Securing Long-term Resilience

Our Action Plan

22 August 2019

WATER for LIFE

from Southern Water

Contents

"Southern Water has learned some tough lessons in recent years. Our people understand now better than ever the importance of preparing to protect our network and customers. This puts us in a strong position to show sector leadership in Resilience throughout the shocks and pressures ahead."

Ian McAulay, Chief Executive Officer, Southern Water

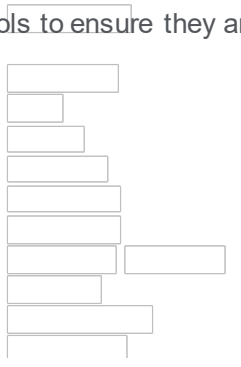
1. Executive summary

Southern Water is committed to driving improved resilience and has put considerable thought into the development of the Resilience Action Plan.

This document provides extensive coverage of both the analysis and considerations to derive a robust Resilience Framework and the detail of the activities and outcomes that make up the Action Plan.

The action plan contains a number of deliverables over the next three years with the following critical to driving our desired step change in resilience:

- Delivering the transformational programmes that address lesson learnt from past failures
- Deploying our system of systems approach across all resilience areas to deal with interconnectivity and cascading impacts, improving overall service resilience
- Fostering a culture through our leadership, training and communications that understands resilience and looks to anticipate, plan and prepare for resilience shocks and stresses
- Applying our new resilience framework, processes and systems to improve our understanding, active management, monitoring and reporting of resilience across financial, corporate and operations in a systematic way
- Strengthening the governance and assurance of resilience controls to ensure they are deployed as intended



1.0 We are committed to enhancing resilience

In Ofwat's initial assessment of our plan (IAP) it was very clear that our approach to resilience needed to improve.

The IAP identified a number of key areas of improvement for us to focus on:

- The need to systemise how we manage resilience.
- Ensure lessons learnt from past failures are incorporated into processes – so we can better anticipate, absorb and respond.
- Provide a maturity assessment of our operational baseline and a plan to improve our understanding and enhance resilience.
- Clearly articulate the line of sight, from risk identification through assessment, option analysis, decision-making and deployment.
- Put in place effective governance and ensure that our Resilience Action Plan (RAP) is deliverable and integrated with our existing business initiatives.

This focus on resilience was a common theme across all water company submissions. With this in mind, we have used internal, industry and out-of-sector insights to drive our thinking, and we are committed to sharing this insight with our peers.

We are determined and committed to enhancing resilience.

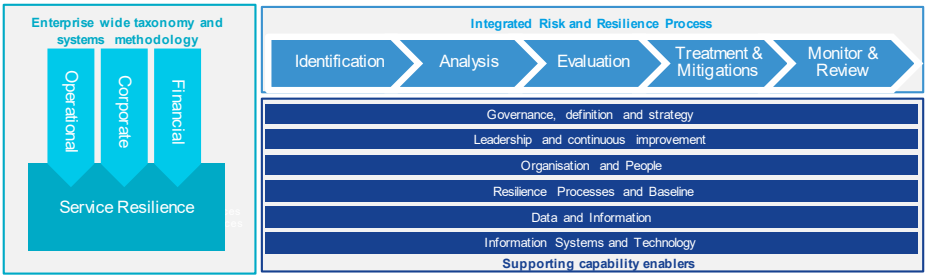
We are committed to improving our resilience. We have allocated significant resource to addressing past failures, and our RAP details how we will make the necessary changes.

Committed to change and continual improvement	A transformation programme is underway to deliver the step change required across the business to meet our AMP7 commitments. Our RAP is a key element of this, which will be reviewed on an annual basis.
Continue to dedicate resource to current resilience initiatives	A desire to reduce the number of operational incidents we experience as a business has driven rapid improvements in the way we manage risk and resilience. This means learning from past failures. We now have dedicated resource focused on continuous improvement.
Clear plan and appropriate governance	We have engaged our Risk Committee. It has provided governance and advice on our Resilience Action Plan. The plan has been independently assured to provide our Board and Ofwat with confidence that it is well thought out and deliverable.
External comparators used to develop Resilience Framework	Our Resilience Framework has been updated to better reflect our business. It is designed to represent our specific needs and is built around recognised risk and resilience standards and external best practice.

1.0 Our Resilience Framework

Our revised Resilience Framework draws heavily on our internal review of past failures and best practice from within and outside of our sector.

In developing our Resilience Action Plan (RAP), we have reviewed our fundamental approach to resilience as a business and how it addresses our needs internally as well as those of our stakeholders, regulators and customers. This is reflected in a revised Resilience Framework.



Our Resilience Framework

For further information, see Section 2.0

The framework contains three key elements:

a) Our systems-based approach and an enterprise-wide taxonomy to connect and cascade resilience risks in the round, in a consistent manner and with clear accountabilities.

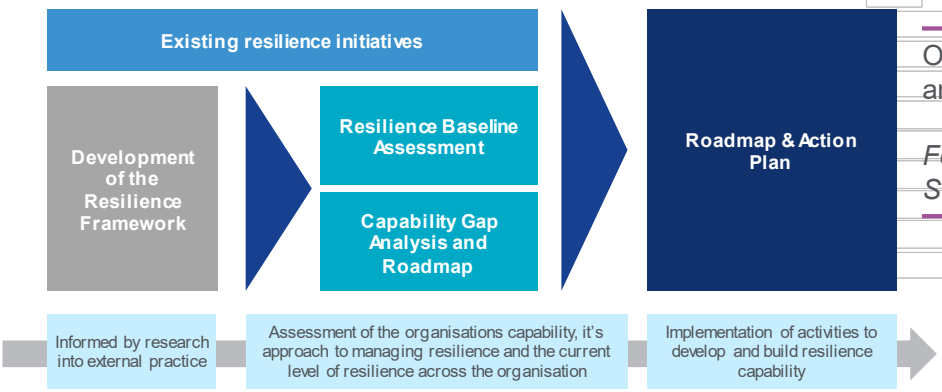
b) A new tailored end-to-end resilience process including our baseline assessment approach, which is based on best available resilience practice and aligned to our Enterprise Risk Management System and Governance.

c) A clear focus on the supporting organisational capability enablers required to make us efficient and effective at resilience management.

Further detail of research and considerations used to establish the framework are in section 2.0.

The RAP is a combination of in-flight initiatives and actions to address gaps, using our Resilience Framework, which will help us achieve our target maturity by 2022.

Our RAP has been developed based on a gap analysis against our framework plus existing initiatives already underway, addressing reasons for past failures and AMP6 and AMP7 planning.



Our Resilience Framework gap analysis

For further information, see Section 3.0

1.0 What we have learned and line of sight

To address causes of past failures significant change programmes are in place to improve our anticipation, response, reliability and overall resilience.

There are a significant number of existing initiatives and change programmes underway, which are based on a review of past failures and our AMP6 and PR19 planning process. These are referenced within this document with a clear line of sight to the 4R's[1] (in the table below) and resilience.

Our IAP response in April included a review of previous incidents, providing descriptions of the causes and our plans to address them. Further analysis has been undertaken to identify and align these systematic causes across the 4R's. This allows us to anticipate issues better and ensure key underlying causes are being addressed.

In-flight activities

For further information, see Section 3.2 and 3.3

Lessons from past resilience failures	
Resilience Control Category	**Causes of resilience failures**
Anticipation	Alarm / sensor failure
	Pre-empting shock or high risk scenario
	Planned work reducing resilience
Resistance	Controls and systems
Reliability	Ineffective O&M
	Multiple asset failure
	Asset protection process
	Culture and Training
Redundancy	Power or asset redundancy
	Limited backup capability
	Loss of storage capacity (known)
	Assurance
Response & Recovery	Delayed response
	Limited supplies / alternate provision of services

The analysis contained in section 3.2 shows that for the majority of cases, improved anticipation, prompt response and recovery could have avoided or significantly reduced the impact.

There are a number of programmes in place with the 'Alarm and Control Centre Transformation'; 'Incident Response Improvement Project' and our focus on improved 'Business Continuity' to address this.

Reliability is the other area for targeted improvement with our 'Operational Excellence', 'Water First' and 'Environment+' programmes driving better management of our assets.

By thinking about the 4Rs and by being able to better anticipate risk, we can create a line of sight from our activities to our performance ODIs.

Looking at the 4Rs and better anticipating risk enables us to improve conversations around resilience. It enables our people to understand our resilience strategy and how this links to areas targeted for improvement, whether through resistance, reliability, redundancy or response and recovery.

This is important, as it allows our people to understand the drivers they should be considering that improve our resilience, and our ODI performance. In section 3.4, we set out a table listing our various activities, with a clear line of sight to ODI performance.

[1] Cabinet Office, Keeping the Country Running: Natural Hazards and Infrastructure, October 2011

1.0 Gap analysis against framework

Our Resilience Action Plan is designed to embed an understanding of resilience into our day-to-day operating model, business processes and governance. This means addressing the development our people, data and systems capability in resilience management.

Some key findings from our assessment of capability include the need for:

Resilience capability gap analysis

For further information, see Section 3.5

- A clearly defined enterprise-wide definition of resilience and how it operates alongside risk with clear governance and ownership.
- A systems-based approach to resilience that is required for planning and decision-making to aid with anticipating risk and allocating resources.
- A well-defined end-to-end process that is consistently applied to identify, plan, deliver and improve our underlying resilience.
- A focus on people and culture, to raise awareness of resilience, its importance and provide training and development to raise overall competency in this area.
- The need to introduce more effective controls to ensure stated resilience mitigations and treatments are deployed as intended.

A maturity assessment of our water and wastewater resilience baseline has already been completed and forms part of our RAP to improve.

The maturity assessment is based around the level of compliance and the effectiveness of application for our new end-to-end resilience process. It is assessed for each steps of the process across the key elements of the water and waste services value chain.

Key findings from our assessment include:

- Water services have a more mature resilience baseline than wastewater.
- A well-designed zonal resilience model has been developed and deployed to water supply across all zones and considers a number of corporate and operational threats.
- The outcome of this analysis has identified a number of treatments and mitigations covering different 4R elements.
- These treatments are being actioned and tracked via the Corporate Risk Management System.
- Wastewater services have a lower level of maturity and have been prioritised as the first area for attention within the RAP, using building blocks developed in Water.
- A further enhancement to maturity is planned for both Water and Waste to use increasing levels of data and increased coverage of shocks, stresses and scenarios.
- The target state is a maturity level 4 (good) understanding of our baseline and consistent application of process within three years.

Maturity assessment of resilience baseline

For further information, see Section 3.6

The maturity assessment will be updated annually.

1.0 Systems and resilience in the round

The Resilience Action Plan includes a review of all corporate risks over the next 18 months in order to widen techniques applied and scenarios considered.

Our risk management system contains a number of methods to identify and manage resilience risks. A key mechanism is the identification and monitoring of "HILL" risks – these are **H**igh **I**mpact **L**ow **L**ikelihood events.

We have commissioned a number of external independent reviews of resilience in high priority areas of Cyber, IT and Brexit, which have a large element of supply chain resilience.

A progressive programme to review corporate resilience is included within the RAP with the aim of improving:

- The identification and management of causal factors – individual threats and coverage that includes varying time horizons of shocks and stresses.
- The management of master scenario events – combination of threats.
- The management of "inject" scenarios – handling of other escalated incidents that could arise during the response to an identified scenario.

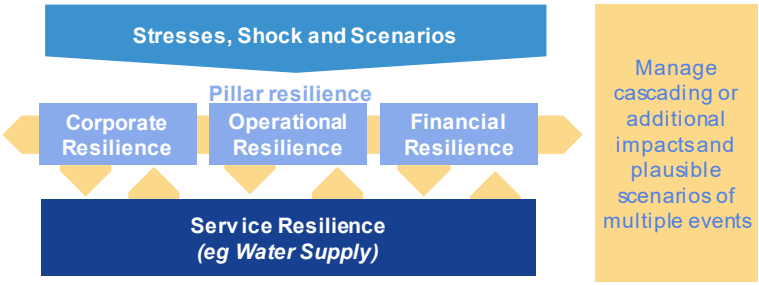
Significant analysis of financial resilience has and will continue to be undertaken and will be shared as part of our Draft Determination response.

The RAP includes a further update to our Financial Resilience Assessment, which will be continuously monitored.

Our systems* approach is multi-dimensional with one of the key principles being the application of pillar and service resilience methodology.

This is used in Financial Services and has a number of benefits:

- It ensures that individual corporate, operational and financial resilience threats are considered in the round against defined end-to-end customer-facing services such as water services, wastewater services or financial servicing of the business needs.
- It instils a push-pull operating principle and culture with the accountable person for service resilience pulling information from all the pillars to inform the service baseline.
- It requires each accountable person to analyse their areas, pushing impacts from their area to the other impacted areas, for pillar and overall service resilience.



Manage cascading or additional impacts and plausible scenarios of multiple events

Key delivery actions to deploy Resilience principles and new processes

- *RAP1.1*
- *RAP2.5*
- *RAP4.3.2*

*For clarity, when referring to our *systems approach*, we consider our business enterprise a "system" which interfaces with a wider group of "systems".

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1.0 Roadmap defined for phased delivery

Our roadmap sets out our three-year plan to address any gaps and achieve our desired level of maturity.

The roadmap and timeline have been developed to account for interdependences, priorities and the enterprise-wide transformation programme to ensure it is deliverable. This will be updated annually.

Priorities from the Resilience Action Plan are highlighted below:

Our Roadmap

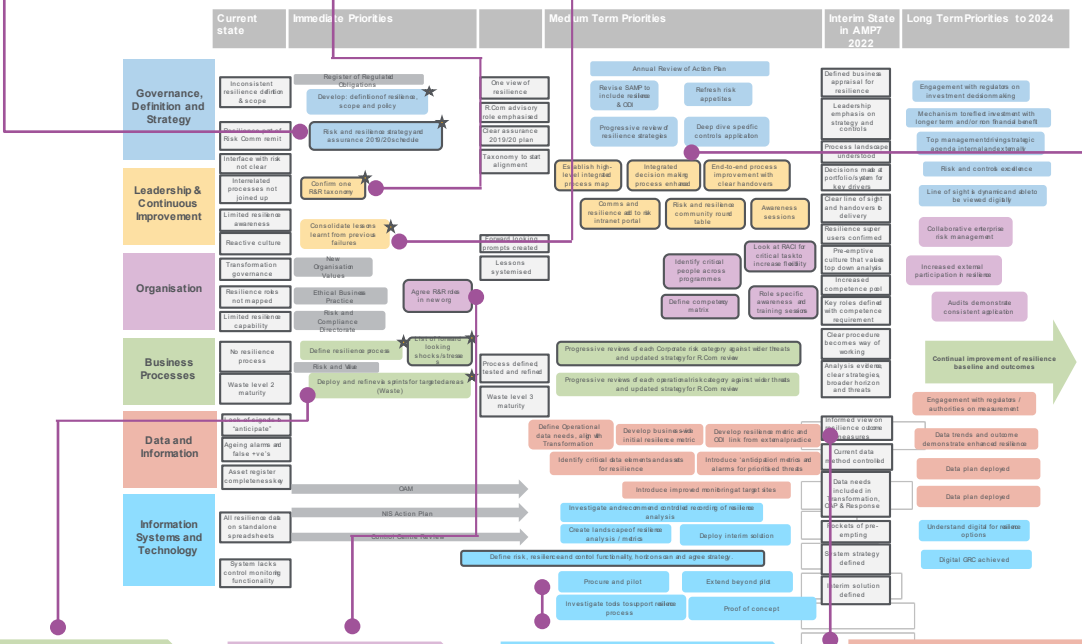
For further information, see Section 3.11

Resilience definition
Development of a resilience definition and supporting principles

Revised taxonomy
Establishment of a Risk and Resilience Taxonomy setting out structure for allocation of risks

Consolidated lessons learnt from past failures
Review of major events to identify common indicators and lessons learnt

Integrated process map
Mapped Level 1 interfaces and interrelated business processes for resilience



Improved baseline, starting with wastewater
This is a key workstream that drives improved resilience baselines progressively with waste as the first priority

Key individuals and working group
Roles and responsibilities in relation to resilience are agreed together with identification of critical roles and tasks

Deploy supporting tools and systems
Deployment of systems and tools required to support the resilience process. This includes further functionality and controls to improve enterprise-wide management of risk and reporting

Development of resilience metrics, linked to ODIs
Identification of potential resilience analysis/metrics and development of metrics linked to ODIs

1.0 Making the action plan real and deliverable

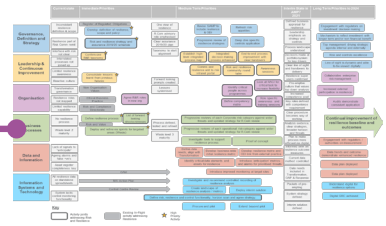
The Resilience Framework and Resilience Action Plan have undergone significant consultation to ensure they address our needs, are understood and are deliverable.

The table below summarises key stakeholder groups that have been engaged:

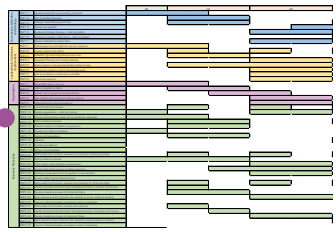
Board Risk Committee	Review in June of gap analysis and initial plan and approval of final Plan.
Board	Review of approach and assurance findings
Resilience Steering Group	Held every 2 weeks and included Directors from Operations, Corporate and Financial functions and key delivery personnel
Customer Challenge Group	Briefing paper and consultation at the July CCG. Regular updates to be provide in future CCG's.
Ofwat	A briefing paper was provided in May 2019 with a subsequent briefing update provided in August along with an engagement meeting
Resilience owners, key staff and action owners	Each Directorate was engaged as part of the gap analysis and road map and subsequent action plan development.
Transformation Programme	Regular sessions with the Transformation team to ensure alignment.
Independent Assurance	PwC provided assurance of draft and final plan approved for submission.

A considered and structured approach has been applied to create a RAP with a number of layers to ensure it is set up for successful delivery.

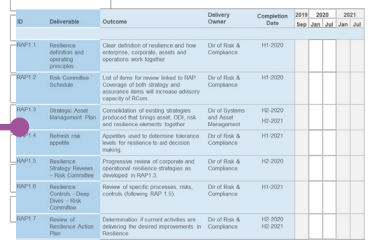
Level 0
Road map
Section 3.11
Our journey to improve resilience



Level 1
PROGRAMME PLAN
Section 5.4
Ordering our plan



Level 2
Work streams
Section 6.0
Structuring our approach



Level 3
Project definition documents
Section 6.0
Detailed charters

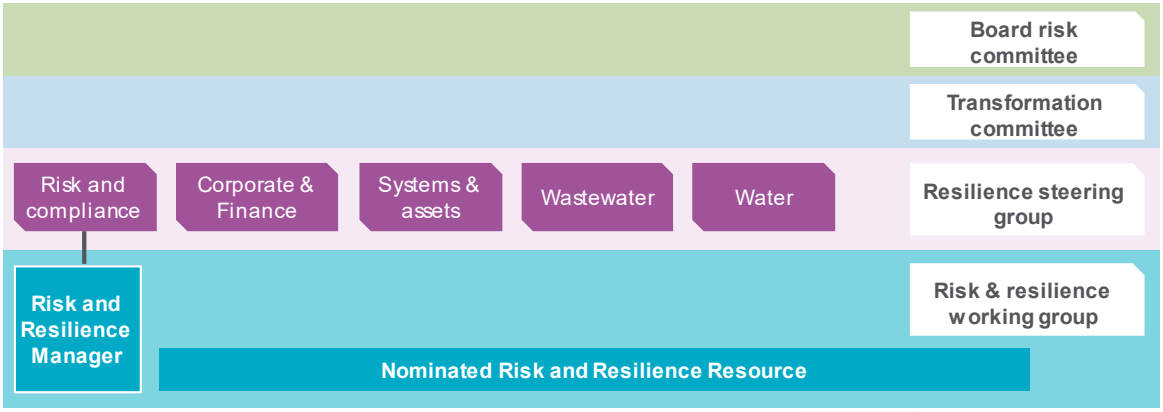
Project Name	Definition, Policy & Strategy	**Project Sponsor**	Dir of Risk & Compliance
Interdependencies	Dependent on – N/A Leads to – RAP1.2	**Action Plan Ref**	RAP1.1 RAP1.3
Background	Southern Water have identified a series of targeted improvements to enhance its current resilience position		
Project Description	Engage with the business by building on the work delivered to-date to develop a definition, scope and policy for resilience. This should then be cascaded into the existing suite of strategies to develop a detailed plan for the Resilience Action Plan.		
Scope	• Enterprise wide (wholesale and retail) • Regulated and non-regulated assets		
Business Case	Resilience lacks a scope and strategy within the business, creating confusion, overlap and duplication of risk management activity. The organisation needs to coalesce around a single view of resilience to help provide a foundation to build business-wide objectives that can be delivered through integrated business processes.		
Constraints	Time		The definition is a critical activity that should be delivered as a priority

1.0 Clear delivery structure and governance

The delivery structure integrates with our existing risk management organisation to form a Working Group that will deliver the Resilience Action Plan.

The delivery structure is outlined below and builds on working practices to date. Key points include:

- The Resilience Steering Group was established in April 2019 with key senior representatives from across our business. A newly formed Working Group is in the process of being established.
- The Director Risk and Compliance is accountable for overseeing the Resilience Framework and the delivery of the Resilience Action Plan. Within this team, there is a manager to drive and coordinate the programme and to provide the necessary enterprise-wide elements of the plan.
- Risk practitioners sit within each of the Corporate and Finance functions, and they will be accountable for undertaking the resilience review actions within the RAP.
- The Director of Systems and Asset Management is responsible for Water and Wastewater service plans that incorporate resilience threats in the round, focusing on potential impact on end-to-end services.
- The Water and the Wastewater directors will be accountable for their respective service response and recovery as well as dealing with operational threats to resilience.



The Risk Committee is the designated governance authority for overall resilience and delivery of the Resilience Action Plan. The Transformation Committee will oversee all change programmes.

Delivery structure and governance

For further information, see Section 5.5 and 5.6

Separate Board Risk and Audit non-executive committees were established in 2019 with the Risk Committee remit including resilience. Members of the Risk Committee have been involved at a number of stages:

- Initial gap analysis;
- Review of gap analysis roadmap;
- Final approval.

A schedule of agenda items relating to resilience is to be reviewed at the Risk Committee in 2020 will be confirmed at the next meeting in 2019.

1.0 Addressing Ofwat's concerns

We have ensured our Resilience Framework and Resilience Action Plan address Ofwat's concerns.

A summary of how we are addressing Ofwat's concerns raised in the IAP test area assessment is shown below and contained within section 4.0.

Addressing Ofwat's concerns

For further information, see Section 4.0

Ofwat concerns	How we are addressing them
There is insufficient evidence of an integrated and systems-based approach to resilience	Our Resilience Framework has been enhanced to strengthen the systems-based approach. A key addition is the pillar and service resilience delivery approach and operating principles.
There is little evidence of a clear and comprehensive baseline resilience maturity assessment	We have undertaken a baseline maturity assessment of our water and wastewater baseline with clear actions to improve maturity within the Resilience Action Plan.
The plan provides little detail that the overall resilience framework and resilience decision making builds on lessons learned in relation to operational and corporate resilience failings	We have revised our Resilience Framework using internal and external research. Lessons learnt analysis of both operational and corporate failings has been undertaken and aligned to improvement in resilience covering the 4Rs.
Little evidence in most necessary areas in relation to resilience of its wastewater business	The wastewater business is prioritised within the RAP to drive improvements and a number of in-flight activities have been deployed in response to lessons learnt around pollution.
The plan provides little evidence on consequences and impacts of risks.	This is a key element of our planned end-to-end resilience process.
The plan is not generally supported by well-defined and stretching common and bespoke PCs	Our IAP response addressed this. As part of the Resilience Action Plan, resilience metrics in addition to ODIs are to be considered with reference to practices and metrics deployed by other sectors.
The plan presents insufficient evidence on the specific schemes being proposed as part of some of the transformational programmes	We have included a table with specific schemes and aligned them to resilience via the 4Rs and to ODIs. We continue to share information with Ofwat regarding our transformational programmes as part of our wider reporting to Ofwat.
It is unclear the company has fully assessed the possible financial impacts of extant regulatory investigations	We have continued to improve our approach toward Financial Resilience and we will continue to evidence our analysis in this area as part of our Draft Determination response on 30 August 2019.

2. Our resilience framework

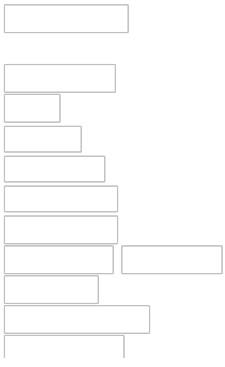
We have updated our resilience framework using external research and to reflect on lessons learnt.

Resilience Definition – Resilience means many things to many people. We have adopted a recognised version including enhanced emphasis on '**anticipation**', reflecting our lessons learnt along with the Cabinet Office 4R's adopted widely by infrastructure organisations.

Resilience Framework – Our external research confirms that resilience is still a **developing discipline** and relatively immature across sectors. We have adopted the more mature elements as the basis for our framework and are committed to continuous improvement and collaboration.

Risk and Resilience Taxonomy – a critical success factor commonly referenced is the need for a clear and consistent taxonomy that covers all areas of the business **in the round.** It provides a structure to connect and aggregate risks across the business.

Pillar and Service Resilience – our research looked outside Infrastructure into the Financial Services sector. Using a systems based approach to deal with **interconnecting risks**, they firstly assess and address 'pillar resilience' (individual resilience risks such as IT or supply chain) and then assess 'service resilience' which aligns all pillar risks to end-to-end services (such as customer payment services).



2.1 Resilience defined and its importance

Resilience has become a top Board agenda item across infrastructure service providers. It is complex and immature in practice, with relatively low organisational capability in most businesses. This presents a clear challenge.

The water sector has placed a high emphasis on resilience in PR19 with Ofwat's focus in "**Resilience in the Round**" launched in their initial document published September 2017 and subsequently the low assessments given to most water companies as part of PR19.

This has been accompanied by a number of high profile **shocks and stresses** across sectors and countries that have caused significant disruption, heightening the importance of resilience in the eyes of public authorities. These ranged from global shocks such as the financial crisis; to public catastrophes such as Grenfell; through to severe disruptions such as snow or drones at airports and the recent freeze-thaw for water companies in 2018.

These events:

- were **unexpected** or not anticipated on the risk radar,
- generally had a number of unlikely **contributing interdependencies** with compounding factors (often referred to as "Black Swans" or "Perfect Storms")
- required significant emergency **response and recovery** involving multiple organisations, agencies and communities.

It is for this reason that Resilience focuses on "shocks, stresses and scenarios" with a systems approach considering interdependencies and effective response, recovery and communication.

Resilience is the capacity of an organisation to plan for and adapt to change or disruption through anticipation, protection, responsive capacity and recoverability

We have applied the Cabinet Office's '4Rs' to the analysis and understanding of resilience baselines and augmented it further with the addition of "Anticipation". This reflects a similar approach set out in the AIRMIC "Roads to Ruin" report.

1. **Anticipation:** the ability to anticipate and prevent by identifying precursory events or increased vulnerability risk.
2. **Resistance:** preventing damage or disruption by strengthening or protecting assets, for example building flood defences to protect transport networks
3. **Reliability:** designing assets to operate under a range of conditions, for example designing electrical cables to operate in extreme temperatures
4. **Redundancy:** making backup installations or spare capacity available in networks and systems to enable operations to be switched or diverted, for example installing back-up data centres
5. **Response and recovery:** understanding the weaknesses in networks and systems and ensure arrangements are in place to respond quickly to restore services

It is worth noting that much analysis is undertaken by water companies on each of these. The challenge is to do it as a system and consider the interdependencies (mutual dependence between 2 or more risks, assets or networks, which impacts their efficient and effective functioning). This is a key element of our framework and approach.

2.2 External research to inform Framework

We have researched a range of external practices across different sectors to design a robust resilience framework

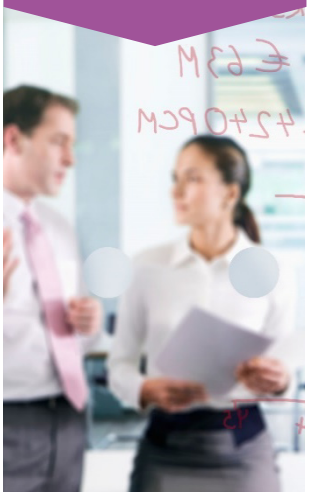
Enhancing the resilience of our services and business is critical given the challenges going forward and increasing expectations of our customers and stakeholders to "**anticipate, absorb, adapt and effectively recovery to change**" and the various threats and stresses we face as a business.

Given this importance, our efforts are self-motivated and go well beyond purely responding to the IAP improvement actions.

In developing our Resilience Framework, we have included **cross-sector research** to provide a number of valuable insights into what makes a good resilience framework. We are committed to converting concepts into **practical change** that enhances the resilience of our business over time.

It is noticeable that most sectors are at the start of the journey with many concepts in publication, with much less evidence of organisations fully 'operationalising' or systemising resilience successfully.

Financial Services



In 2018, the BoE, PRA and FCA published a joint paper, sharing their thinking on Operational Resilience and the ability of the sector to prevent, respond to, recover and learn from operational disruptions.

National Infrastructure Commission

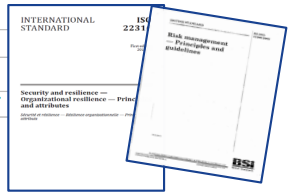
In Spring 2019, the NIC launched a consultation to examine what actions the Government should take to ensure that the UK's infrastructure can cope with future changes, disruptions, shocks and accidents.

PR19

Institutes & International Standards

Government and Public Bodies

External Practice and Research



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2.2 External research to inform Framework

From our review of external practices, a number of common and key findings emerged that have guided the development of our framework.

Governance is critical for effective resilience

Governance of the resilience position must be regularly monitored with clear roles, ownership and lines of responsibility. Flexibility and adaptation to a changing landscape is a necessity.

An integrated risk and resilience framework is recommended with good risk management a key foundation

Sound risk management is essential to improve resilience. However, resilience deals with risks differently and it is critical to clarify and ensure a common understanding within the business. No clear and dominant model for integration of risk and resilience frameworks have been established.

A clear risk taxonomy must be in place in order for risk processes to be effective

A clear and consistent business wide risk taxonomy is required in order for risk processes to be effective. It enables appropriate allocation and aggregation of risks as well as ensuring sufficient coverage.

Systems approach that covers end-to-end resilience

Resilience should be established across end-to-end business services. Business functions should be mapped against these services to understand interlinks and dependencies between systems.

Measured approach with increasing use of resilience thresholds/appetite

Boards should set clear impact tolerance and enterprise wide resilience thresholds. It should be able to measure and report against set tolerance limits.

A culture of resilience must be cultivated internally and externally

A cultural shift is needed in how resilience is perceived and deployed. This is both internal and importantly with external communities to deal with interlinked eco-system challenges.

The concept of resilience needs to be operationalised & systemised

Resilience as a business driver is still relatively immature across organisations, with the review finding much focus on concepts. For it to be effective, it must be integrated into an enterprise operating model, systemised and widely communicated so that it is understood by all.

Decision making must build on learning from the past

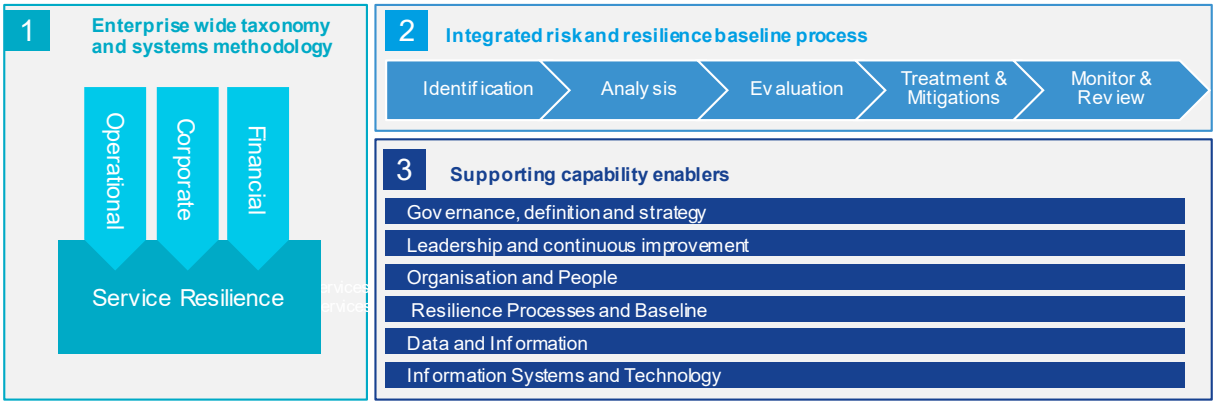
Companies failed to explicitly set out how they had learnt from events in the past in order to develop new and innovative approaches to resilience

Leadership must own and lead resilience

Leadership must take an active role and commit to owning and leading resilience in a visible way. Resilience must be an integral part of their decision making and it must feature prominently in corporate objectives, mission statements and strategies.

2.3 A robust resilience framework to drive change

We have evolved our resilience framework using insight from external research to pick the most mature elements suitable for our business tailored for our specific needs.



1 Taxonomy and systems approach

Summarised in section 2.4

The framework reflects the need for a clearly defined enterprise wide risk and resilience (R&R) hierarchy with a defined structure and accountabilities that applies across the business.

A key benefit of this is the ability to connect, escalate and report R&R analysis from various sources plus clear ownership.

Our systems approach has been enhanced to include external insights from other sectors such as Financial Services to deal with interconnecting risks and the "in the round impact assessment" on service resilience experienced by our customers and communities.

2 Integrated Risk and Resilience Process

Summarised in section 2.5

A defined resilience process is required to ensure consistent and effective resilience baseline assessment and management. The effective application of these process steps will form the basis of the resilience baseline maturity assessment.

The resilience process will be aligned with the high level process steps in ISO31000 Risk Management Standard to enable an integrated approach with risk with specific resilience process steps to cater for the difference between risk and resilience.

3 Supporting capability enablers

Summarised in section 2.6

External research identified that many businesses focused on the technical aspects of risk and failed to address the organisational capability enablers to systemise and improve the way a business manages resilience.

Our framework explicitly covers the need to transform the way the business manages resilience using six recognisable organisation capability elements to drive improvement.

1 2.4 Taxonomy and systems approach

An integrated risk and resiliency taxonomy

A clear taxonomy is critical and performs a number of functions, as it:

- Ensures risk and resilience is integrated by adopting the same hierarchy
- Provides a consistent structure for the whole enterprise to follow and aggregate or consider interconnecting risks
- Provides teams the flexibility and knowledge to use specialist risk tools
- Provides a risk and resilience perspective for the Board across key risk categories
- Ensures the risk assessment is completed against all areas with no gaps present which would undermine the effectiveness of approach

Below is the current draft of our refreshed risk taxonomy with the Action Plan to be finalised by the end of 2019. It is based on internal needs and draws upon structures used in other organisations.

Risk	Level 1	Level 2
Operational Risk	Water	Water Resources
		Water Networks
		Water Treatment
	Customer	Customer Contract Management
		Retail Cost to Serve
		Billing
	Waste	Wastewater Network
		Wastewater Treatment
		Sludge and renewables
Financial Risk	Financial	Economic Risk
		Credit Rating
		Revenue
		Business Risk
Corporate Risk	Compliance	Legal
		Regulatory
		Controls & Assurance
	Climate Change	Adaptation
		Mitigation
	Delivery	AMP7
		AMP8
	IT	Information Security
		Infrastructure
		Governance
	Resources	Workforce
		Chemicals
		Power
	Supply Chain	
	Health and Safety	Well-being
		Safety
		Security
	Corporate Affairs	Legislation
		Government Policy
	Transformation	Technical Change
		People Change

Level 1 represents the key business areas and processes essential to delivering the organisations objectives and services. This is a recognisable approach to risk management and ensures the management team and Executive Team get a view of the relative risks across all the key business areas.

Principal Risks: these are risks that are reported to our Board Risk Committee and Board and are covered by our annual reporting requirements. The principal risks are selected from Level 1 (and may be a combination of level 2 risks) and represent the current business risk . This is due their inherent/residual risk materiality and/or an actual or anticipated change in risk exposure due to external or internal events.

Level 2 represents key Corporate risks at a sub-category level as defined by the Risk Management Policy to be applied across the business and provides the 'key' to cascading risks from across the business onto the corporate risk register.

Level 3 and Level 4 is the structure applied by different level 1 risk owners to reflect the nature of their services and current risk exposure.

Traditional risk management focuses on individual risks based around single owners and statistical analysis of the portfolio. Our systems based approach for resilience applies a method to consider them in the round.

1 2.4 Taxonomy and systems approach

Systems based approach

A key driver for effective resilience management and a key requirement referenced by Ofwat is a systems based approach. We have considered this carefully and our action plan covers this from the two key perspectives:

1. A system of systems approach to analysing resilience
2. Systemising how the business manages resilience

Using external insights to enhance our systems approach

To enhance our systems based approach, we looked at learnings from other sectors, particularly the Banking sector. For context, below is one of our key findings that has influenced our framework and the delivery approach in the action plan to drive improved baseline understanding of Corporate, Financial and Operational Resilience and collective in the round which we refer to as Service Resilience.

Key insight from external research and the Financial Services sector

Following the Global Financial Crisis 2007-2008, the Banks and its Regulators have put significant effort into driving improved resilience. We have looked at some of the concepts deployed in that sector and their approach to interconnected risks was found to be most interesting and relevant.

The approach to resilience covers "Pillar Resilience" and "Service Resilience".

- **Pillar resilience** is the management of specific risk categories such as IT, supply chain, asset maintenance and are typically managed in silos with traditional risk management systems.
- **Service resilience** brings together all the pillars and aligns it to the businesses primary customer service. For a bank, one example given was customer payments services. For Southern Water, this is the equivalent of Water Services, Waste Service and Customer Services.

This approach has two key benefits:

- It allows resilience risks in the round to be assessed as a system against customer centric service lines;
- It provides a practical delivery approach, with business unit owners determining resilience against direct shocks and stresses within their areas using embedded risk processes and for our Water, Wastewater and Customer service Directors to determine service resilience from direct shocks and stresses to operations plus the indirect impacts from Corporate and Financial events.

1. System of systems approach to analysing resilience

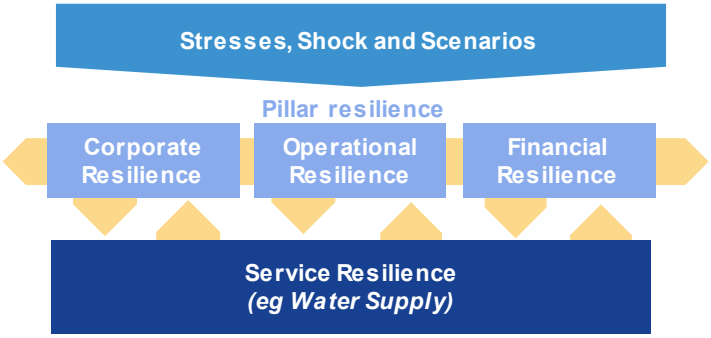
Our system of systems approach covers how resilience in the round will be assessed against the three resilience categories of financial, corporate and operational as a whole and how the underlying infrastructure network will be considered as a system.

In our approach, we consider how our business enterprise (i.e. our system) is resilient to a wide range of shocks, stresses and scenarios from other "systems".

1 2.4 Taxonomy and systems approach

1. System of systems approach to analysing resilience (continued)

Our systems based approach and the delivery plan (work stream 3.0) has incorporated the pillar and service resilience baseline assessment as shown below with increasing use of techniques to understand cascading impacts and plausible multi-event scenarios.



Manage cascading or additional impacts and plausible scenarios of multiple events

An example of cascading impact

- Restricted water abstraction licences
- New Drought permits required annually
- Additional resource and financial commitment
- Temporary Use Bans restrictions
- Spike in complaints/ contact
- Customer and IT system issues
- Multiple pillar and service resilience scenario to mitigate

This approach has already been deployed for our Water Services with the development of a Water Service Zonal Resilience Model. The current model covers six priority resilience areas (shown below) with the Action Plan to extend the coverage across a wider set of shocks, stresses and scenarios.

	Pillar Resilience
Corporate	Cyber
	Climate – flooding
	Water contamination
Operational	Asset failure
	Raw water quality
	Malicious damage

Service Resilience
Water supply resilience

The model undertakes a 4R assessment for each of the six pillars for every water site, understanding impacts from a zonal system perspective.

The other concept within our system of systems approach is the evaluation of the infrastructure network from a systems perspective. This applies network and nodal consequence analysis at an asset, site, catchment, zonal and inter-zonal perspective to understand as a system how resilient the services are from a system perspective. A simple example is if the failure of a water treatment works considers alternate supplies to understand network redundancy – it doesn't just consider the standalone redundancy of the site. This is built into our resilience process in section 2.5.

2. Systemising how the business manages resilience

Our framework places significant emphasis on ensuring the business takes a systemised approach to resilience management and is covered in section 2.6 on our capability enablers.

2 2.5 Integrated risk and resilience process (including baseline assessment)

We will align the resilience process and risk process to the same high level process steps

A key objective in developing the Resilience Framework is the alignment with our established risk management process, system and governance.

We have achieved this by designing our new resilience process within the well recognised high level process steps in the ISO31000 Risk Management Standard as demonstrated by the integrated process to the right.

ISO31000 Risk Management Process	SWS Resilience Process
1. Identify	RACI / Governance clear (including interrelated risks)
	Key outcomes for resilience defined
	Shocks and treats identified along with scenarios and interdependences
2. Analysis	System Criticality evaluated
	Level of Protection to Shock / Threat at Site and in System
	Response effectiveness quantified
3. Evaluate	Current resilience baseline evaluated
	Tolerability evaluated and priorities selected for enhancement
4. Mitigation & Treatment	Resilience strategy with enhancement options
	Specific interventions in current AMP7 baseline
5. Monitor & Review	Monitoring to pre-empt and identify failure
	Regular reviews at all levels

A tailored resilience process that fits into the risk management system

This initial resilience process has been defined based on best available practices available including the Cabinets Office guidance on resilience, practices within Infrastructure and appropriate elements from other sectors. Key design principles include:

- The use of the 4R's to understand the level of resilience against shocks, stresses and scenarios
- Increased emphasis on anticipation, as a critical factor for high resilient organisations
- The use of criticality that relates to business impacts such as the measure of number of properties affected
- Increasing time horizon of threats to consider longer term stress such as climate and carbon

Resilience baseline maturity assessment

The current water and wastewater baseline maturity has been measured against this defined process with a graduated maturity scale measuring effectiveness that considers the degree of a systems based approach adopted, the level of evidence used (as opposed to knowledge) and completeness.

The maturity assessment is shown in section 3.0 and drives the Action Plan (Work stream RAP4.0 in section 6.0 of this document) to drive towards improved understanding the baseline risk of the water and wastewater operational activities that considers operational, corporate and financial aspects.

Application of resilience process to Corporate and Finance Resilience

The process to understand financial resilience already exists and the RAP includes actions to improve resilience understanding for Corporate Resilience with the following key design principles:

- Increasing the long-term view using recognised scanning techniques
- Increasing the coverage of stresses, shocks and scenarios

3 2.6 Supporting capability enablers

Our external research shows that embedding organisational capability for resilience is key

This has driven our resilience framework to contain organisational capability as a key element of the framework. The maturity model to understand organisational resilience capability is shown below and is based on recognised organisational capability change models adopted for many transformations.

A gap analysis has been undertaken against these capability enablers and is shown in section 3.0 of this document. This has driven the actions with the RAP to drive a more resilient business and systemise the way we manage resilience.

The work streams within our Action Plan are based around the six elements below to provide a clear line of sight. The RAP 4.0 work stream covering the risk process and baseline covers the improvement of resilience baselines and maturity.

3 Supporting capability enablers	Key elements of capability			
Governance, definition and strategy (RAP1.0 workstream in RAP)	Policy and Strategy	Operating Principles	Governance Structure	Management Reviews, Audit & Compliance
Leadership and continuous improvement (RAP2.0 workstream in RAP)	Business Planning	Stakeholders	Change Management	Communication
Organisation and People (RAP3.0 workstream in RAP)	Organisation design & team structure	Team / role descriptions	Organisation culture & behaviours	Capability and Training
Resilience Processes and Baseline (RAP4.0 workstream in RAP)	End to end resilience process & procedures	Integration with business processes	Clear decision making and controls	Method and procedure for financial and corporate
Data and Information (RAP5.0 workstream in RAP)	Data & Information Strategy	Data & Information Ownership		
Information Systems and Technology (RAP6.0 workstream in RAP)	Information Systems Strategy	Information Systems Landscape	Information Systems Operation	

3.0 Driving a more resilient business

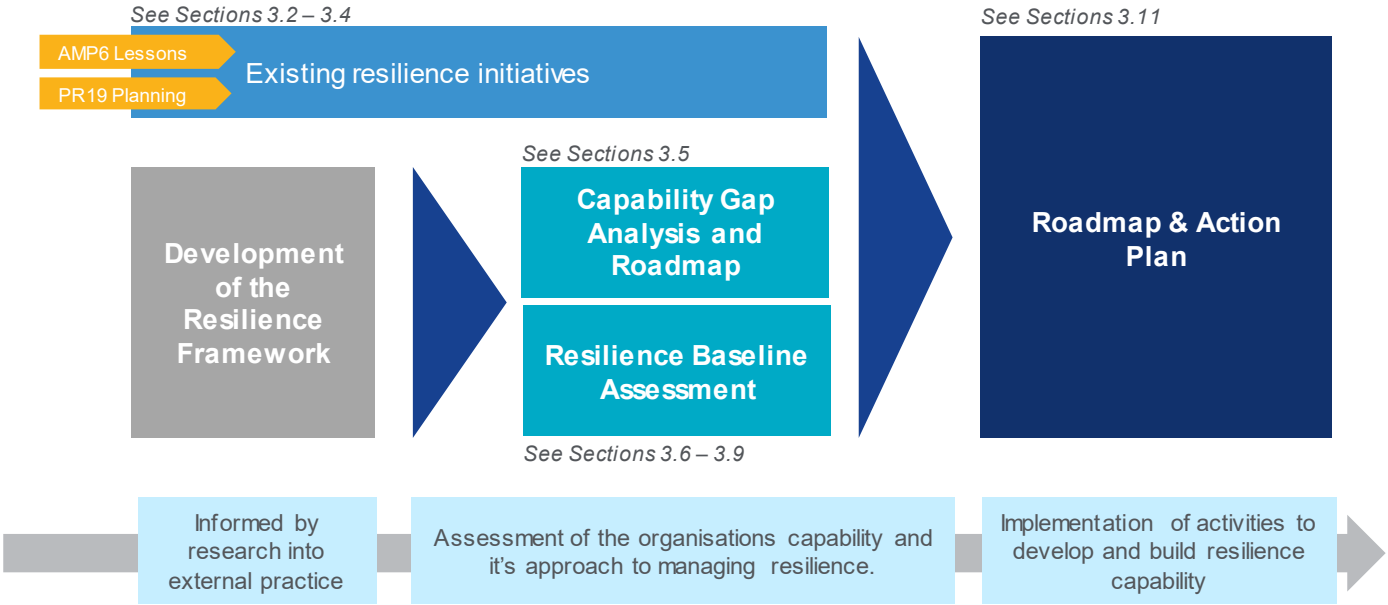
We have updated our Resilience Framework based on a review of insight, best practice and lessons learnt.

- **Approach** – as part of our PR19 plan development and business wide transformation, a significant investment has been made to increase our overall resilience. As part of our response Resilience Action Plan, we have completed a gap analysis against our Resilience Framework to identify improvements that will **systemise** how we manage resilience as a business.
- **Lessons Learnt** – our review of previous events included in our IAP found **that poor recovery and response** and **poor reliability** were the key causes of incidents and better anticipation could have avoided significant failures.
- **In-flight Activity** – we are investing time and effort into **improving and enhancing** our resilience. We have mapped a number of our PR19 activities and in-flight transformation programmes across the Cabinet Office 4Rs.
- **Gap Analysis** – Using our framework, we have conducted an assessment of capability across 21 key enablers and a maturity assessment of our resilience baseline. The outputs from this assessment have informed the development of a road map to improve resilience.

3.1 Our approach

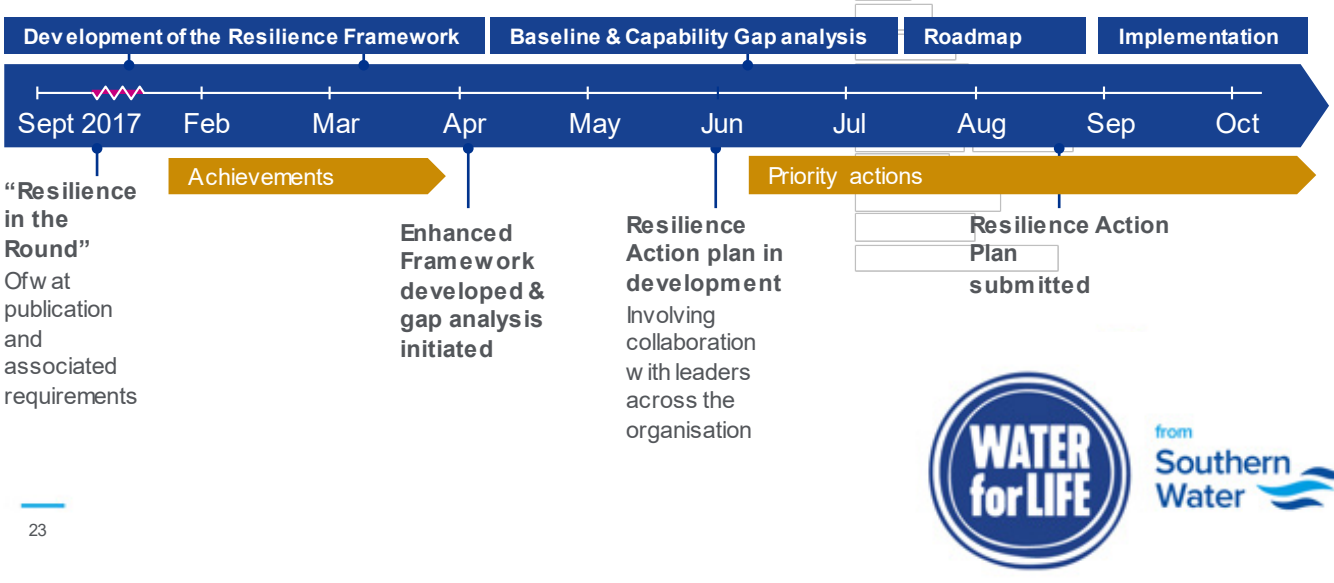
We have undertaken a gap analysis against our Resilience Framework to inform our RAP. This analysis allows us to address both the organisational capability needs and to improve our resilience baseline understanding across Financial, Corporate and Operational activities.

The purpose of the gap analysis is to identify improvements to drive through the Resilience Action Plan. It will also reflect the significant work going on in the business to improve resilience and risk across a number of change initiatives.



Our journey to August 22nd

Immediate priority actions identified within this gap analysis are included within our Resilience Action Plan and work has commenced to progress these.



3.2 In-flight activity from lessons learnt

Enhanced anticipation and reliability will avoid repeat resilience failures

Our March IAP[1] response contained a section that looked across past failures (columns a-p) and further analysis below provides a summary of the key causes linked with the 4R's or resilience plus anticipation. These range from the freeze-thaw and pollution events through to our interactive voice recognition software disrupting the customer payment process (creating a surge in call volumes) and our past misreporting of performance at our wastewater treatment works. A number of programmes are now in flight that will help address and reduce the causes to improve our resilience going forward.

Lessons from past resilience failures

Lessons from past resilience failures				Water Incidents						Waste Incidents								Corporate		
Resilience Control Category	Count		Resilience control failure	a	b	c	d	e	f	g	h	i	j	k	l	m	n	o	p	q
Anticipation	15	8	Alarm / sensor failure	●						●	●	●			●	●	●	●		
		6	Pre-empting shock or high risk scenario	●	●	●		●	●						●					
		1	Planned work reducing resilience	●																
Resistance	1	1	Controls and systems																●	
Reliability	16	8	Ineffective O&M	●		●	●	●				●	●	●			●			
		5	Multiple asset failure	●				●								●	●	●		
		2	Asset protection process		●						●									
		1	Culture and Training																●	
Redundancy	6	3	Power or asset redundancy	●												●				●
			Limited backup capability																	●
		2	Loss of storage capacity (known)			●		●												
		1	Assurance																●	
Response & Recovery	8	7	Delayed response	●	●	●			●									●	●	●
		1	Limited supplies / alternate provision of services	●																●

Headline findings:

A review of past resilience failures find a number of common systematic issues that will be remedied by :

- **Recovery and response** – more effective response: quicker with more integrated communications
- **Anticipation** – linked to the above; the proper working of alarms or introduction of lead metrics to respond quickly or to anticipate and prevent by identifying precursory events or increased vulnerability risk.
- **Reliability** – the proper function of the network as designed. This covers both the effective operations and maintenance of the network and investment in the asset based to reduced level of asset unavailability.

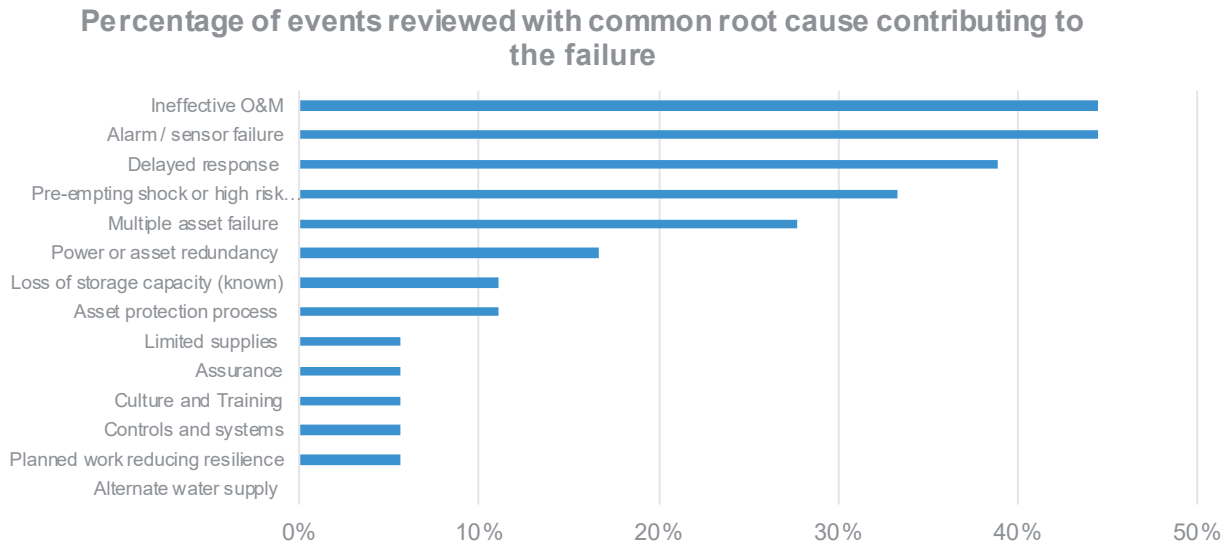
We have significant transformations in place to deal with these causes as shown in section 3.3.

Resilience Event	
a	Freeze thaw
b	[redacted] WSR
c	Southampton Discolouration
d	[redacted] WSW ingress
e	[redacted] WSZ, Loss of Supply
f	[redacted] WSZ, "Do Not Use" Notice
g	[redacted] WwTW (West Sussex)
h	[redacted], Lyndhurst WPS
i	[redacted] Uckfield
j	[redacted] WwTW (Kent)
k	[redacted] South
l	[redacted], Canterbury (Kent)
m	[redacted] WwTW, Ashford (Kent)
n	[redacted] WPS (Hampshire)
o	Interactive Voice Recognition system failure
p	WW treatment work performance reporting
q	Data centre power failure

[1] IAP Technical Annex 8 Accounting for past delivery

3.3 In-flight activity from lessons learnt

When looking at these findings in more detail, between one third and one half of these events could have been avoided by addressing the top five symptoms of failure.



In-flight improvement programmes that are addressing common causes of failure

The table below aligns key initiatives to rectify issues from past failures:

Cause	In-flight initiative	Relevant focus of initiative
Ineffective O&M	▪ Operational Excellence ▪ Water First ▪ Environment+	Focused on the effective deployment of operational control and maintenance that would have avoided event / consequence
Alarm and Sensor Failure Delayed Response	▪ Alarm and control centre transformations ▪ Incident response improvement project ▪ Business Continuity Improvement ▪ Alarms closed out initiative	A number of key business initiatives are in place to improve the anticipation, detection and response to potential or actual resilience events.
Pre-empting shocks and high risk scenarios	▪ Risk and value project and resilience plan	Better risk and resilience management to pre-empt and avoid or reduce impact
Multiple asset failure	▪ Asset investment in AMP7	Ongoing investment in asset base using a risk based approach to address priority investments from a resilience perspective. We are employing a new approach “Causal Analysis based on System Theory” (CAST) where we assess the physical processes that contributed to an asset failure and the actions/decision making taken.

3.4 Inflight activities and line of sight

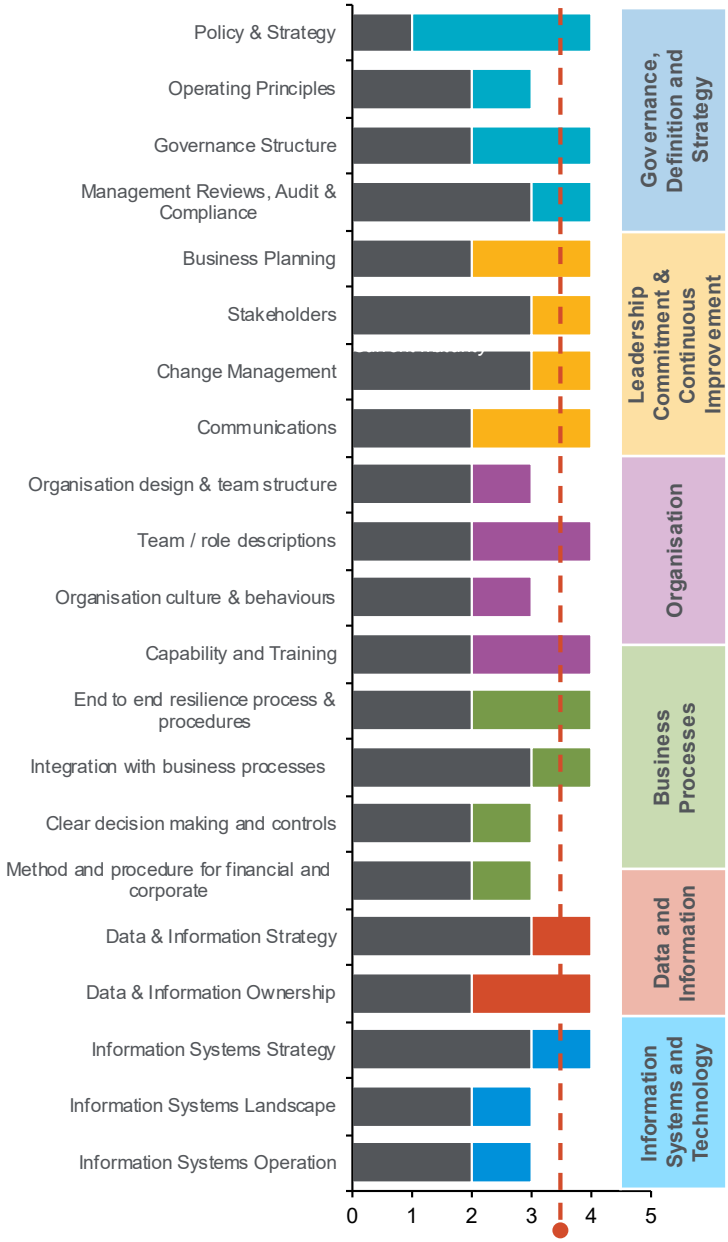
Building on our lessons learnt and through our Resilience Action Plan, we are investing time and effort into improving and enhancing our resilience.

In mapping our activities across the Cabinet Offices' 4Rs of resilience (Resistance, Reliability, Redundancy, Response & Recovery), we are able to understand how they will improve our position, with the benefit either directly or indirectly linking to one of our ODI's. Further information can be found in in Appendix C.

Activity/Treatment/Control	Programme	Anticipation	Resistance	Reliability	Redundancy	Response & Recovery	ODI Benefit or other tracking measure
Construct new service reservoir	Havant Thicket Service Reservoir		●				Water Supply Resilience
Hampshire Regional Grid	Water Resources				●		Water Supply Resilience
PCC reduction	Target100				●		PCC Target 100
Drought Plan procedures	Drought Plan					●	Risk of severe restrictions in a drought
Monitoring and control	Network 2030	●	●				Properties at risk of low pressure
Mains flushing	Water distribution			●			CRI, ERI
Replacement of lead pipes	Lead Pipe replacement programme		●				CRI
WTW investment	Water First			●			CRI, ERI
Hazrev inspections	Water First	●					CRI, ERI
Catchment management	Catchment First, Water First	●		●			CRI, ERI
Refreshed Water Services Manual	Water First			●		●	CRI/ERI
Training Videos	Water First			●		●	CRI/ERI
Site Manuals	Water First			●		●	CRI/ERI
Waste Pumping stations	Conditions based maintenance			●			Pollution Incidents, Serious pollution incidents
Mobile Generation/Power Network	Energy Resilience					●	Pollution Incidents, ERI
Joint Emergency Response & Recovery Plans	Incident Response Framework					●	Water Supply Interruptions, Serious pollution
Contingency Planning	Incident Response					●	Water Supply Interruptions Pollution Incidents
Data and analytics	Drainage 2030		●				Pollution Incidents & Serious pollution
Collaborative Planning	Drainage 2030				●		Surface Water Management
Data and analytics	Drainage 2030		●				Pollution Incidents & Serious pollution
Collaborative Planning	Drainage 2030				●		Surface Water Management
WTW Site Audits	Environment +			●			Reduction in outstanding issues at sites, Compliance, reduction in regulatory risk
Event Monitor Testing	Environment +	●		●			Improved levels of reporting, reduction in regulatory risk
Hub Implementation	Operational Excellence			●		●	Reduction in volume of high priority reactive work
Focus on Core Skills	Operational Excellent			●			Reduction in YTD maintenance spend, CRI, ERI, pollution
Network Modelling	Control Centre Review	●					Reduction in hydraulic issues
Alarm Quality	Control Centre Review			●			Reduction in duplicate alarms, ERI, pollution, compliance
Response Teams and Incident Structure	Incident Management					●	Incident response time improvements
Incident Roles and Responsibilities	Incident Management					●	Incident response time improvements
Scada/PLCHMI Asset Modernisations	IT	●	●	●		●	NIS Compliance/ICF Assessment
New Data Centre	IT				●	●	NIS Compliance/ICF Assessment
Security Transformation	IT	●	●		●		NIS Compliance/ICF Assessment
Register of Obligations	Modern Compliance Framework	●	●				Reduction in regulatory risk, Compliance
Ethical Business Practice & Code of Ethics	Modern Compliance Framework		●				Reduction in regulatory risk, Compliance Employee engagement

3.5 Capability gap analysis and RAP

We have conducted an assessment against the Capability Model within our Resilience Framework to understand our current position and define actions needed in the Resilience Action Plan to achieve an initial target state by end of 2022. The capability model and RAP will be reviewed annually.



Key

Current maturity

Target Maturity at Interim State

Target Maturity at Interim State

This have been set to reflect deliverability of the plan

1	2	3	4	5
Poor	Partial	Adequate	Good	Excellent

Build on good practice developments in risk management by incorporating resilience – Significant improvements in risk can be seen in the form of the new Risk Committee, Modern Compliance Framework and the Risk and Value (R&V) project. However, resilience is not the same as risk and there is an immediate need to define and communicate resilience to the wider business, its scope and governance, and how it operates alongside risk.

Clarify the line of sight from analysis to plan, and build resilience into integrated business planning and decision-making processes – The business appraisal of resilience needs refining, given it is more akin to safety with thresholds than a monetised risk-based decision-making approach. Clear accountability and handovers of resilience to maintenance, business continuity planning, incident response, capital delivery is required.

Drive a more strategic and system-wide risk management culture and increase competence base – strategic, systems-based approach is required to be more effective, in decision making, pre-empting the next issue and allocating resource effort effectively. There are significant dependencies on a small number of key staff with the required competencies.

Systemise pockets of excellence to build organisation-wide process and people capabilities – Good practice analysis is undertaken as part of specific projects to assess resilience. Deeper analysis exists but is not brought together for a systemised approach. There is an urgent need to define the resilience business process and provide awareness, guidance and training to make it business as usual and integrated throughout the whole organisation.

Lack of management information remains an obstacle towards effective management of resilience – The business must take action to identify critical data and apportion clear ownership and accountability for its ongoing management and improvement of resilience.

Execute agreed controls and treatments – The controls mentioned were predominantly preventative mitigations and the response and recovery to alarms/events. The business must continue to implement its IT strategy and improvements across its infrastructure if it is to successfully improve its resilience position and remain compliant.

3.6 Maturity assessment of resilience baseline

Our maturity assessment of the water and wastewater resilience baseline and its effectiveness against the end-to-end process in the Resilience Framework informs the priorities for our Resilience Action Plan.

This improvement plan is shown in the 'RAP4.0 Resilience Process and Baseline' work stream in section 6.0.

The methodology and rating scheme adopted

Our Resilience Framework sets out a resilience process to be deployed for water and wastewater services and is repeated below along with the maturity rating scale:

Methodology Steps

1. Identify	RACI / Governance clear (including interrelated risks)
	Key outcomes for resilience defined
	Shocks and treats identified along with scenarios and interdependences
2. Analysis	System Criticality evaluated
	Level of Protection to Shock / Threat at Site and in System
	Response effectiveness quantified
3. Evaluate	Current resilience baseline evaluated
	Tolerability evaluated and priorities selected for enhancement
4. Mitigation & Treatment	Resilience strategy with enhancement options
	Specific interventions in current AMP7 baseline
5. Monitor & Review	Monitoring to pre-empt and identify failure
	Regular reviews at all levels

Rating Scheme

5	The process is highly digitised and automated within a system to be more efficient and responsive.
4	This process step follows good practice, it is clearly defined and documented. There is evidence that it is applied systematically and consistently, with a more manual process.
3	The organisation has applied analysis to establish a baseline position. The analysis takes account of the 4Rs individual and as a collective to understand resilience at a local level and within the operational system/network. A resilience baseline uses 'local rules' and needs improvement. Line of sight from analysis through to mitigations, treatments and outcomes has been established.
2	Analysis has been applied that understands individual elements of the 4R's but not been combined to understand systemised resilience and in the round. A plan is in place to establish a systems view of resilience
1	The organisation is aware of a shortfall and plans are not in place to rectify to the position.

The RAP is to address short-falls in the current resilience baseline maturity is covered in **Work stream 4 – Resilience processes and baseline**.
All areas to achieve a Maturity Level of 3 as a minimum and a spread of Maturity Level 4 across a number of areas which will be prioritised as our implementation continues to mature.

3.6 Maturity assessment of resilience baseline

Maturity assessment – Water

Below is the current maturity assessment for Water which will be refreshed by December 2019 as part of the Action Plan to initiate the risk process improvement plan.

		IDENTIFY			ANALYSIS			EVALUATE		MITIGATIONS & TREATMENTS		MONITOR & REVIEW		
Outcome or service failure	Shocks and stresses currently covered	Enterprise RACI / Governance	Key resilience categories	Key shocks and stresses	Criticality	Protection Level	Respond & Recovery Effective-Ness	Current resilience baseline	Tolerance level evaluation	Resilience options strategy	Line of sight to AMP7 Plan	Monitoring of lead & lag indicators	Periodic Review and Governance	Average Maturity Rating
Water quality	Various	2	4	3	4	3	3	2	1	2	3	3	4	3.0
Water Supply interruption	Flooding			2	4	4*	3	3	2	2	3	3	4	3.1
	Critical Asset Failure				4	3	3	3	2	2	3	1	4	2.9
	Contamination				4	4*	3	3	2	2	3	3	4	3.2
	Raw Water Loss				4	4*	3	3	2	2	3	3	4	3.2
	Malicious Damage				4	4*	3	3	2	2	3	3	4	3.2
	Cyber Security Incident				4	4*	3	3	2	2	3	3	4	3.2
Water resources	Drought			4	3	3	3	2	4	4	3	4	4	3.4
	Deployable output across zones			2	3	2	3	2	2	4	3	3	4	2.8
	Leakage			1	3	2	3	*Key finding is to test scenarios outside of assumed performance*						2.3
	Seasonal demand			3	3	3	3	2	3	4	3	4	4	3.2
	Long term demand			4	3	3	3	2	3	4	3	3	4	3.2
Average		**2.7**			**3.4**			**3.0**		**2.4**		**3.5**		**3.3**

Key findings

The analysis of resilience across water shows that it is more developed than wastewater and has areas of good practice (rating 4). Some important areas of improvement identified focus on water resource scenario planning around leakage and inter-zonal water disruption resilience. The zonal water resilience model developed 2018–19 for supply is current good practice. It will be extended to cover more shocks and stresses. Its application to wastewater has started with an initial pilot.

Identify 2.7

While threats identified include corporate risks, non-asset risks and some forward looking measures, a longer list of threats and stresses 'in the round' are to be considered and evaluated in the RAP. Interconnecting risk analysis between long-term water resources and water supply is to be strengthened as part of new operating principles.

Analysis 3.4

Generally an area of strength for the threats covered. Water resources analysis of leakage should include scenarios where the leakage target is not meant to understand consequence. The other key improvement is better inter-zonal modelling of strategic water resources.

Evaluate 2.4

The zonal assessment methodology creates a common resilience metric which is adequate for prioritising. As with wastewater, a business-wide approach to evaluating if resilience is acceptable or requires enhancement, and the level of enhancement (vs cost:benefit) is necessary. The RAP covers these items.

Treatment & Mitigations 3.1

The zonal water assessment identified a number of enhancements. These treatments, mitigations and controls have been recorded within XeroRisk (the Corporate Risk system) providing corporate transparency and control. The integration of resilience decision making within the overarching Integrated Decision Making Framework is within the RAP to achieve 4 in this area.

Monitor & Review 3.5

Asset condition monitoring is a key metric for managing asset related outages that needs improvement. The WRMP provides good governance around water quality and resources. The inclusion of zonal assessments within XeroRisk provides corporate coverage.

Action Plan

Detailed activities to improve our overall maturity baseline are set out in RAP4.2 (P61). Our goal is to achieve Maturity Level 3 as a minimum with a spread of Maturity Level 4 across prioritised areas

* This was assessed as being maturity level 4 - current good practice as it assesses each of the 4 R's for each and every site for the identified resilience threats. Going forward, the criteria used is to be become more data based to maintain a 4 rating to reflect what good practice will look like.

3.6 Maturity assessment of resilience baseline

Maturity assessment – Wastewater

Below is the current maturity assessment for Wastewater which will be refreshed by December 2019 as part of the Resilience Action Plan to initiate the risk process improvement plan.

		IDENTIFY			ANALYSIS			EVALUATE		MITIGATIONS & TREATMENTS		MONITOR & REVIEW		
Outcome or service failure	Shocks and stresses currently covered	Enterprise RACI / Governance	Key resilience categories	Key shocks and stresses	Criticality	Protection Level	Respond & Recovery Effective-ness	Current resilience baseline	Tolerance level evaluation	Resilience options strategy	Line of sight to AMP7 Plan	Monitoring of lead & lag indicators	Periodic Review and Governance	Average Maturity Rating
Pollution	22 historical causes			3	3	2	3	1	1	3	2	2	2	2.3
Flooding - Int	10 historical causes			3	3	2	2	1	1	3	2	2	2	2.1
Effluent quality	21 historical causes			3	3	2	2	1	1	3	3	3	2	2.3
Flooding - Ext	Fluvial flooding	3	3											
	10 historical causes			1	1	1	1	1	1	2	2	1	2	1.3
Sludge quality	Causes less structured			2	3	2	2	1	1	3	2	3	2	2.1
Renewables	Causes less structured			2	3	2	2	1	1	3	2	2	2	2.0
	Average	**3.0**	**2.4**			**2.2**		**1.0**		**2.5**		**2.1**		**2.0**

Key findings

Whilst Wastewater was found to have a lower level of maturity, particularly in the evaluation phase, pockets of good practice exist where significant analysis of the various parameters is undertaken. Improvements must be made to review and develop mitigations and treatments as a system, rather than in isolation of one another.

Identify 2.4	Threats identified are based on historical causes of failure. The RAP will need to expand the cover of potential shocks and stresses to include more unexpected events, long-term stresses and corporate risks which could cause significant disruption to operations. Management of interrelated corporate risks that impact operations need clarity.
Analysis 2.2	Critical locations have been identified. Standalone analysis exists covering elements of resilience (reliability, redundancy, recovery). The RAP will combine these elements to create a system-based view of resilience.
Evaluate 1.0	An evaluation metric for resilience needs to be defined and a business-wide appraisal method agreed to evaluate if current resilience levels are tolerable or if enhancement should be considered. This is included within the Resilience Action Plan.
Treatment & Mitigations 2.5	Schemes and strategies have been defined for AMP7 that consider a range of options. These are based on past risks and performance issues and future capacity needs. The RAP will need to link improved line of sight to underlying resilience analysis and create an overarching resilience strategy, with clear options and policy recommendations.
Monitor & Review 2.1	Governance and review is undertaken at local and operational level. The interaction between the operational resilience issues and the corporate risk register is disjointed. The RAP will improve process and governance and introduce the use of lead indicators to anticipate needs, to be incorporated in the medium term.

Action Plan

Detailed activities to improve our overall maturity baseline are set out in RAP4.1, (P60). Our goal is to achieve Maturity Level 3 as a minimum with a spread of Maturity Level 4 across prioritised areas

3.7 Corporate resilience review

Corporate resilience review and Resilience Action Plan

A review of the Corporate Risk Register has been completed with individual business risk owners to understand current maturity levels and to identify improvements to be included within the Resilience Action Plan.

As part of the plan, all the corporate risks areas will be reviewed to provide a more up-to-date view of potential shocks and stressed and associated timelines, whether short or long term. These reviews will include the impact on the Water, Wastewater and Customer systems and ensure they are all talking to each other.

Key findings:

- Financial, Brexit and Cyber risks have all had a detailed external review against the current resilience baseline, and recommended actions have been identified.
- A key element of our Risk Management Systems is the explicit reference and consideration of High Impact Low Likelihood (HILLs) risks. This method is to ensure high-impact events are considered, regardless of the likelihood (frequency).
- The Board and Risk Committee review both high risks along with relevant HILLs
- Risk appetites have been defined and are measured against covering all principal risks including water and wastewater services.

A high level review of the risks on the corporate risk register was also undertaken to understand potential timelines. The results are shown below.

Corporate Risks	Risks registered	Board Dashboard High Risks	Resilience 'HILL' risks	0 - 2yrs	2 - 5yrs	5+ years
Compliance and Asset resilience	42	14	1	14	6	22
Customer Commercial and Innovation	89	14	4	15	24	50
Engineering and construction	18	6	0	6	6	6
Financing	19	1	1	0	1	18
Health & Safety	12	1	1	0	8	4
Legal	10	0	0	5	0	5
Operations	69	19	3	2	13	53
Strategy	20	5	2	1	0	19
Info security and IT	61	14	2	40	21	0

3.7 Corporate and financial resilience review

Corporate Resilience (continued)

A progressive programme to refresh corporate resilience risk is included within the RAP and includes a number of insight findings to enhance our planning. These include:

- The identification and management of causal factors – individual threats and shocks and stresses over varying time horizons.
- The management of master scenario events – combination of threats.
- The management of "inject" scenarios – handling of other escalated incidents that could arise during the response to an identified scenario.
- Assessment of longer term risks and use of horizon-scanning and scenario-planning techniques.

Longer cycle risk and resilience analysis and planning

There are a number of significant longer term resilience risks (10 years ahead or more) that have been identified, where the long lead time required to implement potential solutions or mitigations means that action needs to be taken now.

Our new processes and plans need to include an understanding of these pressures, and the pace at which they could change. For example climate change, increasing populations, changing demographics and technology need to be assessed as part of an ongoing risk review. Any potential impact upon operational resilience needs to be understood to ensure we can continue to provide an acceptable level of service to our customers.

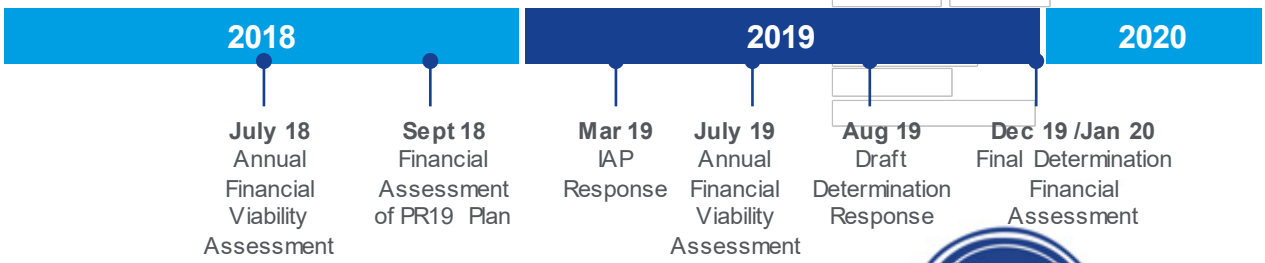
The time needed to mitigate these risks will also need to be taken into account. An example is carbon. To achieve a carbon neutrality by 2050, one mitigation may be the planting of trees to achieve the net zero position. These trees need to be a mature enough (c. 10 years) to be considered under the carbon neutrality scheme. This long lead time requires early anticipation and action. This is expanded upon in section 3.9.

Action Plan

Detailed activities to improve our overall approach to Corporate Resilience are set out in RAP4.3. Actions to review our tolerance levels for resilience are set out in RAP1.4.

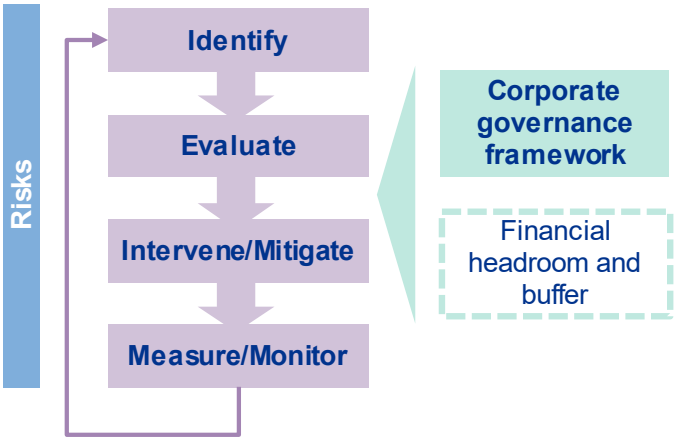
Financial Resilience Reviews

There have been a number of financial resilience reviews undertaken as part of the PR19 process as illustrated below plus the annual financial viability assessment required for our Annual Accounts.



3.8 Financial resilience review

The approach to long term financial resilience is underpinned by regular and detailed consideration of forecast cash flows, risks, liquidity and operational scenarios that form part of business as usual risk management processes of the company.



- In assessing viability (over a 10 year period) the directors of Southern Water take into account the financial impact of principal risks (in severe but plausible downsides).
- Risk assessments are based on outputs from 'top down' and 'bottom up' risk reviews and ongoing monitoring processes.
- Risks are reviewed each month and those considered most critical are escalated to Executive Leadership Team, the Board and the Risk Committee.

The formal process for ongoing monitoring of financial resilience includes:

- Twice annual investor reports as mandated under our WBS
- At least annual meetings with credit rating agencies
- Monthly Financial Modelling Steering Group (FMSG)
- Weekly ELT meetings covering key business activity and impact on finances
- Annual reporting process (including LTVS)
- Maintaining the current status on the Corporate risk register
- Financial resilience Governance remits relating to Financial Resilience of the Audit Committee meetings, Risk Committee and SWS Board meetings
- Our annual budget, and execution plan update
- Monthly reporting of key financial and operational KPI's to ELT and the Board

Key analysis required

Credit rating simulation
Whether financial metrics are in line with the rating agencies' thresholds for target credit rating, and interpretation of rating agency methodologies and adjustments

Analysis of risk exposure
Identification of risks, quantification of probabilities, analysis of correlation and covariance, quantification of risk impact (severe, plausible, reasonable) and development of scenarios

Stress testing
Analysis of impact of downside scenarios on credit rating, liquidity, equity returns and overall financial resilience and consideration of mitigating actions

Compliance with Ofwat requirements and best practice
Addressing new Ofwat requirements (such as extending analysis across multiple AMPs), drawing lessons from best practice e.g. FRC case studies

3.8 Financial resilience review

A suite of actions are available to the company to address financeability.

With the exception of PAYG and run-off rates, the actions can be applied both pre and post event:

1. The use of PAYG and RCV run-off levers to move revenue between control periods on an NPV-neutral basis (where it does not lead to a material depletion of the RCV and where there is sufficient evidence of customer support for the resulting bill profile). Critically, this lever can only be applied at price control resets and is effectively locked in for 5 years;
2. The application of a flexible dividend policy that is solely at the discretion of the Southern Water Services Board;
3. Changes in debt structure, including amendments to the inflation-linked swaps and Artesian finance being considered by Southern.
4. Whilst Southern does not anticipate further equity injections being required following the recently completed strategic refinancing, provision of further equity always remains a possibility where significant downside risk materialises that cannot be mitigated through other means;
5. Maintenance of sufficient cash reserves and liquidity facilities to finance operations for at least 12 months (a combination of cash and committed undrawn bank facilities totalling £577m at 31 March 2019);
6. Continuing access to significant liquidity via a committed Revolving Credit Facility (£330m) and a Debt Service Reserve Liquidity Facility (£103m) for a period of 5 years (with two optional 12-month extensions);
7. The Greensands financing companies also maintain liquidity facilities (£140m) which can provide a short-term source of finance;
8. A limit on the aggregate nominal value of debt maturities (should not exceed 40% of RCV in any single regulatory period and 20% of RCV in any 24 months).

A recent example of strategic refinancing in action

While developing the original PR19 business plan, the company's resilience assessment revealed the existence projected financial constraints over AMP7. In response Southern commissioned a strategic review of the group's existing capital structure, with proposed mitigating options to address expected financeability constraints. As a result of this review, the group decided to strategic refinancing achieved through an increase in equity, and a reduction in ongoing interest costs from 2020 – 2030:

- £450m of equity injected to prepay all Class B debt;
- £425m reduction in swap interest costs from 2020 – 2030;
- Successful completion of a capital restructure resulted in Southern Water leverage reducing to less than 70% and a reduction to interest costs for the period 2020 to 2030;
- As a result of the refinancing, Southern now have a single tranche of securitised debt at Southern Water Services that can be as much as 75% of RCV.

Southern Water has similarly drafted an Resilience Action Plan to mitigate the impact on financial resilience of customer reparations and the penalty resulting from the extant investigations.

3.9 Climate change – Adaptation

The requirement to report the risks of climate change and progress on adaptation initiatives was borne out of the Climate Change Act 2008 adaptation reporting power (ARP). These ARP reports inform Government and the Committee on Climate Change (CCC) on perceived risks and the planning response to these risks. The results are fed into the National Climate Change Risk Assessment and the National Adaptation Programme.

Impact is forecast based on UK climate projections published by UKCIP, based at the Environmental Change Institute at the University of Oxford. The Water UK research body (UKWIR) has supported water sector knowledge and approaches through coordinating substantial research directed at the impacts to the UK water sector. Southern Water is represented on the Water UK Climate Change Network and this group has been actively engaging with Defra on the requirements for ARP3 reporting due in 2021.

Southern Water has reported to Defra on 2 occasions, 2011 (ARP1) and 2015 (ARP2). We have agreed a further update (ARP3) will be completed and shared with Defra in 2021.

A summary of key pressures arising from climate change is tabled below. Our assessment will update our understanding of those potential impacts of climate change pressures, the proximity of the potential impact (i.e. expected number of years to impact or scale of impact) and high level view of monitoring and mitigations required to report to DEFRA in January 2021.

Pressure	Water Supply Services	Wastewater Services
Extreme Heat	Raw water quality reduced	Impact on receiving waters oxygenation
	Impact on workforce	Impact on workforce
Extreme Cold	Burst mains and increased leakage	Reduction of biological treatment capacity
	Transport impact	Transport impact
Drought	Demand exceeds supply	Impact on receiving waters dilution capacity
Extreme weather (Intense rainfall, high wind and electrical storms)	Raw water quality reduced	Sludge to land application window affected
	Surface water and groundwater flooding of assets	Surface water and groundwater flooding of assets and networks
	Loss of power & IT communications	Loss of power & IT communications
	Supply Chain impact	Supply Chain impact
	Transport impact	Transport impact
Sea Level Rise	Saline intrusion	Restricted use of outfalls
	Flooding of assets	Erosion impacting stability of infrastructure
		Flooding of assets

3.9 Climate Change – Mitigation

The Committee on Climate Change (CCC) recommended that a net-zero GHG target for 2050 will deliver on the commitment that the UK made by signing the Paris Agreement. However, the CCC state, this is only possible with the acceleration of clear, stable and well-designed policies to reduce emissions further across the economy without delay. On 27th June 2019, Parliament passed legislation for net zero by 2050 for the UK under the Climate Change Act.

In 2018-19 Southern Water operational activity resulted in 200 kilotons of carbon dioxide equivalent (CO_2e) being emitted.

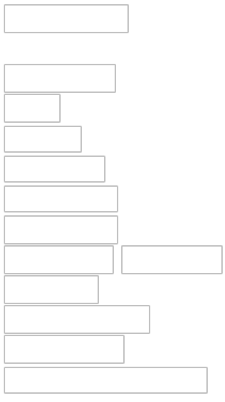
Based on the current snapshot of our emissions, we can look to:

- directly control 55% by procuring green energy and/or expanding our renewable generation capacity,
- await technological change for 15% of our emissions
- seek to offset for 30% of our emissions

The water sector will collectively consider offsetting. Tree planting is the most obvious approach however there are other forms of land management and the potential to develop other forms of offsets specific to the water sector. This will be against the background of the UK Government progressing on a UK wide offsetting scheme.

A calculation has been undertaken on the level of planting required to meet the estimated offsets required. By year 10 of woodland creation, the annual sequestration for 9,000 hectares of mixed tree species is estimated to sequester 69 $ktCO_2e$. This is approx. equivalent to one quarter of area of the Isle of Wight. Trees require some maturation before they can sequester significant volumes of carbon dioxide. This therefore requires an early plan for any afforestation.

We will be updating our strategy to manage this climate change mitigation risk by Q4 2019/20.



3.10 Collaboration

We are committed to continuously improving the way in which we engage and collaborate with our stakeholders on a local and national scale.

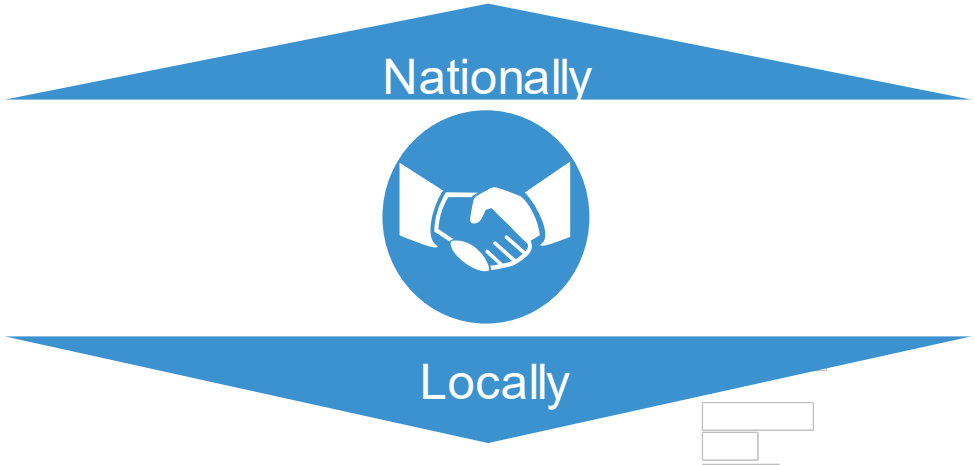
Through our involvement on the '*Naturally Resilient*' project, together with a number of environmental NGOS and water companies, we are jointly exploring the interplay between resilience in the water sector and resilience of the natural environment and how investments in one benefit both.

We are one of the partners in the Water Resources in the South East group, looking to identify and develop long terms plans to secure water supply in the South East.

As a member of the National Drought Group, we are working together to assess and communicate the current water resource situation and agree that actions that much take place to reduce risks to our customers and the environment.

We are actively working with the following groups

Water UK working groups including Alt Supply, Mutual Aid and LRF Standards	Operational Strategy Group – WaterUK strategic group	SEPN – Security and Emergency Planners Networks (tactical level)



At a local level, we are continuing to implement our Incident Management Action Plan, enabling us to respond quicker and in a coordinated manner to a wide variety of shocks, stresses and scenarios. Some of the actions include:

Monthly attendance at Local Resilience Forum Meetings
Joint debriefs post incident (adopting the LRF structured debrief process internally – with training provided to Emergency Planning team by LRF

Joint LRF water supply disruption contingency plans including Vulnerable customer cell and bottle water location pre identification

Joint training and exercising with LRF – including Sim Ex (National scale exercise)

3.10 Collaboration

Engaging on long term water resources and drought

As a key member of the Water Resources in the South East and National Drought group, we are fully committed to collaboration and to developing a plan that ensures long term supply across the South East.

Over the short term (particularly during periods of dry weather), we run fortnightly/monthly water monitoring meetings with stakeholders from across our regulators, customer groups and other companies. In these sessions, we review close proximity risk and develop mitigating actions. We take great efforts to ensure our drought planning is maintained and that we are able to effectively deploy it in a coordinated and consistent manner in line with TUBS criteria.

In the longer term, the National Drought Group and Water Supply Working Group create a forum in which we can vocalise concerns, share experiences and collaborate towards continuous improvement.

Improving compliance across the sector

Following the public release of the Notice of Ofwat's proposal to improve a penalty on South Water Services, we offered to host a discussion session with relevant senior regulatory and compliance representatives (from other WaterUK members).

This session was held in August 2019 where we met with representatives from all English and Welsh Water and Sewerage Companies, three Water-Only Companies and WaterUK.

This session provided us the opportunity to share lessons from the findings and the work we have been doing to improve our culture, organisation structure, monitoring processes and controls. For example, our new Code of Ethic and ethical decision making quick-check. These in turn benefit our corporate resilience and consequently, our operational and financial resilience.

The session was received very positively, with Companies identifying improvements they would like to hear more about (structure, process, controls, culture). We have agreed further actions to work with WaterUK in the form of regular discussions on improvement compliance and compliance framework. We also intend to promote an UKWIR best practice review on behalf of the sector.

Collaborative drainage water management planning

We are developing drainage and wastewater management plans across Kent, Sussex, Hampshire and the Isle of Wight. These are long term plans to ensure the sustainability of drainage infrastructure and systems so that they meet the needs of the customer and the environment now and into the future. This is an opportunity to work with other water/flood risk management authorities and catchment partnerships to consider wastewater and drainage issues in river basin catchments over the longer term. (See also appendix B)

3.10 Collaboration

Driving towards Zero Pollution

As part of our Pollution Reduction Plan, we instigated an industry wide '*Zero Pollutions Conference*' in July this year, hosted by Isle Utilities.

UK water companies are striving to achieve their ambition of zero pollution, through the development of best practice, data led decision making, smart analytics and innovative technologies.

The conference enabled us to hear from peers across the industry both nationally and internationally, sharing best practice on the most effective approaches to tackling pollution, including an innovation showcase for new technologies. Our regulators actively contributed to the conference, providing a wide perspective on the day.

Feedback from delegates was overwhelmingly positive and we would support this becoming a regular event.

Creating a Public Health Water Partnership

As part of adopting a collaborative approach to improving resilience in the South East we are in the early stages of engagement with water companies, the South East Public Health England (PHE) teams and other relevant stakeholders with a view to create a Public Health Water Partnership for the South East.

The aim is to develop a Waterborne Hazard Plan that will standardise the management of water quality / public health incidents across the region and build collaboration for continuous improvement.

Initial contacts have been made with water companies and also with PHE. The first joint Sussex & Surrey meeting is scheduled for October 2019, where a trial proposal will be tabled involving PHE (SE) Sussex (Southern Water) & Surrey (Thames Water). Local authority environmental health representatives for Sussex & Surrey will also be in attendance at the meeting. PHE Sussex & Surrey, Hampshire & IOW and Kent have all been contacted and given a copy of our draft Waterborne Hazard Plan to review.

It is envisaged that members of a Public Health Water Partnership will comprise:

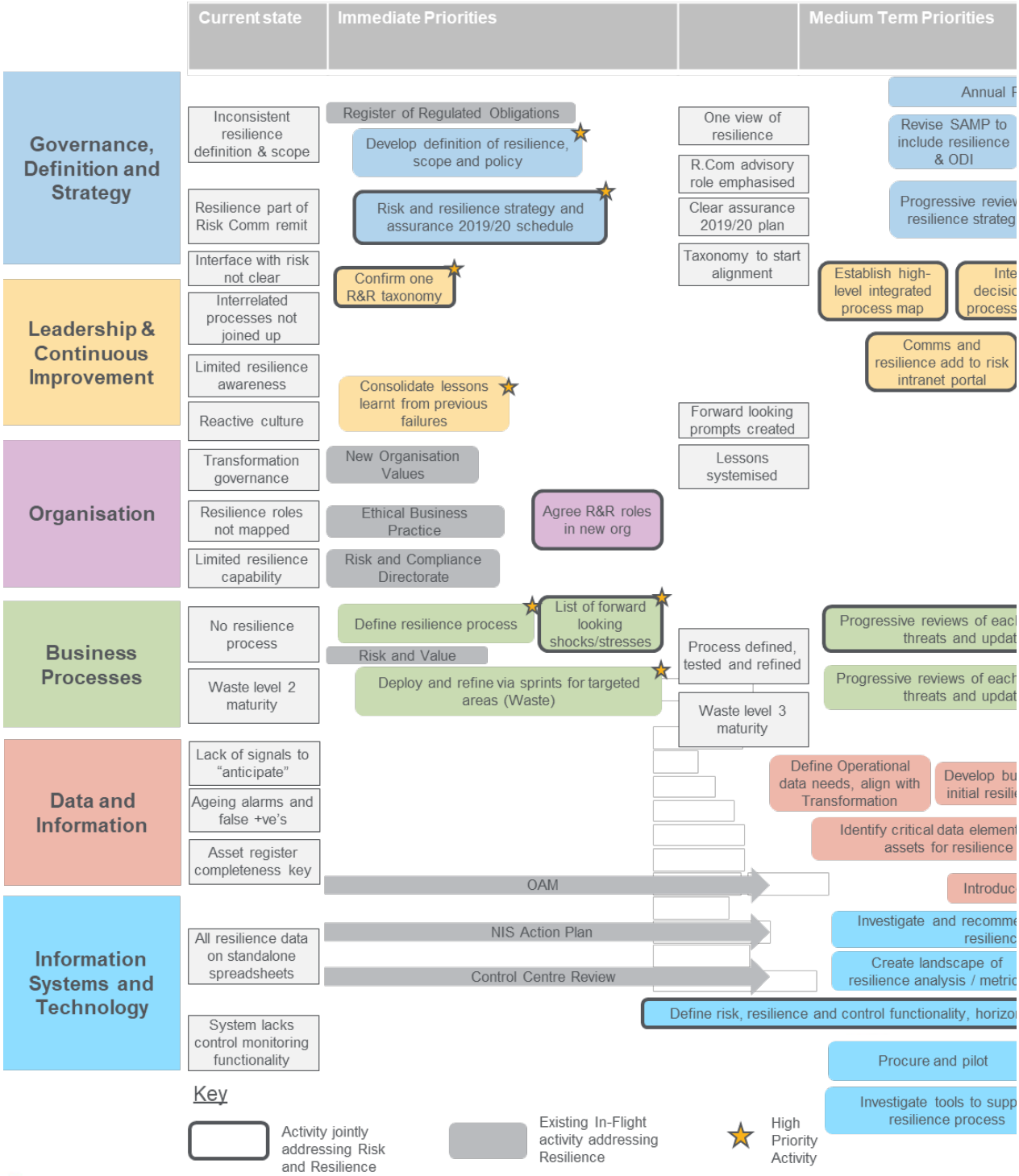
Water Companies (in South East England and London),
Public Health England (Health Protection Teams covering
South East England and London),
Local Authorities Environmental Health Services,
South East will comprise
Consumer Council for Water (CCWater),

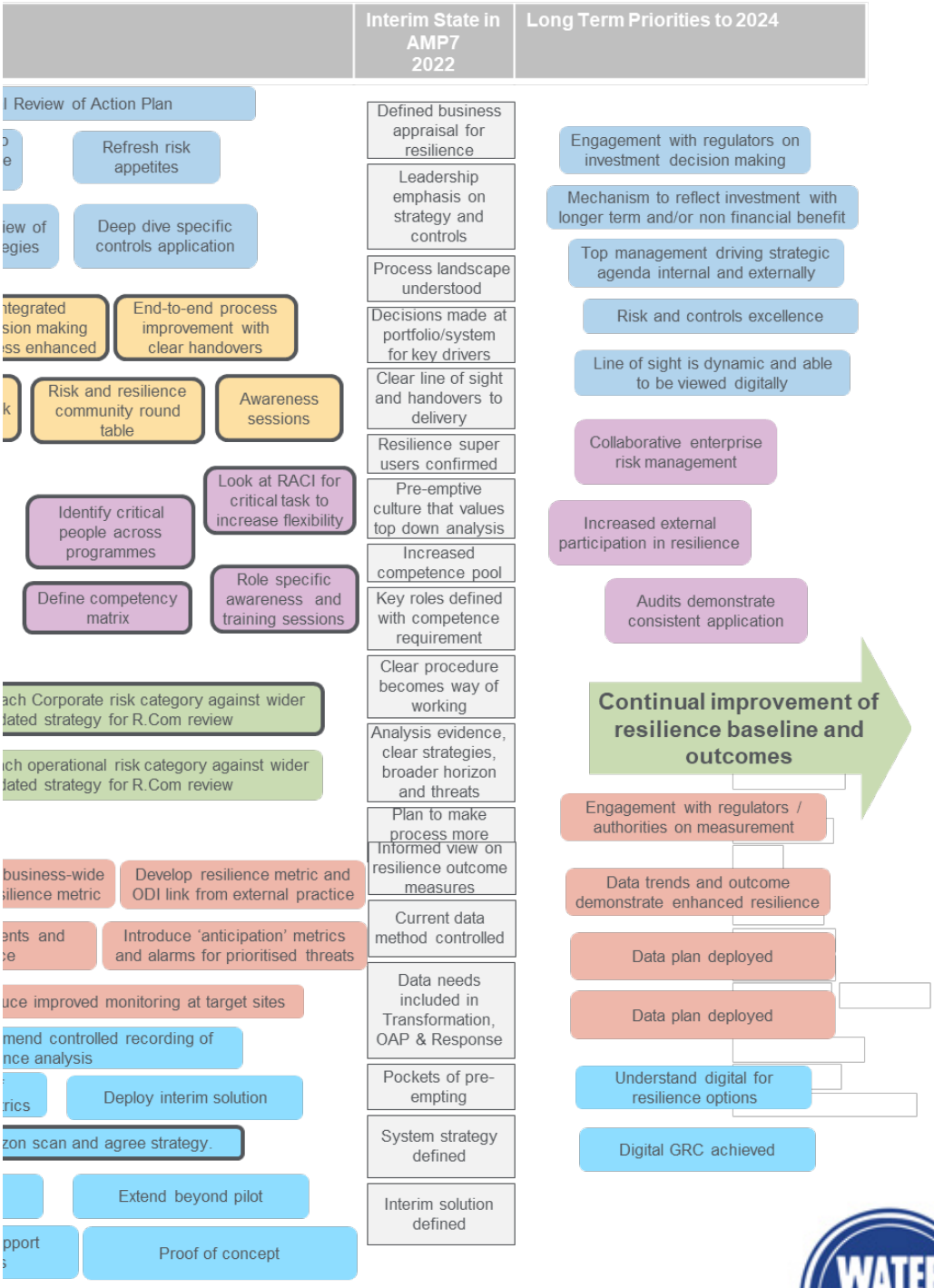
Additional representation may include

The Royal Society for Public Health (RSPH)
Chartered Institute of Environmental Health (CIEH)
Institute of Water (IoW),
Chartered Institute of Plumbing and Heating Engineering (CIPHE)
Water Regulations Advisory Scheme (WRAS)
Food Standards Agency (FSA),
The British Soft Drinks Association (BDSA)
The Automatic Vending Association (AVA).

3.11 Our Road Map

In order to achieve this step change in Resilience and bridge the gaps identified through our baseline assessment and review of capability, we have developed a road map that sets out the journey the business will take over the next few years.





4. Addressing Ofwat's concerns

We are committed to driving improved resilience within our business.

Self-driven: For the action plan to be effective, it needs to be self driven. This action plan has been developed to make it real for all within the company and it needs to be driven by leadership and a collective culture that wants to improve to provide a more resilient service to our customers.

Ofwat have a well considered view of Resilience, so it is natural that your concerns have been used as an input to help derive the plan.

Plan derived from multiple view-points: However, we would like to emphasise that our plan has been developed from first principles using external insight and internally driven lessons, experiences and ambitions to derive the content of the plan along with Ofwats feedback.

Mapping of plan to Ofwat issues: To help reconcile how our plan addresses Ofwats concerns and the initial IAP tests on resilience, a reconciliation has been included within this chapter.

4.1 Addressing Ofwat's concerns

***"There is insufficient evidence of an integrated and systems-based approach to resilience, where interdependencies or cascading impacts of one system to another should be considered"* (Ofwat, Southern Water PR19 IAP Test area assessment).**

ACTION PLAN

- ✓ Our action plan will see the deployment of the new operating models. Progressively over the next 36 months, all pillar resilience and service resilience assessments will be updated to increase the number of interdependent risks considered.
- ✓ The waste resilience baseline has been prioritised to develop a resilience model based on the zonal model deployed within water.

RESLIENCE FRAMEWORK

Our Resilience Framework and operating principles developed since the IAP has been enhanced to more effectively deal with this through the introduction of the 'Pillar Resilience' and 'Service Resilience' to ensure interdependencies and cascading impacts are considered. This approach has been developed from external insights gained from the financial services sector who have been exposed to similar weaknesses in their resilience processes.

***"There is little evidence that a clear and comprehensive baseline resilience maturity assessment, to convince us that the company has sufficient insight on its current corporate and operational resilience and that its [PR19 submitted] plan will drive improvements in resilience"* (Ofwat, Southern Water PR19 IAP Test area assessment).**

ACTION PLAN

- ✓ The action plan has been developed to improve the maturity of our baseline resilience assessments. All areas measured that currently have a partial understanding of resilience, are targeted to have adequate understanding by the end of 2020.
- ✓ Areas with adequate understanding are targeted to achieve elements of good practice by the end of 2022.

RESLIENCE FRAMEWORK

Using our framework, a detailed, transparent and comprehensive maturity assessment of operational, corporate and financial resilience baselines has been undertaken. This assessment is contained within Section 3.

CASE STUDIES OF IT DEPLOYED IN ACTION

WaterFirst, our collaboration with the DWI to overhaul our approach and improve the way in which we provide water services to customers, is reaping the benefits of our commitment to build regulatory confidence and reduce the potential issues.

In the recent report "Summary of the Chief Inspector's Report for drinking water in England", Southern Water was commended for the development of it's HazRev tool.

The company approach to the Hazard Review, (HAZREV), inspections at all of its treatment works is thorough and is identifying a mixture of improvement actions, from simple maintenance tasks to complex engineering solutions. The company approach of a fully integrated review of catchment, operational and asset based hazards is noted as an example of ***good practice****, along with applying the methodology through the development of their Water and Wastewater Risk Frameworks. This approach is welcomed and is showing* ***real outcome improvements*** *clearly evident in a sharp decline in the RRI to an expected level."*

4.2 Addressing Ofwat's concerns

"The [PR19 submitted] plan provides little detail that the overall resilience framework and resilience decision making builds on lessons learned in relation to operational and corporate resilience failings" **(Ofwat, Southern Water PR19 IAP Test area assessment).**

ACTION PLAN

- ✓ Lessons learnt are documented within this plan along with the in-flight activity to address the root cause.
- ✓ Decision making is covered in a number of areas under the Governance, Leadership and Organisation work streams.
- ✓ A key action is the revolving requirement for resilience analysis and strategies to be presented to the Risk Committee along with enhanced controls to ensure governance is followed.

RESLIENCE FRAMEWORK

The framework includes a clearly defined end-to-end process for resilience analysis, evaluation (decision making) and delivery. This process is aligned with operating principles and a resilience taxonomy to ensure clear decision making and governance is detailed.

CASE STUDIES OF IT DEPLOYED IN ACTION

- ✓ Lessons learnt is documented in section 3.2.

Implementation of the Incident Management Framework

With the implementation of our incident management framework (based on the Incident Command System), we have made significant progress in the way we prevent and respond to incidents. Within the past year, we have established an Emergency Planning Team, engaged management staff to take on additional response roles, engaged with our local communities, stakeholders and resilience forums to build communication and trust and implemented OneVoice to log, track and manage our actions.

"The company's [PR19 submitted] plan focuses on resilience challenges in providing water services, but provides little evidence in most necessary areas in relation to resilience of its wastewater business where the company needs to improve from a challenging resilience position" **(Ofwat, Southern Water PR19 IAP Test area assessment).**

ACTION PLAN

- ✓ In-flight activity deployed addressing lessons learnt and PR19 to drive improved waste service resilience.
- ✓ Under the business process work stream; waste services is prioritised for immediate improvements in assessing resilience with the new process. Revised baseline due [Q2-2020].

RESLIENCE FRAMEWORK

The resilience framework includes a maturity model based around ISO31000 and the Cabinet Office resilience measurement approach to drive continuous improvement in the use of evidence to drive more certain resilience outcomes. The current maturity of waster is partial (level 2) with a target of adequate (level 3) by Q2-2020 and elements of good practice by the end of AMP7.

CASE STUDIES OF IT DEPLOYED IN ACTION

- ✓ Following the successful deployment of the Zonal Resilience Assessment for Water, a pilot has been deployed for Waste Water and will support the accelerated deployment within the action plan. It uses evidence to assess resilience elements such as 'time to spill'; no of tankers to support continuity plan, asset reliability and eleven other data items.

4.3 Addressing Ofwat's concerns

***"The company has identified some high-level risks to resilience but the [PR19 submitted] plan provides little evidence on consequences and impacts of those risks needed to convince us that the company fully understands its risks"* (Ofwat, Southern Water PR19 IAP Test area assessment).**

ACTION PLAN

- ✓ In our action plan, a key priority is to address the inconsistencies and in some cases, lack of, risk business processes across our business.
- ✓ An immediate priority is to target specific waste processes for review and revision.
- ✓ The introduction of a revised risk taxonomy through our action plan will help create line of sight from top-to-bottom across our risks and introduce consistency with how they are effectively and consistently managed by our business.

CASE STUDIES OF IT DEPLOYED IN ACTION

As part of our Modern Compliance Framework, we have refreshed our register of obligations and confirmed or enhanced our controls and assurance to ensure risks are current, understood and mitigated.

RESLIENCE FRAMEWORK

Through our assessment of resilience capability, we have identified an urgent need to improve risk and resilience business processes. Although pockets of excellence exist within our organisation (for example, through the Water HazRev process), we recognise that analysis must be brought together to form a cohesive and coherent picture of resilience.

Our Modern Compliance Framework

***"The [PR19 submitted] plan is not generally supported by well-defined and stretching common and bespoke PCs"* (Ofwat, Southern Water PR19 IAP Test area assessment).**

In our March IAP response[1], we set out how we are implementing an approach for continuous monitoring and learning to improve our Performance Commitment performance. This includes improving our data quality, revising our reporting processes and implementing a more rigorous root cause analysis to better understand our performance drivers.

ACTION PLAN

- ✓ As part of our action plan, we have started to identify and develop further ways to monitor and measure our resilience.
- ✓ An example of this is our "time-to-spill" metric, which provides us with an estimate of the time it will take before a wastewater pumping station spills. When aligned to our incident management framework, which allows us to coordinate our incident response teams more effectively.
- ✓ As our plan matures, we will continue to develop our approach internally and through collaborative work with the industry and Ofwat in forums such as Naturally Resilient.

RESLIENCE FRAMEWORK

Through our review into resilience external practice, assessment of our capability and establishment of our baseline, we recognise that resilience is still relatively immature across sectors.

Methods and metrics for assessing and measuring resilience are still emerging with effort still required to develop accurate representations of resilience for our business and that align to customer expectations.

1 IAP Southern Water Technical Annex 8 Accounting for past delivery – SRN.PD.A7 Action Plan on performance commitment monitoring and continuous improvement

4.4 Addressing Ofwat's concerns

***"The [PR19 submitted] plan presents insufficient evidence on the specific schemes being proposed as part of some of the transformational programmes, largely due to their early stages of development"* (Ofwat, Southern Water PR19 IAP Test area assessment).**

ACTION PLAN

- ✓ Our transformation schemes have matured significantly since the submission of the business plan.
- ✓ Our Resilience Action Plan will be integrated as part of our Transformation Programme Management office and governed through similar mechanisms.

RESLIENCE FRAMEWORK

As part of our assessment of resilience capability, we have identified existing inflight transformation programmes that will enable improvements across our organisation.

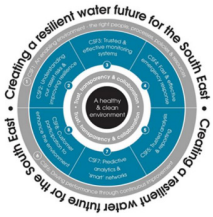
An example of this mapping across our ODIs and across the Resilience 4Rs is set out in section 3.4.

Some of our in-flight transformational programmes are set out below:

Summaries of these programmes can be found in Appendix B.

Environment +

The Environment+ programme focuses on environmental compliance by improving how we manage our risk and assets. Looking across our processes, systems, culture, risk and information management, we are aiming to make comprehensive improvements in our performance, capabilities and compliance by embedding more collaborative, effective and transparent practices, alongside sustainable improvements to our policies, processes and reporting.



WaterFirst

Water First is a multi-AMP improvement programme, developed in collaboration with the DWI, to embed public health protection at the heart of our water services. The programme will deliver improvements through:

- Focusing on doing the basics well
- Providing structure and control to the programme of improvement across policy, process and procedures, tasks and expectations, data and information,
- Leadership and engagement from heads of function

Modern Compliance Framework

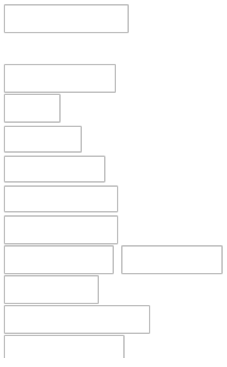
We are currently delivering our Modern Compliance Framework which will improve performance and increase the trust our customers, stakeholders and regulators have in us. Through our programme, we will be introducing a new code of ethics and ethical business practices, improve our regulatory reporting and introduce a register of regulatory obligations.

Control Centre transformation

We are moving forward with a transformation of our Control Centre focused on improving our capabilities, our ways of working and changing the physical space in which we operate. We want to be able to respond quicker to events, build capability to pre-empt them, develop a collaborative structure between the control centre and field operations.

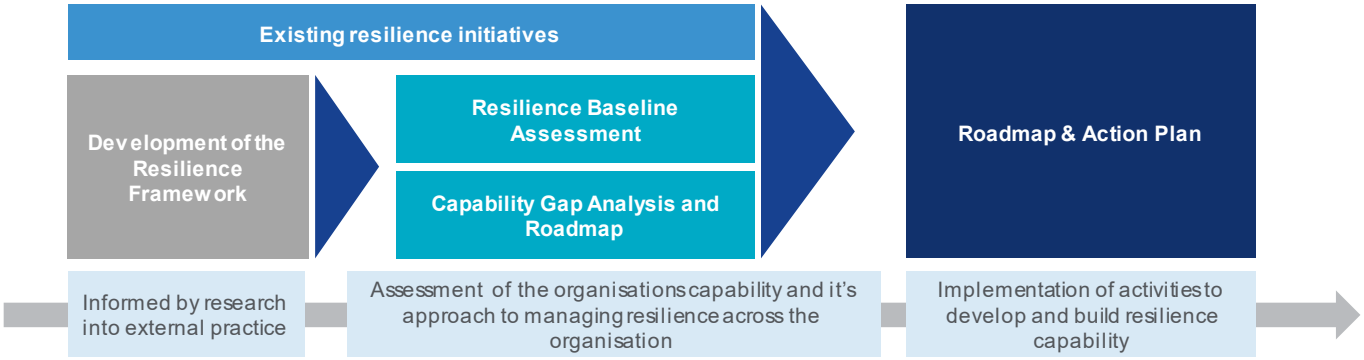
5. Developing the action plan

In order to achieve this step change in Resilience and bridge the gaps identified through our baseline assessment and review of capability, we have developed a road map that sets out the journey the business will take over the next few years.



5.1 Developing our Action Plan

Our action plan to develop a well-rounded approach to resilience reflect this desire to improve. It has been formed through the delivery of key activities:



We have created our Resilience Framework by undertaking cross sector research to provide a number of valuable insights of the elements of what makes a good resilience framework.

By undertaking a gap analysis of our capability against the elements of a standard operating model, we not only understand our current level of resilience capability, but also have a clear plan of what we must do to systemise resilience and ensure it is fit for purpose within our business.

We conducted an assessment of our current operational resilience against our framework in order to establish a baseline. We understand the effectiveness and quality of our current processes and have developed actions to address these.

Our Operational Baseline and Resilience Capability assessments have enabled us to identify the key gaps and opportunities within our business. Our action plan has been developed in response to address these issues and implement a comprehensive approach to resilience.

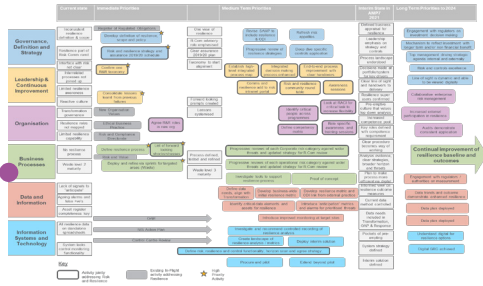
In the development of our plan, we have engaged across our business to ensure that the appropriate level of oversight has been provided.

- A steering group comprising executive level individuals from across the business have **guided** and **informed** our approach.
- Our **Risk Committee** has been engaged in the plans development and approved our approach.
- Our **Board** have reviewed and signed off our plan.
- We have established an **assurance approach** for our action plans that involves assessing the extent to which we have improved our capability. These will be validated through **independent external assurance** and conducted quarterly, commencing from September 2019.
- In line with our commitment made as part of the IAP response, we will provide **quarterly reports** to Ofwat.

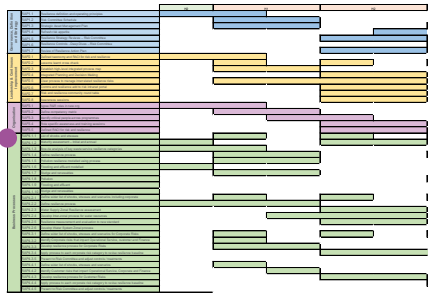
5.2 Structuring our Plan

Our Resilience Action plan is structured across 4 levels, beginning with our Level 0 Roadmap and progressively building layers of detail through to project definition documents.

Level 0
Road map
Section 3.9
Our journey to improve resilience



Level 1
PROGRAMME PLAN
Section 5.4
Ordering our plan



Level 2
Work streams
Section 6.0
Structuring our approach

ID	Deliverable	Outcome	Delivery Owner	Completion Date	2019 Sep	2020 Jan	2020 Jul	2021 Jan	2021 Jul
RAP1.1	Resilience definition and operating principles	Clear definition of resilience and how enterprise, corporate, assets and operations work together	Dir of Risk & Compliance	H1-2020					
RAP1.2	Risk Committee Schedule	List of items for review linked to RAP. Coverage of both strategy and assurance items will increase advisory capacity of RCom.	Dir of Risk & Compliance	H1-2020					
RAP1.3	Strategic Asset Management Plan	Consolidation of existing strategies produced that brings asset, ODI, risk and resilience elements together	Dir of Systems and Asset Management	H2-2020 H2-2021					
RAP1.4	Refresh risk appetite	Appetites used to determine tolerance levels for resilience to aid decision making.	Dir of Risk & Compliance	H1-2021					
RAP1.5	Resilience Strategy Reviews – Risk Committee	Progressive review of corporate and operational resilience strategies as developed in RAP1.3.	Dir of Risk & Compliance	H2-2020					
RAP1.6	Resilience Controls - Deep Dives – Risk Committee	Review of specific processes, risks, controls (following RAP 1.5)	Dir of Risk & Compliance	H1-2021					
RAP1.7	Review of Resilience Action Plan	Determination if current activities are delivering the desired improvements in Resilience	Dir of Risk & Compliance	H2-2020 H2-2021					

Level 3
Project definition documents
Section 6.0
Detailed plans

Project Name	Definition, Policy & Strategy	**Project Sponsor**	Dir of Risk & Compliance
Interdependencies	Dependent on – N/A Leads to – RAP1.2	**Action Plan Ref**	RAP1.1 RAP1.3
Background	Southern Water have identified a series of targeted improvements to enhance its current resilience position		
Project Description	Engage with the business by building on the work delivered to-date to develop a definition, scope and policy for resilience. This should then be cascaded into the existing suite of strategies to develop a detailed plan for the Resilience Action Plan.		
Scope	▪ Enterprise wide (wholesale and retail) ▪ Regulated and non-regulated assets		
Business Case	Resilience lacks a scope and strategy within the business, creating confusion, overlap and duplication of risk management activity. The organisation needs to coalesce around a single view of resilience to help provide a foundation to build business-wide objectives that can be delivered through integrated business processes.		
Constraints	Time	The definition is a critical activity that should be delivered as a priority	

5.3 Where does our roadmap get us?

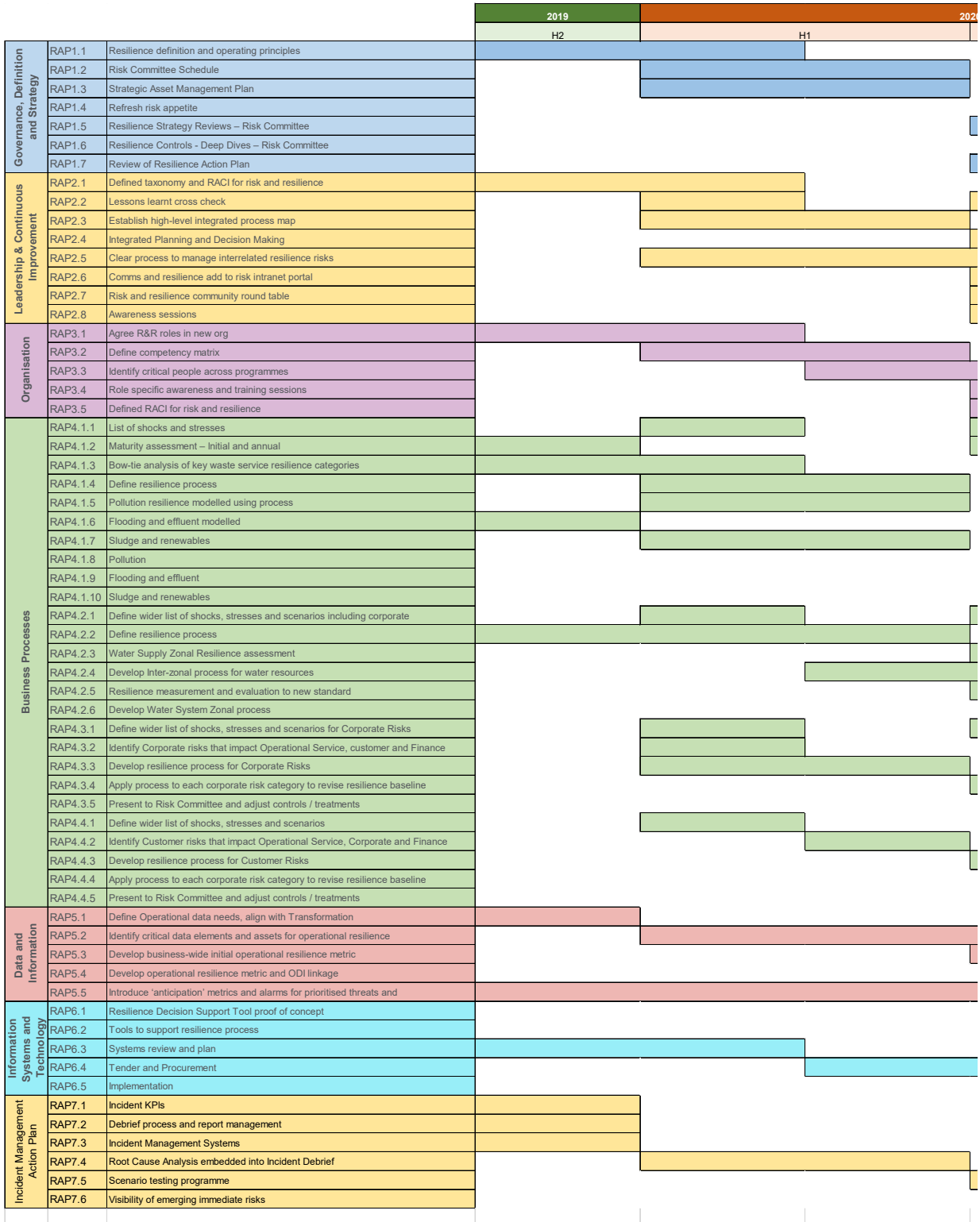
We are committed to delivering an enhanced approach to resilience

We are aiming to achieve a minimum of Level 3 (Developing) or higher capability across each of the 21 key enablers in the framework by the end of AMP7. In the shorter team, a number of immediate priorities have been identified that will provide a foundation to position the business for the capabilities that will developed over the next 5 years.

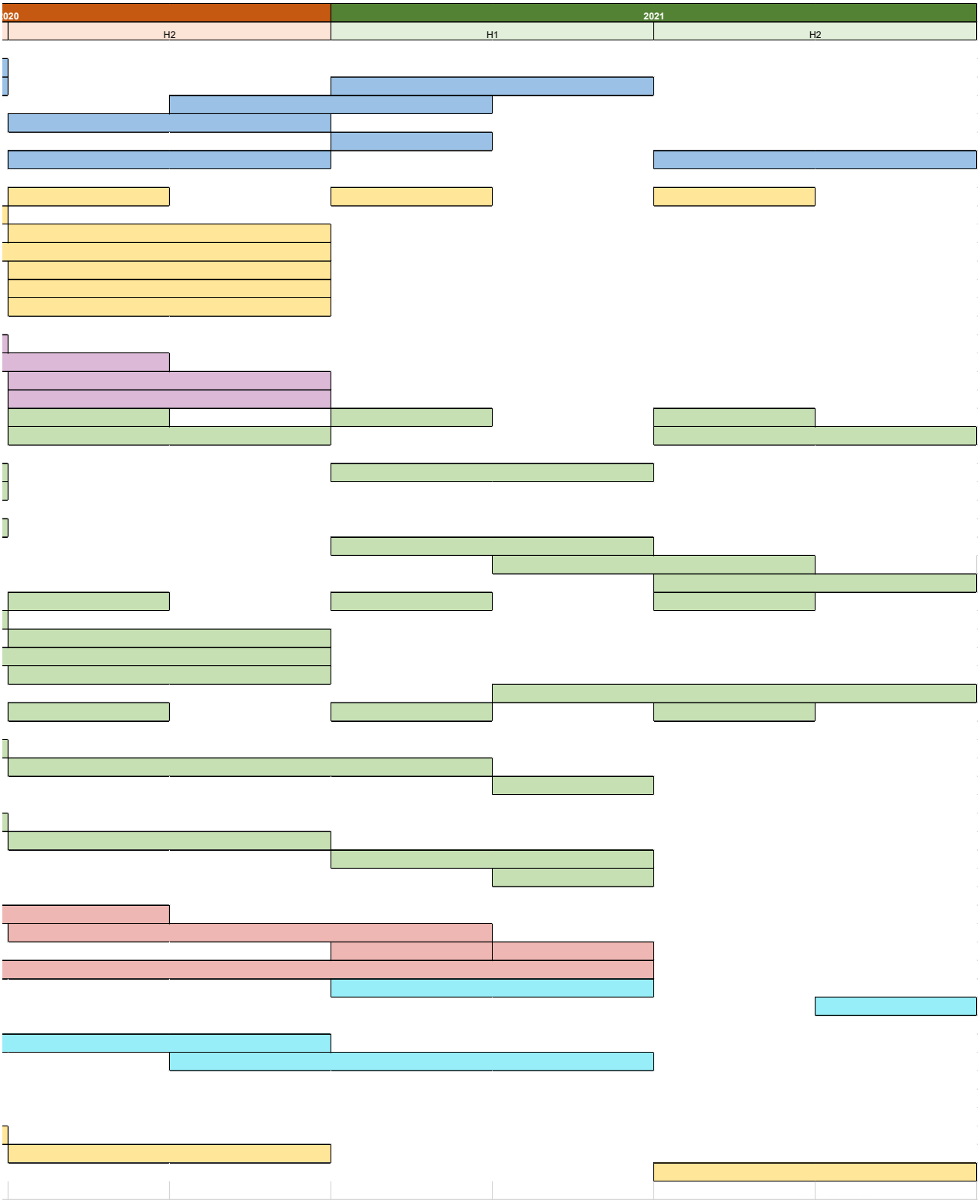
Framework Reference	Aims
Governance, Definition and Strategy	**Immediate Priority:** The business will have started development of an enterprise wide definition of resilience with policy documents and strategies derived from it. It will be implementing regular monitoring and have developed a schedule of assurance. The role and remit of the Risk Committee will be under review to ensure it is clear in the context of resilience. **Interim State:** Resilience is treated as a major focal driver as part of the investment decision making process. The Strategic Asset Management Plan clearly features resilience as a major feature and sufficient controls are in place along with regular oversight from leadership
Leadership Commitment & Continuous Improvement	**Immediate Priority:** The definition of key resilience processes will have commenced. Initial line of sight between the AMP7 capital plan and resilience initiatives will be established. **Interim State:** The water and waste baselines is improved with maturity scores ranging between 3 and 4. The Corporate risks have a wider time horizon and applying scenario testing to test shocks stresses and interdependences. Across each area, a formalised process for identifying threats is employed and supported by horizon scanning
Business Process	**Immediate Priority:** An initial Risk and Resilience taxonomy will have been established, Common indicators, shocks and stresses and lessons learnt across recent major events will have been identified. **Interim State:** Resilience is a key driver within the investment decision making process. Decisions are made with clear and traceable line of sight, supported by an integrated process map setting out the organisations approach to managing risk and resilience across all areas. Resilience Communities of Practice will be in place and are establishing themselves as a resilience focal point.
Organisation	**Interim State:** Establishment of a forward looking organisation that seeks to pre-empt and/or anticipate shocks and stresses with a culture that is supportive and open to sharing. Training regimes have been developed with implementation underway to uplift capability. The business will have started to identify key resilience roles identified and defined across the business. Core resilience competencies set and integrated across the planned Organisational Design.
Data & Information	**Interim State:** Key resilience metrics have been codified with leading indicators introduced, and are aligned to ODIs. Gaps in data, processing and Management Information necessary for resilience are fed into existing in-flight activities to address.
Information Systems and Technology	**Immediate Priority:** The business requirements/ functionality for risk and resilience will be understood and aligned to the wider enterprise issue of GRC control monitoring **Interim State:** Interim solutions are in place to improve control and a new system is piloted and endorsed for deployment across the Enterprise

5.4 Our programme plan

With our programme plan we have sequenced activities, setting them out in a logical order for delivery. We have included key activities from our Incident Response Action Plan, which is a critical component of our overall approach to resilience.

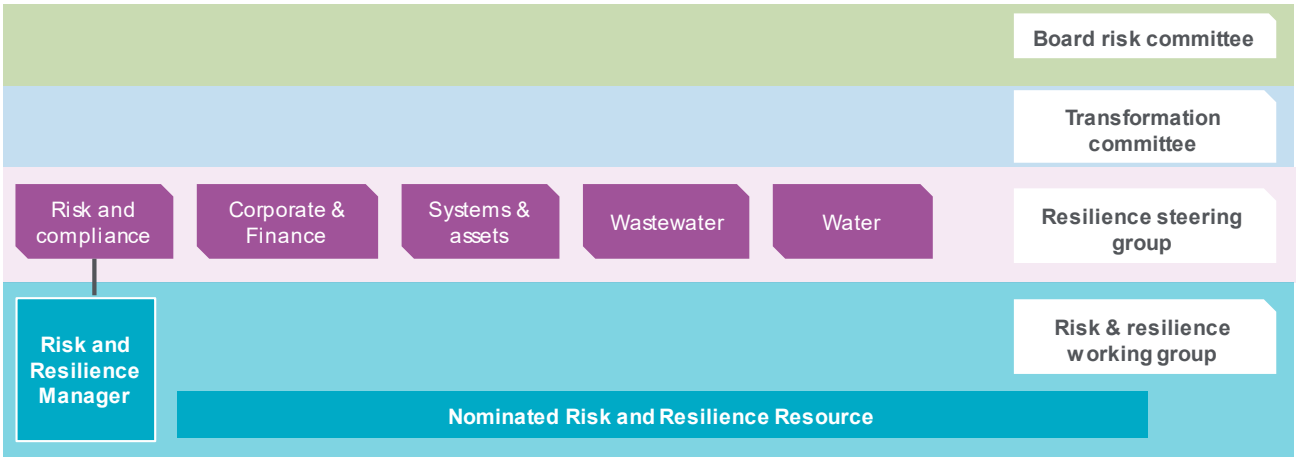


Our plan sets out activities to 2021 followed by a year of anticipated embedment to 2022.



5.5 Delivery structure and resources

A clear delivery structure is in place with the Risk and Resilience Working Group. This ensures collaborative working across risk and resilience resources from each of our Directorates. This feeds into the established Steering Group with the ELT, Transformation Committee and Board Risk Committee providing overarching governance



Clear delivery plans and ownership is set out in section 6 with the delivery owners engaged and committed to delivering their commitments as confirmed by a series of individual reviews and collectively as part of the RAP Steering Group in place.

Significant engagement has been undertaken as part of the Action Plan development to socialise and confirm the improvements as necessary within the plan and in the latter stages to ensure commitment to the actions within the plan. Key engagement activities include:

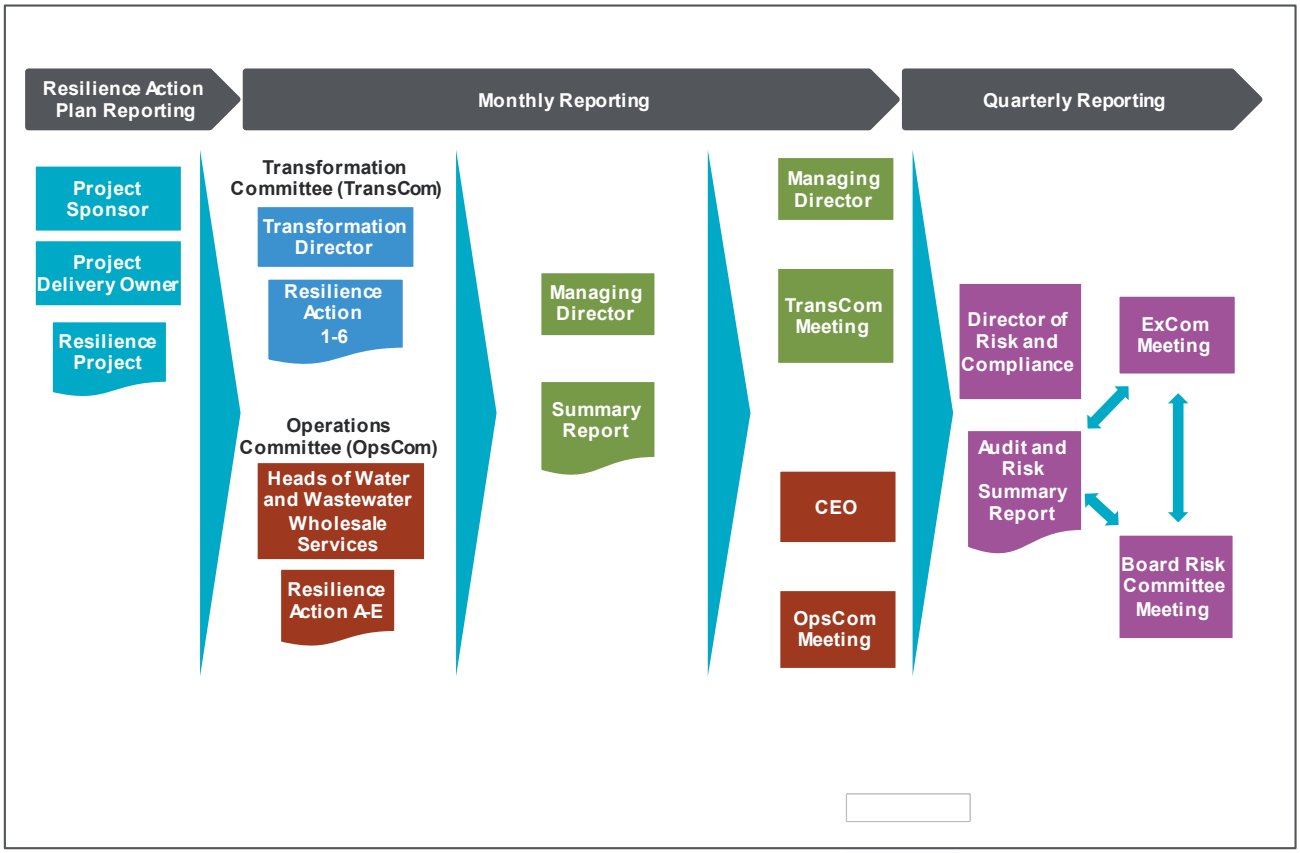
- A Resilience Framework informed by external practice and driven by internal need
- A plan that provides an integrated risk and resilience management system
- Lessons Learnt that are clearly articulated with a line of sight to the Cabinet Office 4R elements of resilience and our own in-flight initiatives to demonstrate expected improvements
- A new risk and resilience taxonomy with operating principles to address interconnected and cascading risks that are often missed with traditional risk approaches
- A progressive programme over two years to improve our resilience understanding, measurement and maturity, with Waste prioritised for Q2-2020 followed by Water and Corporate resilience.
- Targeted improvement in systems to provide more robust controls around risk and resilience mitigations and treatments

Mobilisation

A mobilisation session for our Resilience Steering Group is scheduled for the 3rd week of September. This session will confirm the resources, timescales and deliverables as defined in our Project Definition Documents.

5.6 Delivery structure and resources

The overarching governance arrangements for delivery of the action plan are set out below. The governance route for each of the actions are currently being developed, but will align to and integrate with the overarching arrangements. Through this mechanism, any risks or issues will be escalated to our executive.



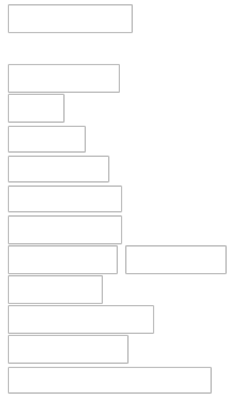
6. Action plan

From our Delivery and Programme plans, we have structured our approach around core work streams with roles identified for delivery and ownership.

These are supported by a further level of detail in our Project Definition Documents.

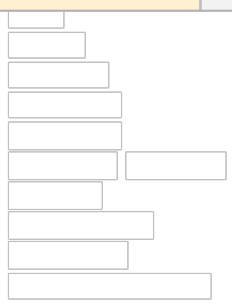
RAP1.0 Governance, definition & strategy

ID	Deliverable	Outcome	Delivery Owner	Completion Date
RAP1.1	Resilience definition and operating principles	Clear definition of resilience and how enterprise, corporate, assets and operations work together	Dir of Risk & Compliance	H1-2020
RAP1.2	Risk Committee Schedule	List of items for review linked to RAP. Coverage of both strategy and assurance items will increase advisory capacity of RCom.	Dir of Risk & Compliance	H1-2020
RAP1.3	Strategic Asset Management Plan	Consolidation of existing strategies produced that brings asset, ODI, risk and resilience elements together	Dir of Systems and Asset Management	H2-2020 H2-2021
RAP1.4	Refresh risk appetite	Appetites used to determine tolerance levels for resilience to aid decision making.	Dir of Risk & Compliance	H1-2021
RAP1.5	Resilience Strategy Reviews – Risk Committee	Progressive review of corporate and operational resilience strategies as developed in RAP1.3.	Dir of Risk & Compliance	H2-2020
RAP1.6	Resilience Controls - Deep Dives – Risk Committee	Review of specific processes, risks, controls (following RAP 1.5)	Dir of Risk & Compliance	H1-2021
RAP1.7	Review of Resilience Action Plan	Determination if current activities are delivering the desired improvements in Resilience	Dir of Risk & Compliance	H2-2020 H2-2021



RAP2.0: Leadership and Continuous Improvement

ID	Deliverable	Outcome	Delivery Owner	Completion Date
RAP2.1	Defined taxonomy and RACI for risk and resilience	Defined taxonomy that enablers clear accountability, aggregation and systems agnostics approach to R&R.	Dir of Risk & Compliance	H2-2019
RAP2.2	Lessons learnt cross check	End to End Review of events to determine if the "resilience" operated as intended and ensure plans are in place to address	Dir of Systems and Asset Management	Every 6 months
RAP2.3	Establish high-level integrated process map	Mapped level 0 process for integrated decision making , understanding of how risk and resilience is integrated	Dir of Systems and Asset Management	H1-2020
RAP2.4	Integrated Planning and Decision Making	Mapped level 1 processes for interrelated decision making processes (following Level 0 process map) and understanding of how risk and resilience is integrated	Dir of Systems and Asset Management	H2-2020
RAP2.5	Clear process to manage interrelated resilience risks	Developed clear process for managing risks and resilience within business units and across business units.	Dir of Risk and Compliance	H2-2021
RAP2.6	Comms and resilience add to risk intranet portal	Risk and Resilience added/updated on intranet portal and communicated to business	Dir of Risk & Compliance	H2-2020
RAP2.7	Risk and resilience community round table	Risk and Resilience round table event organised with stakeholders (local and national)	Dir of Risk & Compliance	H2-2020
RAP2.8	Awareness sessions	Improved awareness of risk and resilience across business through communications	Dir of Risk & Compliance	H2-2020



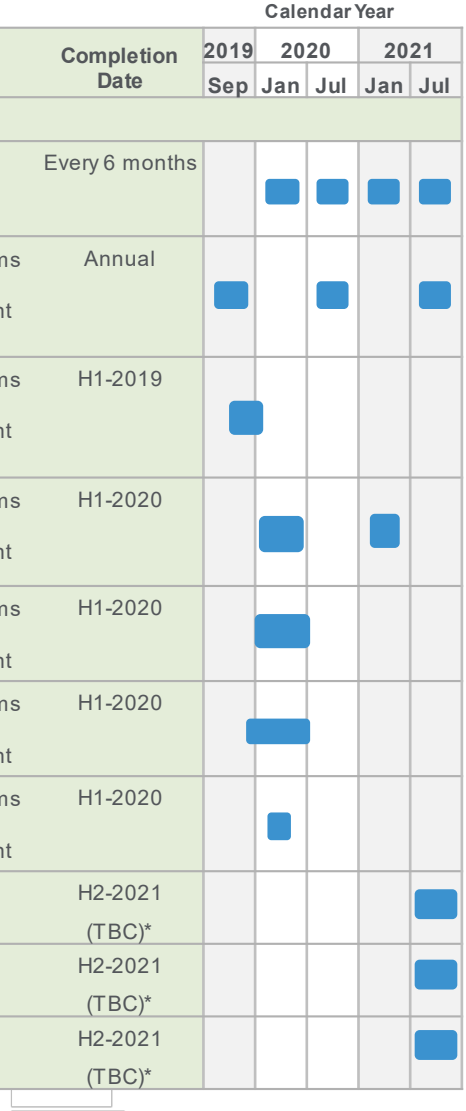
RAP3.0: Organisation and people

ID	Deliverable	Outcome	Delivery Owner	Completion Date	Calendar Year 2019 Sep	2020 Jan	2020 Jul	2021 Jan	2021 Jul
RAP3.1	Agree R&R roles in new org	Minimum resource requirement dedicated to Resilience defined and integrated with the risk organisation design.	Dir of Risk & Compliance	H1-2020					
RAP3.2	Define competency matrix	Four levels of resilience competency defined and allocate to organisation (leadership, management, specialist, operators).	Dir of Risk & Compliance	H1-2020					
RAP3.3	Identify critical people across programmes	Review of Organisational Structure to determine roles critical to the operation of the resilience processes across the 4Rs	Dir of Risk & Compliance	H2-2020					
RAP3.4	Role specific awareness and training sessions	Development of specific resilience training aligned to competencies (RAP3.2) and deployment phased and targeted by cohorts.	Dir of Risk & Compliance	H2-2020					
RAP3.5	Defined RACI for risk and resilience	RACI mapping of roles against risk and resilience activities (aligned to RAP3.3)	Dir of Risk & Compliance	H2-2020					

RAP4.0 Resilience processes and baseline

4.1 Operations – Wastewater Services

ID	Deliverable	Outcome	Delivery Owner	Completion Date
RAP4.1.1	List of shocks and stresses	Single, agreed list of shocks and stresses that can be reviewed on a regular basis	Dir of Wholesale Wastewater	Every 6 months
RAP4.1.2	Maturity assessment – Initial and annual	Validate scores from maturity assessment with clear link to evidence. Undertake annual review.	Dir of Systems and Asset Management	Annual
RAP4.1.3	Bow-tie analysis of key waste service resilience categories	First step of process applied to create initial resilience landscape covering shocks, stresses and scenarios linked to potential 4R controls.	Dir of Systems and Asset Management	H1-2019
RAP4.1.4	Define resilience process	Process and procedure documented. Refreshed following Maturity Level 3 assessments.	Dir of Systems and Asset Management	H1-2020
RAP4.1.5	Pollution resilience modelled using process	Process applied to waste to achieve maturity 3 baseline assessment including bow-tie analysis	Dir of Systems and Asset Management	H1-2020
RAP4.1.6	Flooding and effluent modelled	Maturity Level 3 baseline assessment	Dir of Systems and Asset Management	H1-2020
RAP4.1.7	Sludge and renewables	Maturity Level 3 baseline assessment	Dir of Systems and Asset Management	H1-2020
RAP4.1.8	Pollution	Targeted Maturity Level 4 baseline assessment	As above	H2-2021 (TBC)*
RAP4.1.9	Flooding and effluent	Targeted Maturity Level 4 baseline assessment	As above	H2-2021 (TBC)*
RAP4.1.10	Sludge and renewables	Targeted Maturity Level 4 baseline assessment	As above	H2-2021 (TBC)*



*In recognition that level 4 maturity will need time to embed, we intend to first assess this in 2021 to support focussed embedment in advance of a 2022 assessment.

RAP4.0 Resilience processes and baseline

4.2 Operations – Water Services

ID	Deliverable	Outcome	Delivery Owner	Completion Date	Calendar Year 2019 Sep	2020 Jan	2020 Jul	2021 Jan	2021 Jul
RAP4.2.1	Define wider list of shocks, stresses and scenarios including corporate	Clear understanding of corporate resilience interface. List of wider resilience threats to be incorporated within zonal assessments	Dir of Wholesale Water	Every 6 months		■	■	■	■
RAP4.2.2	Define resilience process	Process and procedure documented for Zonal Resilience	Dir of Systems and Asset Management	H1-2020		■			
RAP4.2.3	Water Supply Zonal Resilience assessment	Maturity Level 3 baseline assessment	Dir of Systems and Asset Management	H2-2020			■		
RAP4.2.4	Develop Inter-zonal process for water resources	Maturity Level 3 baseline assessment	Dir of Systems and Asset Management	H2-2020		■	■		
RAP4.2.5	Resilience measurement and evaluation to new standard	Evaluate resilience against defined enterprise-wide resilience appraisal methodology	Dir of Systems and Asset Management	H2-2020			■		
RAP4.2.6	Develop Water System Zonal process	Maturity Level 4 baseline assessment	Dir of Systems and Asset Management	H2-2021 (TBC)*					■

*In recognition that level 4 maturity will need time to embed, we intend to first assess this in 2021 to support focussed embedment in advance of a 2022 assessment.

RAP4.0 Resilience processes and baseline

4.3 Corporate Resilience

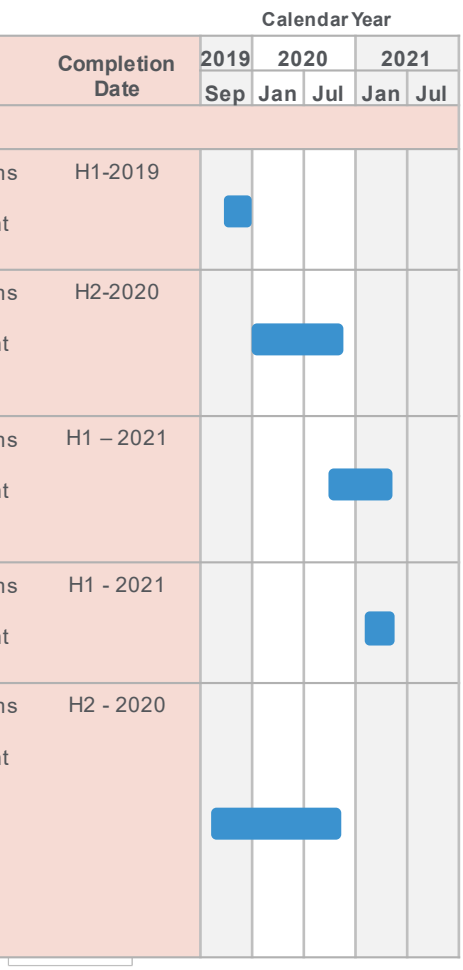
ID	Deliverable	Outcome	Delivery Owner	Completion Date	Calendar Year 2019 Sep	2020 Jan	2020 Jul	2021 Jan	2021 Jul
RAP4.3.1	Define wider list of shocks, stresses and scenarios for Corporate Risks	Clear understanding of corporate resilience threats	Dir of Risk & Compliance	Every 6 months					
RAP4.3.2	Identify Corporate risks that impact Operational Service, customer and Finance	Clear understanding of Operational, Customer and Financial resilience interface	Dir of Risk & Compliance	H1-2020					
RAP4.3.3	Develop resilience process for Corporate Risks	Adjusted process to reflect need of corporate. Amended emphasis on the Infra 4R's.	Dir of Risk & Compliance	H1-2020					
RAP4.3.4	Apply process to each corporate risk category to revise resilience baseline	Process and procedure documented and baseline revised	Dir of Risk & Compliance	H2-2020					
RAP4.3.5	Present to Risk Committee and adjust controls / treatments	Approved set of Corporate Resilience processes that have been calibrated and validated	Dir of Risk & Compliance	H2-2020					

4.4 Customer Resilience

ID	Deliverable	Outcome	Delivery Owner	Completion Date	Calendar Year 2019 Sep	2020 Jan	2020 Jul	2021 Jan	2021 Jul
RAP4.4.1	Define wider list of shocks, stresses and scenarios	Clear understanding of corporate resilience threats	Director of Commercial and Innovation	H1-2020					
RAP4.4.2	Identify Customer risks that impact Operational Service, Corporate and Finance	Clear understanding of Operational, Customer and Financial resilience interface	Director of Commercial and Innovation	H1-2020					
RAP4.4.3	Develop resilience process for Customer Risks	Adjusted process to reflect need of Customer. Amended emphasis on the Infra 4R's.	Director of Commercial and Innovation	H2-2020					
RAP4.4.4	Apply process to each corporate risk category to revise resilience baseline	Process and procedure documented and baseline revised	Director of Commercial and Innovation	H2-2020					
RAP4.4.5	Present to Risk Committee and adjust controls / treatments	Approved set of Resilience processes that have been calibrated and validated	Director of Commercial and Innovation	H2-2020					

RAP5.0 Data and Information

ID	Deliverable	Outcome	Delivery Owner	Completion Date
Establish metrics for resilience				
RAP5.1	Define Operational data needs, align with Transformation	Engaged with Transformation to understand in-flight data transformation activities	Dir of Systems and Asset Management	H1-2019
RAP5.2	Identify critical data elements and assets for operational resilience	Critical data required to support resilience process identified	Dir of Systems and Asset Management	H2-2020
RAP5.3	Develop business-wide initial operational resilience metric	Identification and development of resilience metrics	Dir of Systems and Asset Management	H1 – 2021
RAP5.4	Develop operational resilience metric and ODI linkage	Alignment of resilience metric to ODIs	Dir of Systems and Asset Management	H1 - 2021
RAP5.5	Introduce 'anticipation' metrics and alarms for prioritised threats and Introduce improved monitoring at target sites	'Anticipation' metrics and alarms for prioritised threats and improved monitoring through Control Centre transformation	Dir of Systems and Asset Management	H2 - 2020



RAP6.0 Systems and Technology

ID	Deliverable	Outcome	Delivery Owner	Completion Date	Calendar Year 2019 Sep	2020 Jan	2020 Jul	2021 Jan	2021 Jul
RAP6.1	Resilience Decision Support Tool proof of concept	Proof of concept developed for Resilience management and used to evaluate business consequence	Dir of Systems and Asset Management Chief Information Officer	H1 - 2021					
RAP6.2	Tools to support resilience process	IT systems to facilitate the resilience process deployed	Dir of Systems and Asset Management Chief Information Officer	H2 – 2021+					
RAP6.3	Systems review and plan	▪ Complete a gap-fit Assessment of GRC Tools & budgetary estimates ▪ Validate approach, procurement needs, gain budget approval & high-level planning	Chief Information Officer Compliance and Risk Director	Q1 - 2020					
RAP6.4	Tender and Procurement	▪ If tender is needed, procurement activities & contracting (4 months)	Chief Information Officer	Q3 - 2019					
RAP6.5	Implementation	▪ Incremental Implementation, data migration and training (4-6 months)	Chief Information Officer Dir of Risk and Compliance	Q4 – 2020 Q1 - 2021					

RAP7.0 Incident Management Action Plan

ID	Deliverable	Outcome	Delivery Owner	Completion date	Calendar Year 2019 Sep	2020 Jan	2020 Jul	2021 Jan	2021 Jul
RAP7.1	Incident KPIs	Clearly defined and trackable KPIS for incident response	Dir Wholesale Water	H2 - 2019	■				
RAP7.2	Debrief process and report management	Defined debrief process that allows us to learn from previous mistakes	Dir Wholesale Water	H2 - 2019	■				
RAP7.3	Incident Management Systems	Introduction of the incident management system	Dir Wholesale Water	H2 - 2019	■				
RAP7.4	Root Cause Analysis embedded into Incident Debrief	Process for the identification of true root cause, and embedding into post incident reviews	Dir Wholesale Water	H1 – 2020		■			
RAP7.5	Scenario testing programme	Programme for regular testing of incident escalation and team stand-up across a range of scenarios	Dir Wholesale Water	H2 – 2020			■		
RAP7.6	Visibility of emerging immediate risks	Improved situational awareness and pro-active response through visualisation of emerging immediate risks	Dir Wholesale Water	H1 – 2021					■

RAP8.0 Financial Resilience Plan

ID	Deliverable	Outcome	Owner	Completion Date	Calendar Year 2019 Sep	2020 Jan	2020 Jul	2021 Jan	2021 Jul
RAP8.1	Financial resilience definition and metrics	Clear definition of financial resilience and identification and specification of metrics to be used for measurement and monitoring (e.g. metrics used by rating agencies)	CFO	Complete					
RAP8.2	Base case financial projections	Robust base case financial projections taking into account company financing, the regulatory framework and macroeconomic factors.	CFO	Complete					
RAP8.4	Base case financeability	Assessment of base case financial projections against the thresholds for specified metrics and simulation of credit rating. Develop conclusions on whether the base case projections and metrics are consistent with target rating and covenants (prior to consideration of mitigations)	CFO	Complete					
RAP8.5	Mitigation plan	If base case projections are not consistent with target, develop an action plan to ensure that there is sufficient financial headroom in the base case, taking into account the potential financial impact of downside scenarios and mitigants available.	CFO	H2-2019					
RAP8.6	Identification of risks with financial impact	A complete register of risks with potential financial implications (including variances in spend and performance against regulatory parameters.)	CFO	Complete					
RAP8.7	Identification of financial risk exposures	A complete register of financial risks arising from macroeconomic factors.	CFO	Complete					
RAP8.8	Risk measurement	Quantification of probabilities and quantification of risk impact for all risks identified. To be updated quarterly and for LTVS	CFO	Ongoing					
RAP8.9	Development of scenarios	Financial projections based on a suite of scenarios (on the basis individual and combined risk exposures) taking into account correlation between risks.		Complete					
RAP8.10	Non-financial mitigations available	An understanding of the mechanics and the impact of non-financial mitigations available from the operational and corporate teams.	CFO	Complete					
RAP8.11	Stress testing before financial mitigations	Analysis of impact of downside scenarios on credit rating, liquidity and overall financial resilience taking into account the impact of mitigations	CFO	Complete					
RAP8.12	Review and monitoring	Review and monitoring of outturn results including implementation of mitigating actions where a downside has materialised.	CFO	Ongoing					
RAP8.13	Stakeholder management	Hold regular meetings with rating agencies,, equity and debt investors, and majority creditor	CFO	Ongoing					

PROJECT DEFINITION DOCUMENTS

RAP1.0 Governance, definition & strategy

Governance, Definition and Strategy
Project Definition Document

Governance, Definition and Strategy — Priority 1

Project Name	Definition, Policy & Strategy	**Project Sponsor**	Dir of Risk & Compliance
Interdependencies	Dependent on – N/A Leads to – RAP1.2	**Action Plan Ref**	RAP1.1 RAP1.3
Background	Southern Water have identified a series of targeted improvements to enhance its current resilience position		
Project Description	Engage with the business by building on the work delivered to-date to develop a definition, scope and policy for resilience. This should then be cascaded into the existing suite of strategies to develop a detailed plan for the Resilience Action Plan.		
Scope	▪ Enterprise wide (wholesale and retail) ▪ Regulated and non-regulated assets		
Business Case	Resilience lacks a scope and strategy within the business, creating confusion, overlap and duplication of risk management activity. The organisation needs to coalesce around a single view of resilience to help provide a foundation to build business-wide objectives that can be delivered through integrated business processes.		
Constraints	Time	The definition is a critical activity that should be delivered as a priority	

Project Deliverables	▪ Resilience Policy containing the scope, definition and key principles to be applied through the Resilience Management System ▪ Gap analysis between the Resilience Policy and a suite of existing strategies with changes identified. ▪ Development of detailed Plan for resilience through the consolidation of existing strategies (bringing together assets, ODI, risk and resilience elements).
Stakeholders	▪ Director of Risk and Compliance ▪ Risk Committee ▪ Dir of SAM
Risks	▪ Insufficient engagement from the business to develop a definition (and associated documents) that accurately reflect the business
Benefits	▪ The business has a foundation to build resilience capabilities ▪ Board assurance that strategies are compliant with the Resilience Policy
Related/ supporting In-flight projects and programmes	▪ Modern Compliance Framework

2019	2020	2021
✓	✓	✓

Governance, Definition and Strategy — Priority 1

Project Name	Risk Committee Schedule	**Project Sponsor**	Dir of Risk & Compliance
Interdependencies	Dependent on – RAP1.1 Leads to – N/A	**Action Plan Ref**	RAP1.2
Background	Southern Water have identified a series of targeted improvements to enhance its current resilience position		
Project Description	The business must implement a process for the regular monitoring of resilience and publish a schedule of assurance. The role and remit of the Risk Committee must be clarified and communicated to all.		
Scope	▪ Activities that are covered by the Resilience Policy		
Business Case	Significant improvements in risk have been identified; changes to XeroRisk reporting; a new proposed risk rating scheme on 'HILL's' more aligned with resilience, the risk and value (R&V) project, proposed risk taxonomy and resilience framework.		
Constraints	Time	Providing a clear process between risk and resilience supported by regular assurance is seen a critical activity	

Project Deliverables	▪ Process for the regular monitoring of resilience by the risk committee ▪ A schedule of resilience assurance ▪ Updated Terms of Reference for the Risk Committee (optional)
Stakeholders	▪ The Risk Committee ▪ Dir Risk and Compliance
Risks	▪ Delays in confirming Resilience Policy ▪ Lack of resources to develop and deliver the audit schedule ▪ Lack of engagement from the business to effectively communicate key messages.
Benefits	▪ Provision of assurance back to Ofwat and Board that the business is appropriately managing and improving it's resilience position
Related/ supporting In-flight projects and programmes	▪ Modern Compliance Framework

2019	2020	2021
✓	✓	

Governance, Definition and Strategy
Project Definition Document

Governance, Definition and Strategy — Priority 2

Project Name	Refresh Risk Appetite	**Project Sponsor**	Dir of Risk and Compliance
Interdependencies	Dependent on – RAP1.1 Leads to – N/A	**Action Plan Ref**	RAP1.4
Background	Southern Water have identified a series of targeted improvements to enhance its current resilience position		
Project Description	Review the existing risk appetites developed by the business against the resilience definition and operating principles. Determine the need to update the existing appetites and/or develop accompanying resilience thresholds		
Scope	▪ Risk appetites		
Business Case	The business has developed risk appetites to be used as part of decision making. These are not fully integrated and may need to be refreshed to reflect the resilience framework, definition and operating principles.		
Constraints	Dependency	This activity is dependent on the development and agreement of a resilience definition and policy	

Project Deliverables	▪ Refreshed risk appetites ▪ [TBC] Develop resilience thresholds
Stakeholders	▪ Dir of Risk and Compliance ▪ Risk Committee
Risks	▪ Insufficient engagement from the business to refresh the risk appetites
Benefits	▪ Risk appetites that reflect the businesses approach to resilience and which can be incorporated into the decision making process
Related/supporting In-flight projects and programmes	▪ Modern Compliance Framework

2019	2020	2021
	✓	✓

Governance, Definition and Strategy — Priority 2

Project Name	Resilience Strategy - Review of Operational and Corporate Strategy,. Deep Dive into processes, risks, controls	**Project Sponsor**	Dir of Risk and Compliance
Interdependencies	Dependent on – RAP1.1 Leads to – RAP1.5➔RAP1.6	**Action Plan Ref**	RAP1.5 RAP1.6
Background	Southern Water have identified a series of targeted improvements to enhance its current resilience position		
Project Description	Progressive review of the corporate and operational resilience strategies is required once the definition and policy is in place. If necessary, conduct Deep Dive assessments into specific resilience processes, controls and risks that form the strategies.		
Scope	▪ Enterprise wide		
Business Case	The business must regularly review it's strategy to determine if they are fit for purpose and reflect the current resilience landscape (noting the incremental changes underway). Elements of the strategy may require revision and/or deep dives to understand how resilience is accounted for.		

Project Deliverables	▪ Review of the Corporate Resilience Strategy and Operational Resilience Strategy. ▪ Revision to reflect the improved capability and understanding of resilience ▪ Deep Dive analysis into specific areas of the strategies
Stakeholders	▪ Dir of Risk and Compliance ▪ Dir of SAM
Risks	▪ Delays in confirming Resilience Policy ▪ Lack of engagement from the business to conduct progressive review and deep dives
Benefits	▪ Strategies in place that reflect the businesses resilience landscape
Related/ supporting In-flight projects and programmes	▪ N/A

2019	2020	2021
	✓	✓

Governance, Definition and Strategy
Project Definition Document

Governance, Definition and Strategy

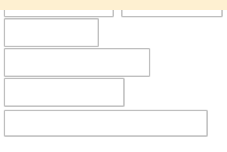
Priority 2

Project Name	Annual Review of Resilience Action Plan	**Project Sponsor**	Dir of Risk and Compliance
Interdependencies	RAP1.0-6.0	**Action Plan Ref**	RAP1.7
Background	Southern Water have identified a series of targeted improvements to enhance its current resilience position		
Project Description	Annual review of the resilience action plan to determine if it is delivering the outcomes expected and desired by the business. Exact period TBC – proposed review period September 2020 and 2021.		
Scope	▪ Enterprise wide		
Business Case	To ensure that the Resilience Action Plan is fit for purpose, it will need to be reviewed and revised (if necessary)		

Project Deliverables	▪ [TBC] revised resilience action plan
Stakeholders	▪ Dir of Risk and Compliance ▪ Dir of Wholesale Water ▪ Dir of Wholesale Wastewater ▪ Dir of Regulation
Risks	▪ Insufficient engagement from the business to determine whether the plan should be updated.
Benefits	▪ The business continues to implement an action plan that is delivering the desired outcomes
Related/ supporting In-flight projects and programmes	

2019	2020	2021
	✓	✓

RAP2.0 Leadership and Continuous Improvement



Leadership and Continuous Improvement
Project Definition Document

Leadership & Continuous Improvement | Priority 1

Project Name	Define Risk and Resilience Taxonomy	**Project Sponsor**	Dir Risk and Compliance
Interdependencies	Dependency on – N/A	**Action Plan Ref**	RAP2.1
Background	Southern Water have identified a series of targeted improvements to enhance its current resilience position		
Project Description	Establish a Risk and Resilience taxonomy that sets out the organisations top-level structure for risk and resilience allocation. Business principles for the taxonomy will be needed to aid categorisations within the taxonomy. Identify, review and develop a high-level resilience process for key areas that is recognised and deployed by the business to improve organisational understanding and outcomes.		
Scope	At present, the rules and principles around risk and resilience allocation are unclear leading to misallocation and confusion over ownership of risks. The business struggles to differentiate between inherent, principal and top 10 risks. Resilience is not considered in "the round" with no defined business approach or methodology in place to integrate and consolidate approaches. The relationship between resilience and associated processes (such as risk, asset management and business continuity management) is unclear and inconsistent.		
Constraints	Resources	The businesses ability to drive improvements in risk and resilience management and governance is dependent on the delivery of this activity	

Project Deliverables	▪ Confirmation of a Risk and Resilience Taxonomy ▪ Development of supporting business principles. ▪ Defined Resilience process for (a) specific business area(s)
Stakeholders	▪ Dir Risk and Compliance ▪ Risk Committee
Risks	▪ Lack of engagement from the business to effectively and key messages.
Benefits	▪ With a Risk and Resilience taxonomy, the business has a structured framework with which it can ensure it is considering all types of risks that could impact on its systems. ▪ It now has a structured approach to aggregating its risks. ▪ It allows for the comparative assessment of risks over time
Related/ supporting In-flight projects and programmes	▪ N/A

2019	2020	2021
✓	✓	

Leadership & Continuous Improvement | Priority 1

Project Name	Lessons learnt cross check	**Project Sponsor**	Dir of Risk and Compliance
Interdependencies	Leads to: RAP2.3 Dependent on: RAP7.4	**Action Plan Ref**	RAP2.2
Background	The business has suffered from a number of significant shocks and stresses over the past few years, resulting in the development and implementation of action plans to prevent repeats and improve the businesses position. These events have been treated in isolation and should be reviewed to determine common root causes to form a cohesive picture of resilience		
Project Description	Conduct a review of major events of the past few years to identify common indicators, root cause and lessons learnt. Undertake regular end to end reviews of events to determine if the "resilience" (e.g. 4Rs) operated as intended and ensure plans are in place to address This is informed by the Root Cause Analysis process established in RAP7.4		
Scope	▪ Major events, shocks and stresses from the past few years ▪ Recent events		
Business Case	The organisation current does not have a view of the common causes across many of its major events		
Constraints	Information	Access to the relevant information in order to build a comprehensive view of the potential indicators and lessons learnt	

Project Deliverables	▪ Review of events to identify common indicators and lessons learnt ▪ Assess if the "resilience" operated as intended during the incident ▪ Ensure lessons learnt are integrated into resilience decision making and monitoring
Stakeholders	▪ Dir of SAM ▪ Dir of Risk and Compliance ▪ Dir of Wholesale Water ▪ Dir of Wholesale Wastewater ▪ Dir of Regulation
Risks	▪ Lack of resources to review past events ▪ Lack of information to appropriately assess the incident and/or determine if the resilience operated as intended
Benefits	▪ Identification of common causes across major events ▪ Development of appropriate controls within decision making and monitoring to prevent repeats
Related/ supporting In-flight projects and programmes	▪ Freeze-thaw action plan ▪ IAP accounting for past delivery action plans ▪ Incident Management Framework ▪ Control Centre Transformation

2019	2020	2021
✓	✓	✓

Leadership and Continuous Improvement
Project Definition Document

Leadership & Continuous Improvement | Priority 2

Project Name	Establishment of integrated decision making processes	**Project Sponsor**	Dir of Systems and Asset Management
Interdependencies	Leads to: RAP2.3 RAP2.4	**Action Plan Ref**	RAP2.3 RAP2.4
Background	During the resilience maturity assessment interviewees reported that the business applied too much focus on short term cost when planning and only on an operational basis, with some areas inward or siloed in their focus. In order to counteract this, there is an intent to develop a blueprint for longer term investment. This would help set the level of resilience over a longer period and in turn, allow the organisation to investment appropriately based on the risk profile, rather than reactively spend money		
Project Description	Mapping the Level 0 to Level 1 decision making processes to understand how risk and resilience are integrated		
Scope	All assets and systems that fall within the Resilience Policy		
Business Case	In order to effectively manage resilience and to adopt a systems-based approach it is crucial that interfaces and interrelated business processes are identified, mapped and agreed with key stakeholders.		
Constraints	Time	The processes will need to be mapped on the basis that they are a initial view that will be developed over time	
	Dependency	Each level of detailed processes is dependent on the previous level being approved	

Project Deliverables	▪ Integrated Level 0 Decision-Making Processes map for resilience related assets and systems ▪ Mapped Level 1 processes for interrelated decision making processes
Stakeholders	▪ Business wide (Principally Dir of SAM)
Risks	▪ Lack of resources to identify and review processes ▪ Lack of engagement from the business to effectively communicate key messages
Benefits	▪ The business is able to understand how risk and resilience are integrated as part of decision making. ▪ It is able to understand the key touch-points across the business that enable decision making, in doing so, building a systems view of the overall approach.
Related/ supporting In-flight projects and programmes	▪ Risk and Value process ▪ Revised Integrated business planning processes ▪ Wholesale Operating Model change

2019	2020	2021
✓	✓	✓

Leadership & Continuous Improvement | Priority 2

Project Name	Clear process to manage interrelated resilience risks	**Project Sponsor**	Dir of Risk and Compliance
Interdependencies	Dependent on: RAP2.1	**Action Plan Ref**	RAP2.5
Background	The business required clear and consistent approaches to managing resilience across it's business. This follows the feedback from the assessment interviews held across the organisation where it was found that inconsistent approaches to risk management are applied across the organisation. These risks are treated in a siloed manner and the interdependencies across risks (within and across business units) are not identified or assessed.		
Project Description	Development of a clear, common and consistent process for managing risk across the business. This process should enable the business to understand how the impacts across services and pillars should interact This approach can be deployed across the business and allows for the aggregation of risks from different business areas (inline with the taxonomy)		
Scope	All assets and systems that fall within the Resilience Policy		
Business Case	In order to effectively manage risk and resilience in a consistent manner, a common and consistent approach to risk must be applied across the organisation.		

Project Deliverables	▪ A process for managing risks and resilience within business units and across business units
Stakeholders	▪ Business wide (Principally Dir of SAM)
Risks	▪ Lack of resources to identify and review processes ▪ Lack of engagement from the business to effectively communicate key messages
Benefits	▪ The business is able to apply a common approach to risk that is understood across the business and allows for the aggregation of risks in a structured manner. ▪ The business understands how impacts across services and pillars interact with one another
Related/ supporting In-flight projects and programmes	▪ Modern Compliance Framework ▪ Risk and Value process ▪ Revised Integrated business planning processes

2019	2020	2021
	✓	

Leadership and Continuous Improvement
Project Definition Document

Leadership & Continuous Improvement

Priority 2

Project Name	Communications and Wider Engagement	**Project Sponsor**	Dir of Risk and Compliance
Interdependencies	N/A	**Action Plan Ref**	RAP2.6 RAP2.7 RAP2.8
Background	The organisation struggles to effectively communicate resilience to its internal and external stakeholders.		
Project Description	Survey the organisational view of resilience. Collate and review feedback to develop an action plan including targeted communications through the intranet and awareness sessions. Engage with the wider stakeholder community at a local and national level to discuss ways to improve.		
Scope	All teams and roles that are part of the resilience process.		
Business Case	A mind-shift is needed to drive better behaviours and alignment of corporate values to those of resilience. Although pockets of excellence do exist a baseline understanding of resilience is needed across the business in order to effectively manage it in the long term.		
Constraints	Time	Raising awareness of resilience will take a relatively short time. However, behavioural change will require long-term commitment and focus from top management.	
	Resources	It is anticipated that the awareness action plan can be carried out as part of business as usual via the existing corporate comms team. However, specialist support will be required.	

Project Deliverables	▪ Survey results ▪ Communications plan ▪ Creation and maintenance of risk and resilience through the intranet ▪ Arrange community round-table event(s)
Stakeholders	▪ Business wide
Risks	▪ Insufficient survey data ▪ Resilience messages not amongst other awareness campaigns
Benefits	▪ Greater understanding, engagement and behaviours towards improving resilience
Related/supporting In-flight projects and programmes	▪ WaterFirst ▪ Environment+ ▪ Risk and Value ▪ Control Centre Review ▪ New Organisational Values

2019	2020	2021
	✓	

RAP3.0 Organisation and people

Organisation and people
Project Definition Document

Organisation | Priority 1

Project Name	Establishment of Risk and Resilience roles	**Project Sponsor**	Dir of Risk and Compliance
Interdependencies	Leads to: RAP3.1 → RAP3.3 → RAP3.5	**Action Plan Ref**	RAP3.1 RAP3.3 RAP3.5
Background	The assessment of capability found that the business lacks clear understanding and definition of roles and responsibilities relating to risk and resilience. Some work has been done to ensure that teams across all levels are being given greater autonomy and are empowered to make decisions, reducing decision making and response times. Notwithstanding, further work is needed to build on this to drive a step change in resilience.		
Project Description	Develop understanding of Roles and responsibilities in relation to risk and resilience within business. Define the minimum business requirement and agree critical roles.		
Scope	▪ Existing in-flight organisational change activity ▪ Roles and responsibilities across organisation required to operate the processes deemed critical to resilience		
Business Case	The Resilience Policy cannot become part of business-as-usual unless roles and responsibilities have been agreed and communicated		
Constraints	Time	The RACI should be developed to a level of granularity sufficient to support the level 0 to level 2 integrated process	

Project Deliverables	▪ List of critical roles across organisation for the operation of resilience processes ▪ RACI matrix of resilience critical roles ▪ Activity matrix of resilience critical roles ▪ (optional) Paper setting out Resource Requirement to be dedicated to resilience
Stakeholders	▪ Dir of SAM ▪ Dir of Wholesale Water ▪ Dir of Wholesale Wastewater ▪ Dir of Risk and Compliance
Risks	▪ Lack of engagement with the business ▪ Impasse on gaining agreement with RACI ▪ Loss of momentum due to over-processing
Benefits	▪ The RACI will provide a basis to ensure that the Resilience Policy is embedded within role and team ways of working ▪ Regulator and Board assurance
Related/supporting In-flight projects and programmes	▪ Wholesale Operating Model change ▪ WaterFirst ▪ Network+ ▪ Modern Compliance Framework ▪ Incident Management Action Plan

2019	2020	2021
✓	✓	✓

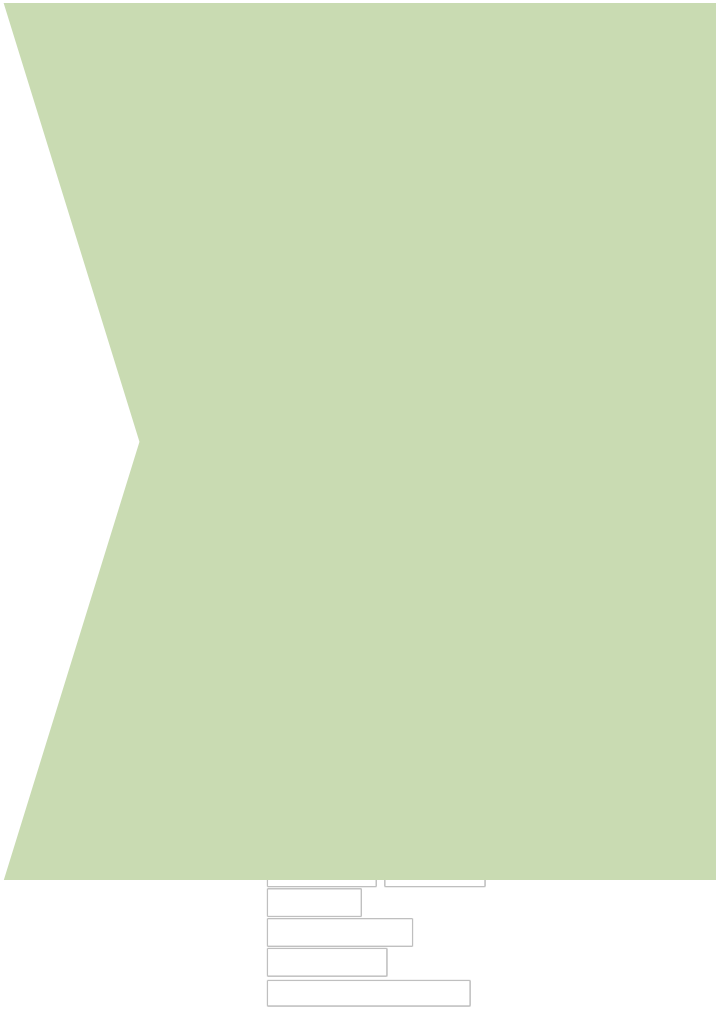
Organisation | Priority 2

Project Name	Competency and training	**Project Sponsor**	Dir of Risk & Compliance
Interdependencies	Dependency on – N/A	**Action Plan Ref**	RAP3.2 RAP3.4
Background	Competent, trained staff are key enable better resilience management within the resources available. For resilience to become a more focal part of day-to-day business Southern Water needs to ensure that its staff are able to predict, prevent and respond to shocks and stresses to its systems.		
Project Description	Identification of critical roles (including 'Resilience Champions'), confirm competency requirements and roll-out training.		
Scope	Roles critical to operation of the resilience process		
Business Case	Individuals are not operating with a resilience mind set and are not equipped to ensure business continuity. No resilience training or governance is covered during induction.		
Constraints	Time	Training will need to be rolled out in a phased approach. There will also be significant time needed to invest in developing training materials and guidance,	
	Cost	Training would need to be tailored for Southern Water's needs, meaning that external support would likely be required.	

Project Deliverables	▪ Competency framework ▪ Training needs analysis ▪ Training plan ▪ Training materials and guidance ▪ Post training support and monitoring
Stakeholders	▪ Dir of Risk & Compliance ▪ Dir SAM ▪ Dir Wholesale Water ▪ Dir Wholesale Wastewater ▪ MD
Stakeholders	▪ Delays in developing materials ▪ Staff not being available to attend the training ▪ Staff not applying the training
Risks	
Benefits	▪ Staff able to fulfil their responsibilities
Related/ supporting In-flight projects and programmes	▪ Operational Excellence ▪ Control Centre Review ▪ WaterFirst ▪ Network +

2019	2020	2021
	✓	✓

RAP4.0 Resilience processes and baseline



Resilience processes and baseline
Project Definition Document

Business Processes

Priority 1

Project Name	Definition of wider list of shocks, stresses and scenarios	**Project Sponsor**	Dir of Risk and Compliance
Interdependencies	Dependent on: RAP2.1 Leads to: RAP4.1.1➔4.1.3 RAP4.2.1➔4.2.2 RAP4.3.1➔4.3.2 RAP4.3.7➔4.3.8	**Action Plan Ref**	RAP4.1.1 RAP4.2.1 RAP4.3.1 RAP4.3.6
Background	The business has suffered from a number of significant events over the past few years, resulting in the development and implementation of action plans to prevent repeats and improve the businesses position. These events have been treated in isolation and the various triggers and lessons learnt have yet to be reviewed and combined to form a cohesive picture.		
Project Description	The company will identify a forward view of shocks and stresses that impact on the business. This will be linked to the revised taxonomy and will cover threats across operational, corporate and financial. These will be reviewed regularly to ensure they are relevant. A review of major events over the past few years to identify common indicators and lessons learnt will be a component of this review.		
Scope	Shocks and stresses covered by the definition of resilience		
Business Case	The organisation currently does not have a view of the long term shocks and stresses that could impact upon it's system.		
Constraints	Information	Access to the relevant information in order to build a comprehensive view of the potential indicators.	

Project Deliverables	▪ Long list of potential shocks and stresses from across the business ▪ Mapping of shocks and stresses to the taxonomy.
Stakeholders	▪ Dir of SAM ▪ Dir of Wholesale Water ▪ Dir of Wholesale Wastewater ▪ Dir of Risk and Compliance
Risks	▪ Lack of resources to develop and deliver.
Benefits	▪ Clearly defined list of shocks and stresses that can impact on its systems. ▪ The business is able to develop appropriate controls in response to the shocks and stresses, improving it's resilience.
Related/ supporting In-flight projects and programmes	▪ Freeze-thaw action plan ▪ IAP Accounting for Past Delivery action plans ▪ WaterFirst ▪ Network+

2019	2020	2021
✓	✓	✓

Resilience processes and baseline
Project Definition Document

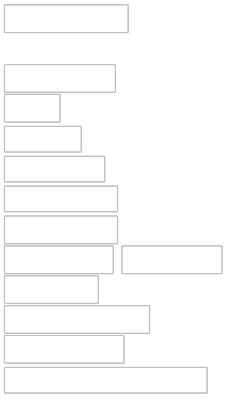
Business Processes

Priority 1

Project Name	Wastewater Resilience Process Improvement and Baseline	**Project Sponsor**	Dir of Wholesale Wastewater
Interdependencies	Dependent on: RAP4.1.1 Leads to: RAP4.1.3➔RAP4.1.4/4.1.5/4.1.6/4.1.7 RAP4.1.5➔RAP4.1.8 RAP4.1.6➔4.1.9 RAP4.1.7➔4.1.10	**Action Plan Ref**	RAP4.1.2 to RAP4.1.10
Background	Southern Water have identified a series of targeted improvements to enhance its current resilience position		
Project Description	Building off of the resilience baseline maturity assessment, review and develop processes and procedures for defining and baselining resilience across key areas of wastewater service resilience categories. Processes must be deployed, tested and refined within the business via a series of sprints. Achieve maturity level 3 across all key areas. Achievement of maturity level 4 to be completed across prioritised areas, with the exact timings for delivery to be confirmed following the achievement of level 3.		
Scope	Key wastewater resilience service		
Business Case	The business lacks defined resilience processes or procedures to sufficiently assess resilience in a systematic and standardised approach. These need to be implemented as BaU to drive improvements in the way the business manages resilience		
Constraints	Dependency	This activity is dependent on the definition of shocks and stresses	
	Resources	Dependent on the identification of dedicated resources to deliver.	

Project Deliverables	▪ Bow-tie analysis of key waste service resilience categories ▪ Review of existing resilience processes and procedures. ▪ Redesign, implementation and test of processes via sprints (x2) ▪ Integrate processes into BaU activity ▪ Resilience maturity baseline assessment to ensure Level 3 ▪ Resilience maturity baseline assessment (across targeted areas) to ensure level 4 maturity
Stakeholders	▪ Dir SAM ▪ Dir of Risk and Compliance ▪ Dir of Wholesale Wastewater ▪ Dir of Risk and Compliance
Risks	▪ Engagement from the business is needed to effectively implement the process changes. ▪ Lack of resources to develop and deliver the changes.
Benefits	▪ The business has improved it's ability to assess it's wastewater resilience and establish a baseline following a systematic, standardised and repeatable approach. ▪ Going forward, it is able to assess how changes to the business have impacted on this ability
Related/supporting In-flight projects and programmes	▪ Network + ▪ Operational Excellence ▪ Control Centre Review

2019	2020	2021
✓	✓	✓



Resilience processes and baseline
Project Definition Document

Business Processes

Priority 2

Project Name	Water Resilience Process Improvement and Baseline	**Project Sponsor**	Dir of Wholesale Water
Interdependencies	Dependent on: 4.2.1 Leads to: RAP4.2.2→RAP4.2.3/4.2.4 →4.2.5→4.2.6	**Action Plan Ref**	RAP4.2.2 to RAP4.2.6
Background	Southern Water have identified a series of targeted improvements to enhance its current resilience position		
Project Description	Building off of the resilience baseline maturity assessment, review and develop processes and procedures for defining and baselining resilience across Water Zonal Supply. Develop Inter-zonal and Water System zonal resilience model. Processes must be deployed, tested and refined within the business via a series of sprints. Achieve level 3 maturity across all key areas. Achievement of maturity level 4 to be completed across prioritised areas, with the exact timings for delivery to be confirmed following the achievement of level 3.		
Scope	Key wastewater resilience services		
Business Case	The business lacks defined resilience processes or procedures to sufficiently assess resilience in a systematic and standardised approach. These need to be implemented as BaU to drive improvements in the way the business manages resilience		
Constraints	Dependency	This activity is dependent on the definition of shocks and stresses	
	Resources	Dependent on the identification of dedicated resources to deliver.	

Project Deliverables	▪ Review of existing water resilience processes and procedures. ▪ Redesign, implementation and test of processes ▪ Development of inter-zonal resilience process ▪ Development of water system zonal resilience process ▪ Integrate processes into BaU activity ▪ Resilience maturity baseline assessment to ensure Level 3 ▪ Resilience maturity baseline assessment (across targeted areas) to ensure level 4 maturity
Stakeholders	▪ Dir of SAM ▪ Dir of Wholesale Water ▪ Dir of Risk and Compliance
Risks	▪ Engagement from the business is needed to effectively implement the process changes. ▪ Lack of resources to develop and deliver the changes.
Benefits	▪ The business has improved it's ability to assess it's water resilience and establish a baseline following a systematic, standardised and repeatable approach. ▪ Going forward, it is able to assess how changes to the business have impacted on this ability
Related/supporting In-flight projects and programmes	▪ WaterFirst ▪ Operational Excellence ▪ Control Centre Review

2019	2020	2021
✓	✓	✓

Business Processes

Priority 2

Project Name	Corporate Process Improvement and Baseline	**Project Sponsor**	Dir of Risk and Compliance
Interdependencies	Dependent on: 4.3.1 Leads to: 4.3.2→RAP4.3.3→RAP4.3.3→RAP4.3.5	**Action Plan Ref**	RAP4.3.2 to RAP4.3.5
Background	Southern Water have identified a series of targeted improvements to enhance its current resilience position		
Project Description	Building off of the resilience baseline maturity assessment and aligned to the list of shocks and stresses, review and develop processes and procedures for defining and baselining resilience across Corporate activities.		
Scope	Key corporate resilience services		
Business Case	The business lacks defined resilience processes or procedures to sufficiently assess resilience in a systematic and standardised approach. These need to be implemented as BaU to drive improvements in the way the business manages resilience		
Constraints	Dependency	This activity is dependent on the definition of shocks and stresses	
	Resources	Dependent on the identification of dedicated resources to deliver.	

Project Deliverables	▪ Review of existing corporate resilience processes and procedures. ▪ Redesign, implementation and test of processes ▪ Integrate processes into BaU activity	
	▪ Dir SAM ▪ Dir Wholesale Water	▪ Dir Wholesale Wastewater ▪ Dir Risk and Compliance ▪ CIO
Stakeholders	▪ Delays in developing materials ▪ Staff not being available to attend the training ▪ Staff not applying the training	
Risks	▪ Engagement from the business is needed to effectively implement the process changes. ▪ Lack of resources to develop and deliver the changes.	
Benefits	▪ The business has improved it's ability to assess it's corporate resilience and establish a baseline following a systematic, standardised and repeatable approach. ▪ Going forward, it is able to assess how changes to the business have impacted on this ability	
Related/supporting In-flight projects and programmes	▪ Modern Compliance Framework	

2019	2020	2021
	✓	

Resilience processes and baseline
Project Definition Document

Business Processes

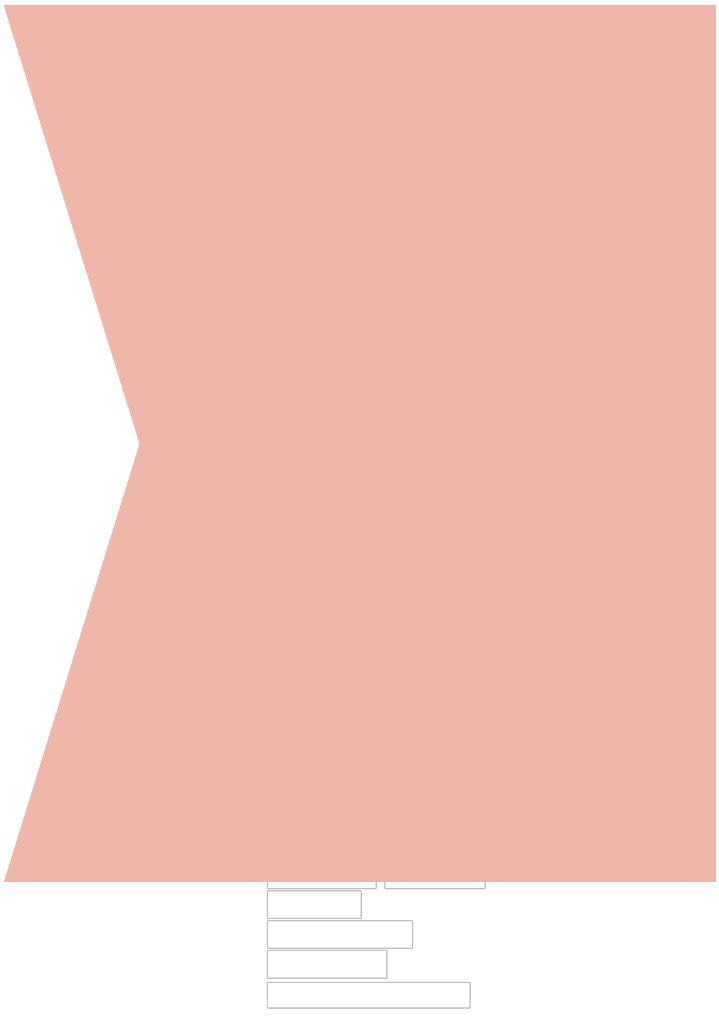
Priority 2

Project Name	Customer Process Improvement and Baseline	**Project Sponsor**	Director of Commercial and Innovation
Interdependencies	Dependent on: 4.4.1 Leads to: RAP4.4.2➔RAP4.4.3➔RAP4.4.4.4➔4.4.5	**Action Plan Ref**	RAP4.4.1 to RAP4.4.5
Background	Southern Water have identified a series of targeted improvements to enhance its current resilience position		
Project Description	Building off of the resilience baseline maturity assessment and aligned to the list of shocks and stresses, review and develop processes and procedures for defining and baselining resilience across Customer service activities.		
Scope	Key customer resilience services (payments, billing, customer contacts, GSS)		
Business Case	The business lacks defined resilience processes or procedures to sufficiently assess resilience in a systematic and standardised approach. These need to be implemented as BaU to drive improvements in the way the business manages resilience		
Constraints	Dependency	This activity is dependent on the definition of shocks and stresses	
	Resources	Dependent on the identification of dedicated resources to deliver.	

Project Deliverables	▪ Review of existing customer resilience processes and procedures. ▪ Redesign, implementation and test of processes ▪ Integrate processes into BaU activity
Stakeholders	▪ Dir of Risk and Compliance
Risks	▪ Engagement from the business is needed to effectively implement the process changes. ▪ Lack of resources to develop and deliver the changes.
Benefits	▪ The business has improved it's ability to assess it's customer services resilience and establish a baseline following a systematic, standardised and repeatable approach. ▪ Going forward, it is able to assess how changes to the business have impacted on this ability
Related/supporting In-flight projects and programmes	

2019	2020	2021
	✓	✓

RAP5.0 Data and Information



Data and Information
Project Definition Document

Data and Information

Priority 2

Project Name	Operational Resilience Data	**Project Sponsor**	Dir of Systems and Asset Management
Interdependencies	Leads to: RAP5.1➔RAP5.2 RAP2.3 RAP2.4	**Action Plan Ref**	RAP5.1 RAP5.2
Background	Ownership of operational resilience data is lacking across the business, with poor governance and controls around usage and maintenance. There is an over reliance on undocumented local knowledge, anecdotal or outdated evidence to inform decision making.		
Project Description	Understand the wider Transformation Programmes addressing operational data gaps (e.g. OAM and Control Centre Transformation) across the business Identify the Operational Resilience critical data to support the integrated decision making business processes.		
Scope	All assets that fall within the remit of the Resilience Policy. Data and systems that enable the collection, processing, analysis and reporting of operational data.		
Business Case	Translating data into Management Information continues to remain a challenge for the business. The current level of information cannot be used effectively to make informed resilience (or risk) decisions. The business lacks line of sight and ability to coordinate across its data sets, requiring regular manual intervention.		
Constraints	Dependency	In order to identify resilience critical data, the business must review and develop it's resilience business processes	

Project Deliverables	▪ High level Resilience data requirements defined. Understanding of how the existing in-flight transformation programmes address operational resilience data gaps.
Stakeholders	▪ CIO ▪ Dir of SAM ▪ Dir of Wholesale Water ▪ Dir of Wholesale Wastewater
Risks	▪ Interoperability with current systems ▪ Delays in identifying and/or defining data ▪ Delays in development of business processes
Benefits	▪ Ability to improve the way the business tracks, monitors and reports risks and resilience. ▪ Improves the controls around risk and resilience critical data.
Related/supporting In-flight projects and programmes	▪ Control Centre Review ▪ OAM ▪ IT Transition

2019	2020	2021
✓	✓	✓

Data and Information

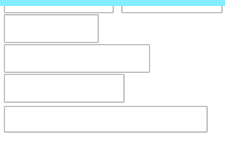
Priority 2

Project Name	Operational Resilience Metrics	**Project Sponsor**	Dir of Systems and Asset Management
Interdependencies	Dependent on: RAP5.1, RAP5.2, RAP 5.5	**Action Plan Ref**	RAP5.3 RAP5.4 RAP5.5
Background	Consistent and relevant data plays a key part in ensuring the operational resilience of Southern Water's systems.		
Project Description	Identification of possible operational resilience analysis / metrics and development of a business-wide initial resilience metric linked to ODIs. The metric will be supported by a method of controlled recording of resilience analysis, improved monitoring at target sites and 'anticipation' metrics and alarms for prioritised threats.		
Scope	All assets that fall within the remit of the Resilience Policy. Data and systems that enable the collection, processing, analysis and reporting of operational data.		
Business Case	Without a coherent, single view of the businesses' operational resilience it is difficult to anticipate threats and make effective decisions.		
Constraints	Dependency	Identification and availability of resilience critical data (RAP5.1 and RAP5.2)	
	Time	In some cases, the data will take time to be captured and be made accessible	

Project Deliverables	▪ Operational Resilience Data metrics (proposed) ▪ Operational Resilience metrics methodology
Stakeholders	▪ Dir of Risk and Compliance ▪ Dir of SAM ▪ CIO
Risks	▪ Data not being available, easily accessible or of sufficient quality ▪ Duplication of data already utilised by the business ▪ Technological limitations
Benefits	▪ Greater understanding of cause and effect ▪ Ability to better predict and prevent shocks and stresses on the system
Related/supporting In-flight projects and programmes	▪ OAM ▪ Control Centre Review ▪ Risk and Value

2019	2020	2021
	✓	✓

RAP6.0 Systems and Technology



Systems and Technology
Project Definition Document

Systems and Technology

Priority 2

Project Name	Resilience decision support tools	**Project Sponsor**	Dir of Systems and Asset Management
Interdependencies	Dependent on: RAP4.1.4 to 4.1.10 RAP4.2.2 to 4.2.6 Leads to: RAP6.1➔RAP6.2	**Action Plan Ref**	RAP6.1 RAP6.2
Background	The business is currently developing it's resilience baseline maturity and will require decision support tools for effectively deliver the processes.		
Project Description	Identification of business requirements through the OAM programme and definition of the business processes. Work with IT to facilitate the deployment of proof of concept tool. Test and develop tool(s) (propose final system and works up)		
Scope	Key wastewater and water resilience processes		
Business Case	As part of the development of resilience baseline processes, tools may be required to improve the maturity.		
Constraints	Dependency	On the development of the processes and procedures for defining and baselining resilience	
Constraints	Resources	Adequate resources to build business requirements and deploy Budget to deploy.	

Project Deliverables	▪ Defined business requirements for decision support tools ▪ Development of proof of concept tool(s) prior to implementation ▪ Development of tools to support the improvement in resilience baseline maturity
Stakeholders	▪ Dir of SAM ▪ Dir of Wholesale Water ▪ Dir of Wholesale Waterwater ▪ CIO
Risks	▪ Lack of resources to develop and deliver change ▪ Business requirements and solution not properly defined
Benefits	▪ Improved it's resilience baseline maturity
Related/supporting In-flight projects and programmes	▪ OAM ▪ IT transition and transformation

2019	2020	2021
	✓	✓+

Systems and Technology

Priority 1

Project Name	GRC Tool Review and implementation	**Project Sponsor**	Dir Risk and Compliance/ CIO
Interdependencies	Dependent on - RAP2.1	**Action Plan Ref**	RAP6.3 RAP6.4 RAP6.5
Background	Governance risk and compliance tools are needed to effectively manage performance and minimise risks.		
Project Description	Review and assess GRC tools and produce estimates of the cost to implement. Determine the appropriate solution and route for procurement. Implement the tool incrementally and migrate data across. Run training with stakeholders.		
Scope	Enterprise wide		
Business Case	There is a need to implement a new GRC platform as the current system XeroRisk does not have the functionality required to effectively manage and control risks within and across the business		

Project Deliverables	▪ Gap analysis of GRC tools and budgetary estimates ▪ Roadmap of activities to implement successfully ▪ Business case and procurement plan ▪ GRC tool implemented ▪ Training delivered
Stakeholders	▪ CIO ▪ Dir Risk and Compliance ▪ Dir Wholesale Water ▪ Dir Wholesale Wastewater
Risks	▪ Lack of budget to undertake assessment and/or implement ▪ Lack of resources to undertake assessment
Benefits	▪ New system with appropriate controls in place to manage risks effectively, monitor and report them.
Related/supporting In-flight projects and programmes	

2019	2020	2021
✓	✓	✓

7. APPENDIX

- **Appendix A**: External Practice reviewed
- **Appendix B:** Summary of in-flight activities

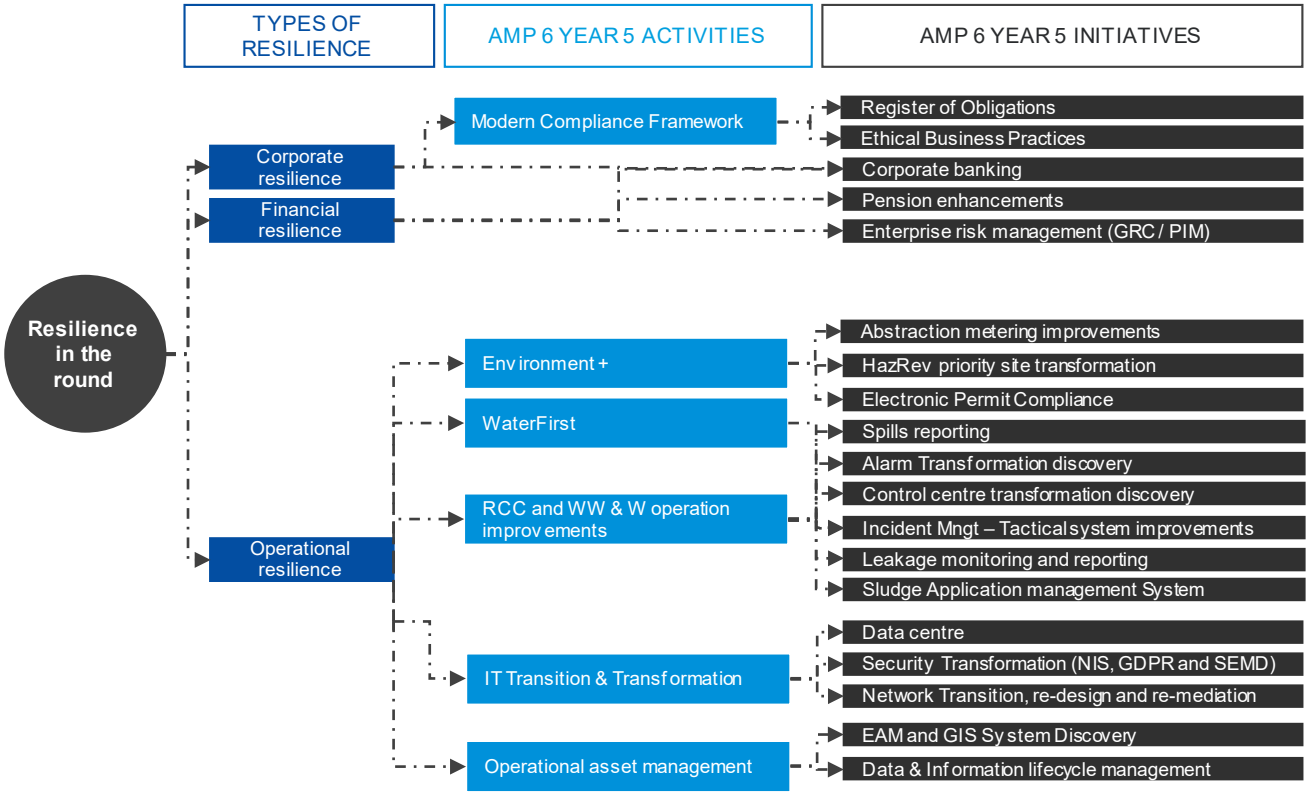
APPENDIX A: External Practice reviewed

ID	Document
1	Ofwat PR19 initial assessment of plans: Summary of test area assessment
2	Ofwat Resilience-in-the-Round-report: Building Resilience for the Future
3	Ofwat: Out in the Cold - Water companies' response to the 'Beast from the East'
4	Delivering Water 2020: Our methodology for the 2019 price review Appendix 4: Resilience
5	Delivering Water 2020: Our methodology for the 2019 price review
6	Ofwat Towards Resilience: How we will embed resilience in our work
7	KPMG Enterprise Risk Management: Industry Survey
8	KPMG Managing Risk and Building Resilience in the US Water Utility Industry
9	Resilience in society: infrastructure,
10	Measuring Resilience
11	Bank of England - Building the UK financial sector's operational resilience
12	OECD Guidelines for Resilience Systems Analysis
13	A Taxonomy of Threats for Complex Risk Management
14	Guidance on organizational resilience
15	keeping the Country Running: Natural Hazard and Infrastructure
16	Summary of the 2016 Sector Security and Resilience Plans
17	Defra Enabling Resilience in the Water Sector
18	J100 Risk and Resilience Management of Water and Wastewater Systems
19	ISO 22316 Security and Resilience
21	A Risk Practitioners Guide to ISO 31000
22	ISO 55000 Asset Management
23	ISO 23001 Business Continuity Management
24	Societal Security – Business continuity management systems – Requirements
25	Clause-by-clause explanation of ISO 22301
26	Affinity Water - Our Business Plan for 2020-2025 Appendix 9 - Ensuring Long Term Resilience September 2018
27	Anglian Water - Our Plan - 2020-2025
28	Bristol Water - C4 - Clearly Resilience
29	Northumbrian Water Appendix 3.4 Resilience Assessment Independent Assessment
30	Northumbrian Water Appendix 3.6 Resilience Assessment Final Report
31	Northumbrian Water 2020-2025 Plan
32	Severn Trent 2020-2025 Plan
33	South West Water Securing Long Term Resilience
34	Thames Water - Appendix 4 Resilience
35	United Utilities Measuring Resilience in the Water Industry
36	United Utilities Securing Long Term Resilience
37	Welsh Water PR19 Resilience in the Round Review
38	Welsh Water 2050
39	Wessex Water Support Document Providing Resilience Services

APPENDIX B: Summary of in-flight activities

In this section, we have set out some of the key in-flight activities within our business that are contributing towards resilience

Illustrative (Not exhaustive)



Modern Compliance Framework

We are currently delivering our Modern Compliance Framework which will improve performance and increase the trust our customers, stakeholders and regulators have in us

Register of Obligations Policy Framework

Our RoO is a document which lists all obligations Southern Water needs to comply with.
The RoO groups obligations logically together and maps them against Business Owners and processes responsible for ensuring compliance with the obligation.
The RoO also identifies Business Owners and processes who need awareness of specific obligations and those who do not require it.

Ethical Business Practice & Code of Ethics

We have completed a refresh of our values and our revised code of Ethics has been approved by our Board.

End to End Process mapping

We are improving the accountability and ownership of processes, driving the review and improvement of risks and helping increase the effectiveness and robustness of controls.

Business Assurance Improvement

We are improving the accountability and ownership of processes, driving the review and improvement of risks and helping increase the effectiveness and robustness of controls.

Regulatory reporting improvements

We have rolled out a new Statement of Compliance and are implementing changes to improve the 2nd line of assurance.

Establishment of our Compliance and Risk Directorate

3 Lines of defence model

1. Delivering compliance from our frontline business units (Wholesale Water and Wastewater, Engineering & Construction, Customer Services);

2. Challenging frontline performance in process compliance and technical asset resilience with the implementation of Water First and Environment+;

3. Auditing of Internal and external process and technical compliance

WaterFirst

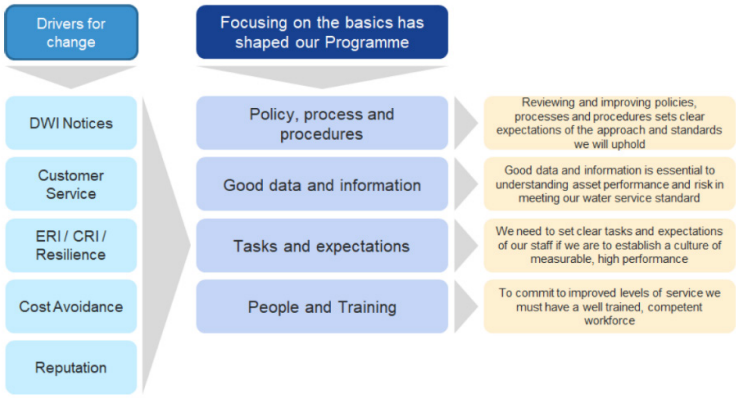
Water First is a multi-AMP improvement programme, developed in collaboration with the DWI, to embed public health protection at the heart of our water services

It is about bringing together the wholesale water community to transform water quality performance by putting public health at the heart of our 'source to tap' approach.

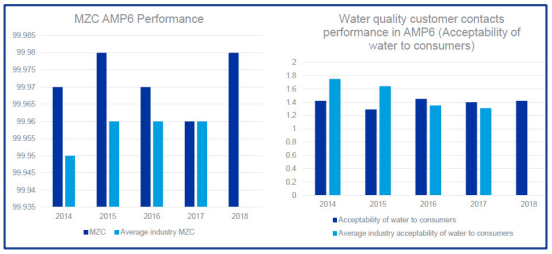
The programme will deliver improvements through:

- Focusing on doing the basics well
- Providing structure and control to the programme of improvement across policy, process and procedures, tasks and expectations, data and information,
- Leadership and engagement from heads of function

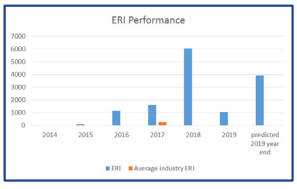
And it is supported by asset improvements and expanded catchment management.

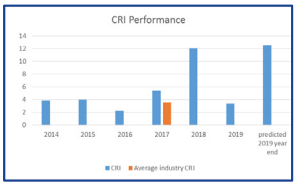


Although our AMP6 indicators are stable or improving



There is still significant work to be done to improve against the DWI indices.





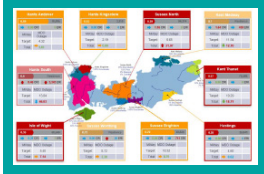
Through this programme, we aim to:

Provide a quality and resilient service to our Customers.

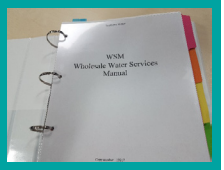
Build regulatory confidence and reduce the potential for future regulatory enforcement action and prosecutions.

Reduce the company water quality risk profile and demonstrate this to regulators by an improvement in water quality metrics (CRI and ERI).

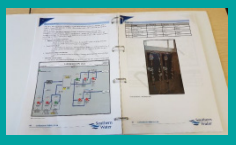
We are prioritising improvements to provide resilience services



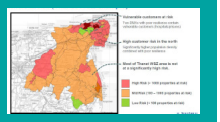
Refreshed Water Services Manual



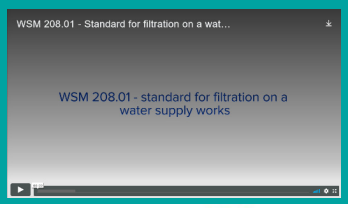
Comprehensive Site Manuals



Customers at Risk (Thames WSZ example)



We are improving the way in which we train our staff, using technology and implementing a new skills and competency matrix

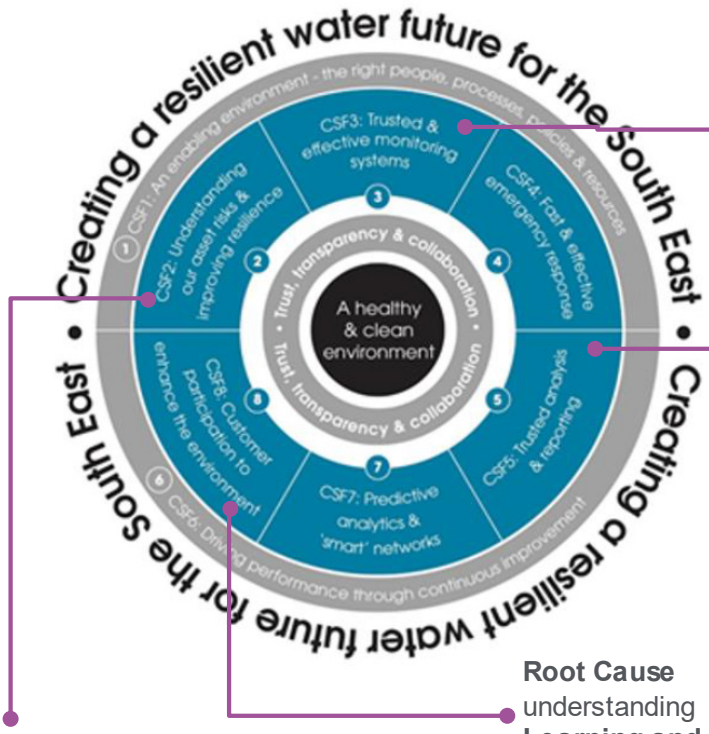


WATER for LIFE from Southern Water

Environment+

The Environment+ programme focuses on environmental compliance by improving how we manage our risk and assets.

Looking across our processes, systems, culture, risk and information management, we are aiming to make comprehensive improvements in our performance, capabilities and compliance by embedding more collaborative, effective and transparent practices, alongside sustainable improvements to our policies, processes and reporting.



Our programme is structure around 8 Critical Success Factors.

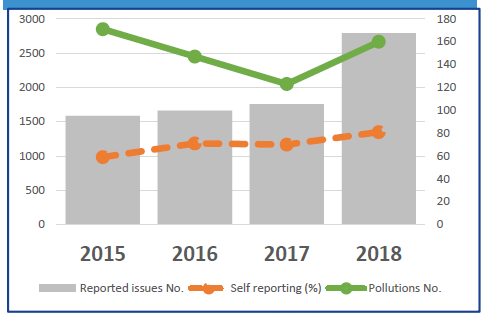
1350 event monitor tested end-to-end
147 new event monitors,
281 telemetry outstation upgrades

Trusted Reporting through process mapping, controls review and implementation of new assurance measures

Root Cause understanding
Learning and collaboration through front line hubs

291 WTWs audited (site audits, storm tank and flow surveys)
Investment risk framework reviewed
£17.9 forecast investment
Continuous Improvement (understanding of root cause, learning and collaboration through hubs)
Investment Risk Framework reviewed to address wider permit risks

Through the programme, we have created improved levels of reporting, issue visibility and root cause investigations



We have increased awareness levels throughout the organisation and with our customers.

Self reporting is at its highest this AMP.

Operations Control Centre Transformation

As part our ambition to become *brilliant at the basics,* we are investing heavily in our Operations Control Centre. Our goal is to utilise prescriptive analytics to create a highly effective, proactive and collaborative function that improves our resilience through better anticipation, allowing us to build better resistance, reliability and redundancy and respond and recovery more effectively.

In our target state, we will have the capability and capacity to:

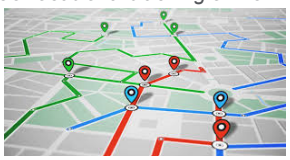
- Pre-empt events
- Improve responsiveness to incidents
- Work collaboratively with Field Operations to jointly own asset performance
- Improve our perception across the industry

To achieve this, we are designing a 21st century frontline response capability. Our transformation is focused on three key areas:

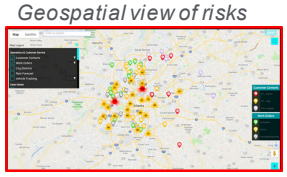
1 Communication Capability

- With OneVoice CIM, we can create event logs, assign tasks and create handover reports automatically
- We are able to track location and identify proximity so that we can resolve actions more efficiently.

Geo-locational tracking of workforce

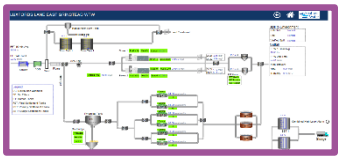


Geospatial view of risks

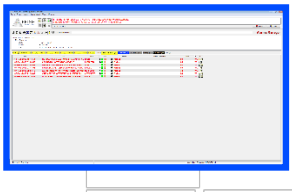


2 Access to Information

- Providing our teams with the right information, systems and functionality to record, track and action activities.



Real time schematics (PI) of sites linked to information such as contingency plans, schematics and permits



Transforming our Alarms

3 The Right People

- Using the Energy & Utility Skills Register Control Room Operational Competence Framework, we are improving the competency of our people to ensure they understand the processes, regulations, systems and structure of our business.
- We are co-locating to bring the right teams together to facilitate efficient and effective collaboration
- We are building clear accountabilities and responsibilities across our teams

Topic competency levels

WATER for LIFE from Southern Water

IT and Systems

In the remainder of AMP6, we are delivering an ambitious IT and Systems programme which will contribute to all aspects of resilience.

Maintenance and improvement of IT Security measures

- Improvements made to access management and web security

Governance of Shadow IT

- Implementing controls and governance around Shadow IT spend and usage

Enhancement of our Information Security capabilities

- Implementation of the actions following the Integrated Controls Framework review.

Architecture and systems review

- Review and rationalisation of our assets

Investment in operational technology and real-time systems

- Modernisation of SCADA,HMI, Telemetry and other assets

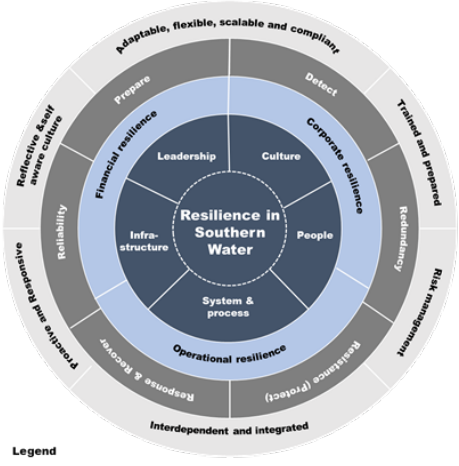
Investments to improve the communication and IT infrastructure

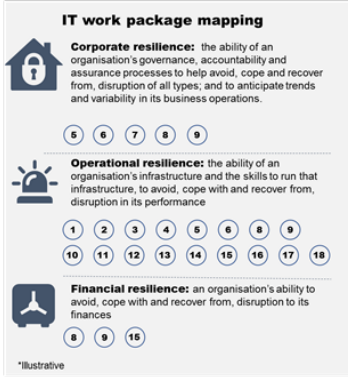
- Establish a new co-located data centre infrastructure to improve the resilience of operational and corporate systems

Our AMP7 strategy has been developed to ensure it delivers resilience

We have proposed a number of work-packages, aligned to deliver more resilient service

Building on the 4Rs of resilience, we taken the step to recognise the importance of preparation, monitoring and detection in regards to IT/OT security, in order to prevent and minimise threat in the first instance.





Legend

- Delivering resilience as a core capability within Southern Water
- Ofwats - Delivering resilience in the round
- Ofwat's four R's in which resilience provision can be delivered plus additional Southern Water resilience measures of **prepare and detect**
- 1st layer of characteristics

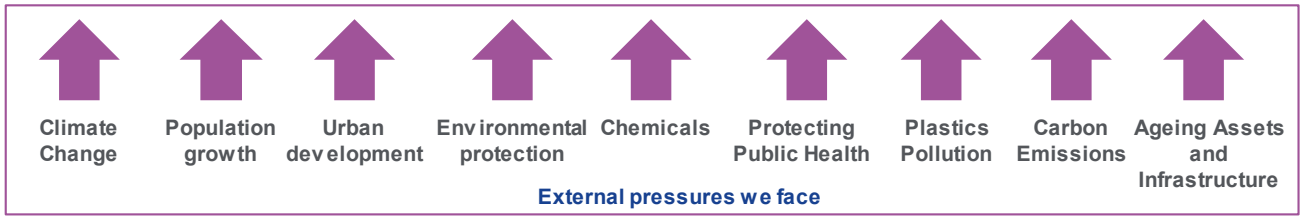
In delivering our IT objective of 'supporting the continuity of the business' to deliver resilience we have considered the following:

1. Five core dimensions of:
   - leadership,
   - culture,
   - people,
   - systems & process
   - infrastructure.
2. Resilience in the round;
3. 4R's in which resilience is provisioned ;
4. 1st layer of characteristics

Drainage and Wastewater Management Plans

As part of our commitment to Ofwat, we are developing drainage and wastewater management plans across Kent, Sussex, Hampshire and the Isle of Wight. These are long term plans to ensure the sustainability of drainage infrastructure and systems so that they meet the needs of the customer and the environment now and into the future.

Our region faces growing pressures from a number of areas that impact our ability to provide drainage and wastewater services to our customers and to protect the environment. We must plan for the future and work in partnership with our stakeholders, regulators, government and communities to deliver a sustainable solution. As such, we are committed to delivering our plans for consultation by Summer 2022.



Our DWRMP is a plan that sets out how we intend to extend, improve and maintain a robust and resilient drainage and wastewater system. It is an enabler toward achieving our long term vision and the outcomes our customers want.

In the development of our plan, we will be conducting a number of key activities, including

- Establishing a systematic understanding of our wastewater services and current system risks
- Developing planning scenarios for the future states based on the challenges and drivers for change
- Assessing long-term impacts and risks to and from drainage and wastewater systems
- Assessing where third party infrastructure may impose additional risks
- Facilitating partnership-working to deliver sustainable drainage, flooding and pollution management
- Identifying best value options for our customers and the environment (considering Natural Capital Accounting as part of their appraisal)

The DWMP is an exciting opportunity to work with other water/flood risk management authorities and catchment partnerships to consider wastewater and drainage issues in river basin catchments over the longer term.

In the development of our plans, we will work to identify the shocks and stresses that impact our services and develop appropriate options to ensure they are resilient.

We will work closely and collaboratively with a diverse range of stakeholders to ensure our plan delivers the outcomes and benefits our customer expect. We will consult and engage throughout the planning process to co-imagine, co-create and co-deliver the plans and actions.

Ultimately, through better planning, we will be able to deliver better outcomes for people and the environment.

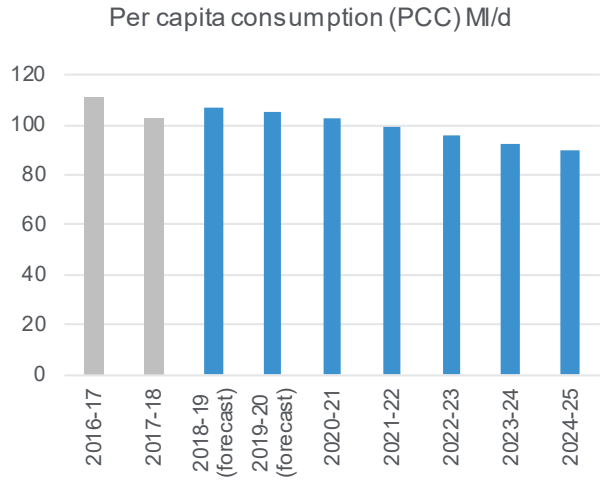
APPENDIX C: Targeted investment to improve resilience

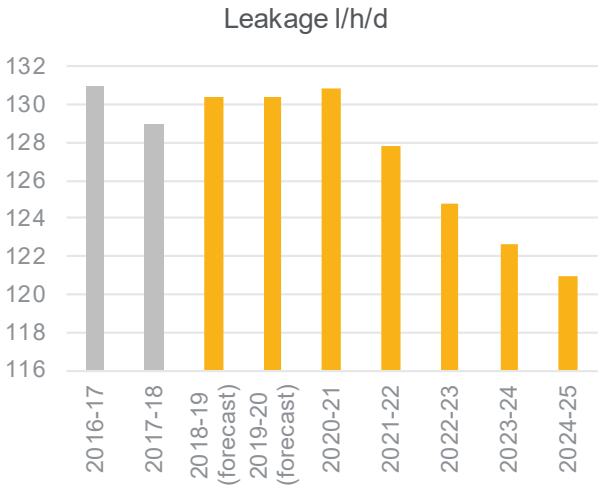
One way in which we are measuring the improvement in resilience is through our ODI's.

In our IAP response – Annex 8 – Accounting for Past Delivery, we set out the root cause of our outcomes performance and the steps we are taking to improve and ensure deliverability in AMP7.

We have set out our forecast performance against some key indicators of resilience and how our investment will drive these improvements.

The resilience of our water resources is a core element of our services and a key area of focus for our business as we continue to operate in a water stressed region. Two key measures are PCC and Leakage, where we are forecasting positive reductions over the next AMP period.



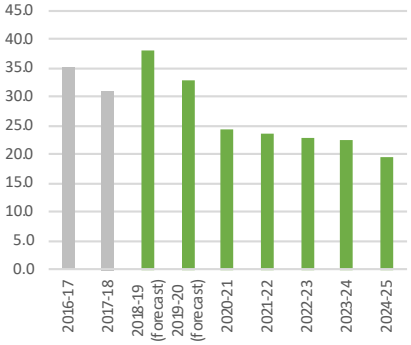


To achieve these ambitious targets, we are undertaking a major behavioural change programme to transform the way in which our customers consider their consumption. This includes advanced smart metering, home efficiency visits and incentivising. To reduce leakage, some of the activities we are delivering include investing in tools to improve our ability detect leaks, revisiting our water balance assumptions, implementing a new leakage management system and expanding the size of our leakage team.

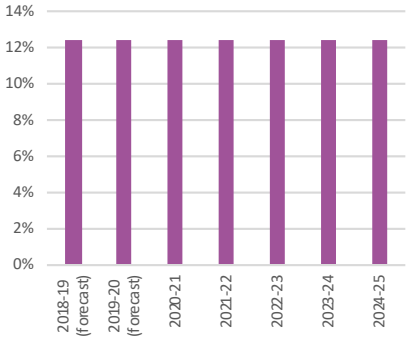
APPENDIX C: Targeted investment to improve resilience

Other areas where we are targeting investment to improve resilience:

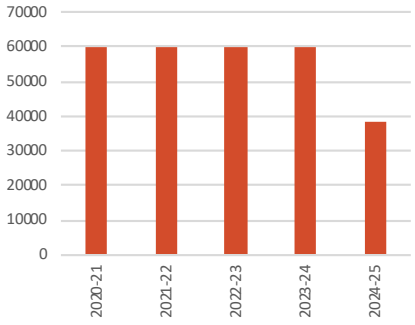
The total number of pollution incidents (categories 1 to 3) in a calendar year per 10,000km sewer



The percentage of population at risk of sewer flooding in a 1-in-50 year storm



Number of residential properties at risk of long term loss of supply (>48 hours) in Thanet, Brighton and the Isle of Wight Water Supply Zones.

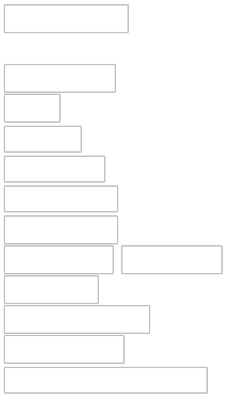


This measure is being trialed in these areas during AMP7.

Our Environment+ programme will drive improvements in our performance by putting compliance at the centre of what we do.

To ensure the population at risk of sewer flooding does not increase, we are pursuing new innovations on our network to improve our monitoring, modelling and detection capability.

We are implementing interventions across our network and monitoring their effectiveness through our zonal resilience assessments



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