compliance	There is a risk that WwTWs not complying with Pass Forward
at WwTW	Flow (PFF) permits may result in prosecution by the NRW.
Bio Solids Assurance Scheme	There is a risk that DCWW cannot comply with the standard
	and therefore cannot be certified. This results in reputational
	risk. Additionally, in the long-term there could be a potential
	reduction in Landbank availability.
Major Asset Failure without	There is a risk that we could have a major asset failure with no
Contingency	contingency plan available. A review is required on those
	critical WwTWs that do not have a total loss contingency plans
	in place.
Event & duration Monitoring	There is a risk that the new EDM information will highlight
(compliance)	unknown problems at sites and provide our Regulators with a
	case to prosecute us before we have the opportunity of taking
	corrective action.
Event & duration Monitoring	There is a risk that under FIA rules the new EDM process will
(Stakeholder Management)	mean the information shared may be used by individuals, local
	authorities, NGOs or the media to complain, put pressure on
	our regulators to take unnecessary action or run media
	campaigns that damages DCWW reputation.
New Infraction linked to the	"On 4th May 2017 the Court of Justice of the EU ruled that the
Lougher Estuary	UK was in breach of the UWWTD in the agglomerations served
	by Llanelli and Gowerton WWTWs. The ruling noted that the
	UK had admitted in previous correspondence that the area did
	not comply with the directive and committed to deliver the
	required improvements by 2020.



Table 5 Latest risks from water asset risk register (Feb/March 2019)

Long term trend	Description
Dam safety	
Pipes and valves in dams -	The risk is for failure of sections of pipe and or valves which
Generic	could result in dam safety risks as well as risks to supply.
	This risk will vary on a site by site basis. This assessment
	represents an overall risk assessment across all sites.
	In future versions of this register we will separate out and
	assess individually a small number of higher risk sites.
Delivery of key/high profile	There is a risk to the timely delivery of key projects. This risk is
projects e.g. Caban, Talybont,	due to the volume of work in dam safety and elsewhere in
Wentwood, Usk Spillway, Plas	DCWW and the ability of the business to resource this via the
Uchaf, Breddig, Celyn, Llanishen	Alliance and in house teams.
	In future versions of this register we will separate out and
Dem sefetu incidente	There is a rick of future dam asfatu insidents siven the near
Dam safety incidents	increases and safety incidents given the poor
	the pipes and values
Distribution	the pipes and valves.
Wenvee Tunnel 26" main and	There is a rick of catactrophic failure and loss of supply
other tuppels such as	There is a risk of catastrophic failure and loss of supply.
Cwmtillery and Llynfawr	
Trunk main renair activity	There is a risk to the husiness from the increased level of trunk
	main leaks which need renairing - giving rise to risk to CMI
	colleague fatigue maior os failure
Cefn mabley 48" trunk main	Catastrophic failure of this main would lead to extensive
leak	flooding and closure of the M4 north of Cardiff.
Production	
Major asset failure	Reassess our total loss contingency plans for all WTW above
	10,000 pa.
Felindre WTW	Work to refurbish the Cocodaf filters at Felindre is revealing
	significant defects causing concern for Crypto breakthrough.
Cryptosporidium breakthrough	There is a risk that active cryptosporidium in final water could
from WTWs	result in illness within communities served.