

Appendix 12b: Water Resilience in Yorkshire appendix



WATER RESILIENCE IN YORKSHIRE

The methodology and findings of our new framework
to quantify the resilience of our business and services
Appendix - An overview of each business function

AUGUST 2018

Contents

ABOUT THIS REPORT

This document provides a detailed, systematic overview of the resilience of each part of our business and the services we provide, we call these resilience systems. For each section we share the quantified resilience scores from our latest assessment, an interdependence map we have undertaken as part of our “systems thinking”, and a summary of our current resilience and plans to maintain and enhance resilience.

This document is the appendix to a main report which explains the process and findings of our new cutting-edge resilience framework.

The main document is available on our website at www.yorkshirewater.com/resilience

TRUSTING THIS INFORMATION

We have undertaken multiple assessments of our resilience to assure our approach, including an independent assessment of our resilience maturity by the Cabinet Office Emergency Planning College - the first in the water industry. We summarise the steps we have taken to assure our resilience in Section 4 of the main report.

We always want to provide information you can trust. Our Assurance Plan explains the process we have in place to give confidence that the information we publish is accurate, accessible and easy to understand.

You can find our Assurance Plan on our website at www.yorkshirewater.com/discoverwater

GET IN TOUCH

We invite feedback to help us advance our approach to resilience in Yorkshire and we welcome opportunities to support the development of a national standard in the water sector.

Please get in touch with your feedback and questions.

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INTRODUCTION	01
OPERATIONAL RESILIENCE SYSTEMS	
Customer service	03
Land management	09
Water resources and collection	17
Water treatment and drinking water safety	23
Water distribution	29
Wastewater collection	37
Wastewater treatment and effluent disposal	45
Sludge treatment and bioresources	51
CORPORATE RESILIENCE SYSTEMS	
Company strategy and horizon scanning	57
Supply chain management	63
Enabling business support services	69
Human resource planning and management	75
Stakeholder management and communication	81
FINANCIAL RESILIENCE SYSTEMS	
Business planning financeability	87
Long term viability planning	93
Financial transparency and reporting	99

INTRODUCTION

We undertake various interlinked operations and activities to provide water and wastewater services to our customers. We have assessed these in detail to ensure that our services are resilient now, tomorrow and in the future.

The services we provide to our customers and businesses in Yorkshire are immensely important. We deliver clean and good quality water to 5 million people and 140,000 businesses and take away their wastewater to be treated and returned to the environment. While we are resilient in the way we deliver our services, we need to look further into the future and prepare ourselves for any kind of new challenges that may come.

We have worked with Arup, leaders in resilience planning, to deliver a substantial project to develop a repeatable framework which quantifies the resilience of all our activities and which builds on recent water industry best practice, including Ofwat’s publication ‘resilience in the round’.

The project to develop the framework was substantial, taking several months and involving colleagues from across the business to gain a rich understanding of our resilience in all our functions.

The framework has been developed by adopting international best practice and tailoring this to complement our existing risk and resilience processes. The approach uses and aligns to the best practice BS 65000. We use the maturity rating from the standard to quantify our resilience in different ways, including 16 internal functions (or ‘Systems’). These cover all our corporate, financial and operational activities and processes.

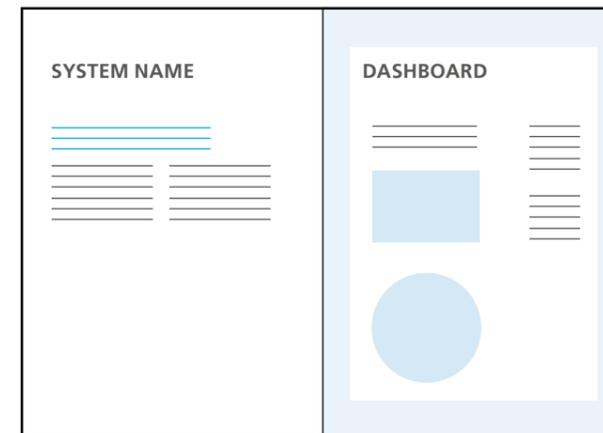
The framework also considers interdependencies within internal systems by using a ‘systems thinking’ approach which recognises the complexity of our operations and our links with external systems such as our customers, the natural environment, the economy and other infrastructure sectors.

Effective consideration of interdependencies is widely recognised as complex and challenging so this demonstrates the leading nature of our approach. We examine the resilience of these systems to a comprehensive range of internal and external shocks and stresses which could ultimately impact our services directly or indirectly through any of the interdependent systems.

Our assessment is a ‘snapshot in time’ and reflects how we see our resilience today. We are embedding this new approach to enable us to repeat the assessment in the future and make it part of our business-as-usual decision making.

The maturity and rate of improvement in our resilience varies depending on the combination of shocks and stresses facing that part of the business, and the potential for mitigating actions and supporting levels of investment. Our detailed resilience assessments have helped to shape an effective business plan and specific proposals within it. It will also enable us to be more transparent with our customers about the resilience we provide to them and the impact of our activities and investments.

Throughout this appendix to the main report you will find more detail on our assessment findings and our plan to secure effective resilience. Our assessments show that our business plan will maintain and enhance resilience in all areas of our business and essential services, against the broad range of shocks and stresses we face, and despite increasing pressure from climate change, population growth and other factors which would erode resilience if we did not act.



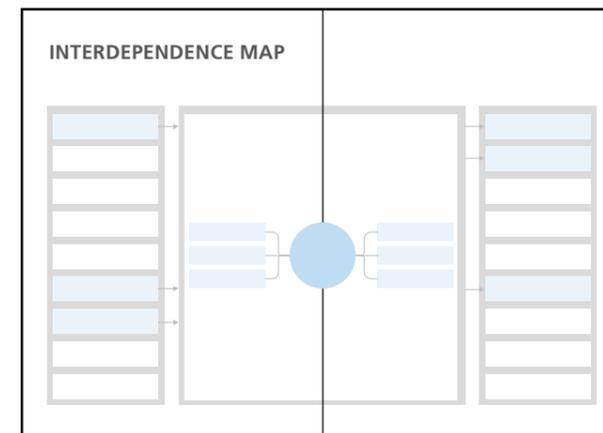
RESILIENCE DASHBOARD

The first page of each section outlines the scope of the resilience system being discussed in this chapter and some key points.

We summarise our findings for each of the resilience systems on a one-page dashboard. It displays the resilience journey from 1989 to 2050 as well our detailed resilience maturity along the five resilience qualities.

Each dashboard highlights five priority shocks and stresses for each system and the most relevant performance commitments we are supporting.

These are indicative of what our colleagues and Arup experts considered to be the most relevant shocks, stresses and commitments, however we found this varies with events, time and areas of personal interest.



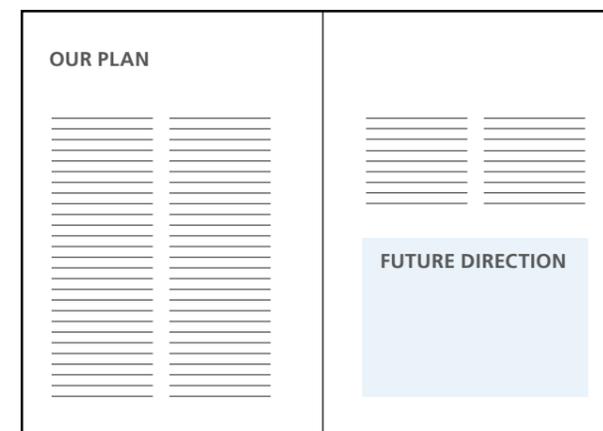
INTERDEPENDENCE MAP

For each system we have assessed the interdependencies within our business and all external factors.

The left column identifies the relevant external shocks and stresses for the Yorkshire Water system and their origin.

The centre shows the Yorkshire Water system under review and its key links to other Yorkshire Water systems, both leading and lagging. It also identifies any shocks and stresses originating from within Yorkshire Water.

The right column identifies selected key impacts of poor resilience for the system under review on external stakeholders.



OUR PLAN AND FUTURE DIRECTION

We lay out our plan for maintaining and improving the resilience of each part of our business. This includes headlines from our current activities and our plan to 2025, as well as a long term outlook into how we are planning on developing our business further. We also provide case studies and other examples of our work to make Yorkshire more resilient.

CUSTOMER SERVICE

We provide essential water and wastewater services to two million households and 140,000 business premises, including management of customer queries and billing.

We deliver consistently high quality customer service, independently recognised through our leadership in the UK Customer Services Index (UKCSI) and surveys of customer satisfaction by the Consumer Council for Water (CCW). We offer a range of ways for customers to contact us. We are investing in our systems to help further improve our approach. We ensure our customer service is resilient through a range of mature and tested systems, processes and training.

We are tailoring our services in response to our innovative research on the diversity of our customers and their needs of our services, for example making special efforts to avoid disruption to communities celebrating cultural and religious events. We prioritise those in vulnerable circumstances - we have hired the first Safeguarding Officer in the water industry to help implement our new strategy for customers in vulnerable circumstances.



CASE STUDY BEING DEMENTIA FRIENDLY

Some customers need additional help from us. This could be because they are older, or because a disability or an illness means they need extra help during a water shortage, or they need help to read their bills by receiving them in different font sizes or braille. Some customers may temporarily need additional help during pregnancy, or while recovering from medical treatment. Whatever the reason, we want to reassure those customers that we are here to help and have a range of priority services for them.

One area of focus for us is to better support those with dementia. Research by Alzheimer's Society shows that 850,000 people in the UK have a form of dementia, and this is growing fast. That's why we are working to become a Dementia Friendly business as part of our work to better tailor our services to individual needs.

We have been raising awareness amongst our colleagues by rolling out training to help volunteers become Dementia Friends. This is an initiative led by Alzheimer's Society to help people understand more about dementia and the little ways they can help. So far we have trained around 100 of our workforce and we want to go much further. The outcome for our customers is that we have staff that can have direct contact in a way that is better for them, as well as allowing staff to improve all aspects of our business to suit people who may have different needs.

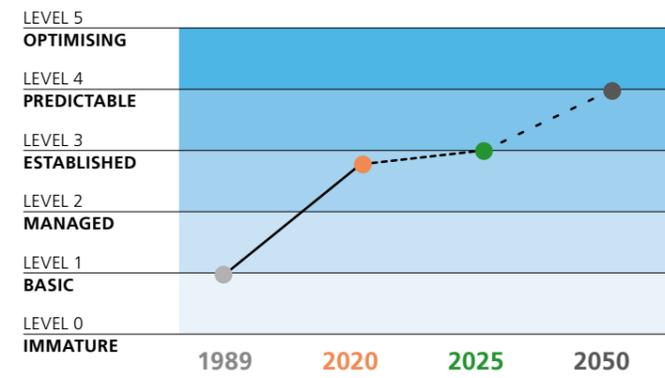


DASHBOARD

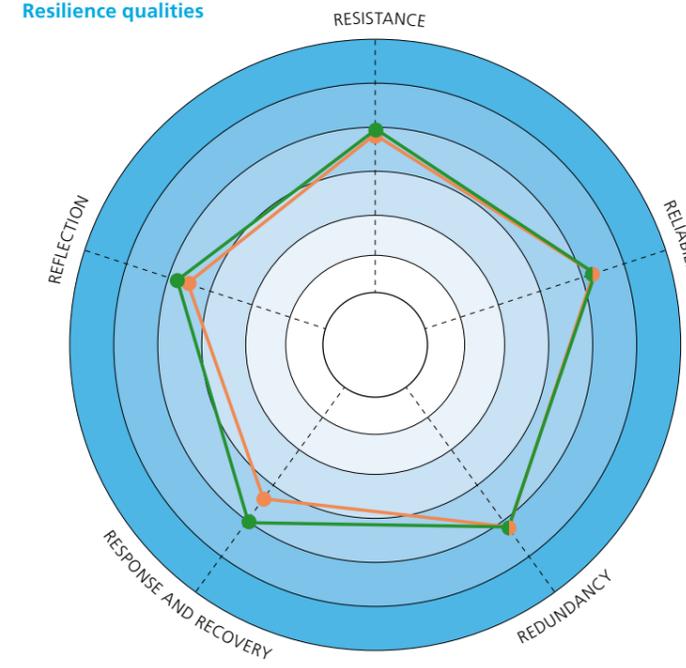
RESILIENCE MATURITY

We have assessed our resilience maturity at four time periods and of five qualities of resilience. We have given each a grade from immature to optimising, following the the maturity scale in the British Standard for Organisational Resilience (BS 65000).

Resilience through time



Resilience qualities



PRIORITY SHOCKS AND STRESSES

Listed in alphabetical order

- Asset failure
- Change in customer behaviour and expectations
- Cyber attack
- Extreme rainfall
- Vulnerable communities and customers

SUPPORTED PERFORMANCE COMMITMENTS

Improving awareness of the Priority Services Register.

Improving satisfaction of experience with the Priority Services Register.

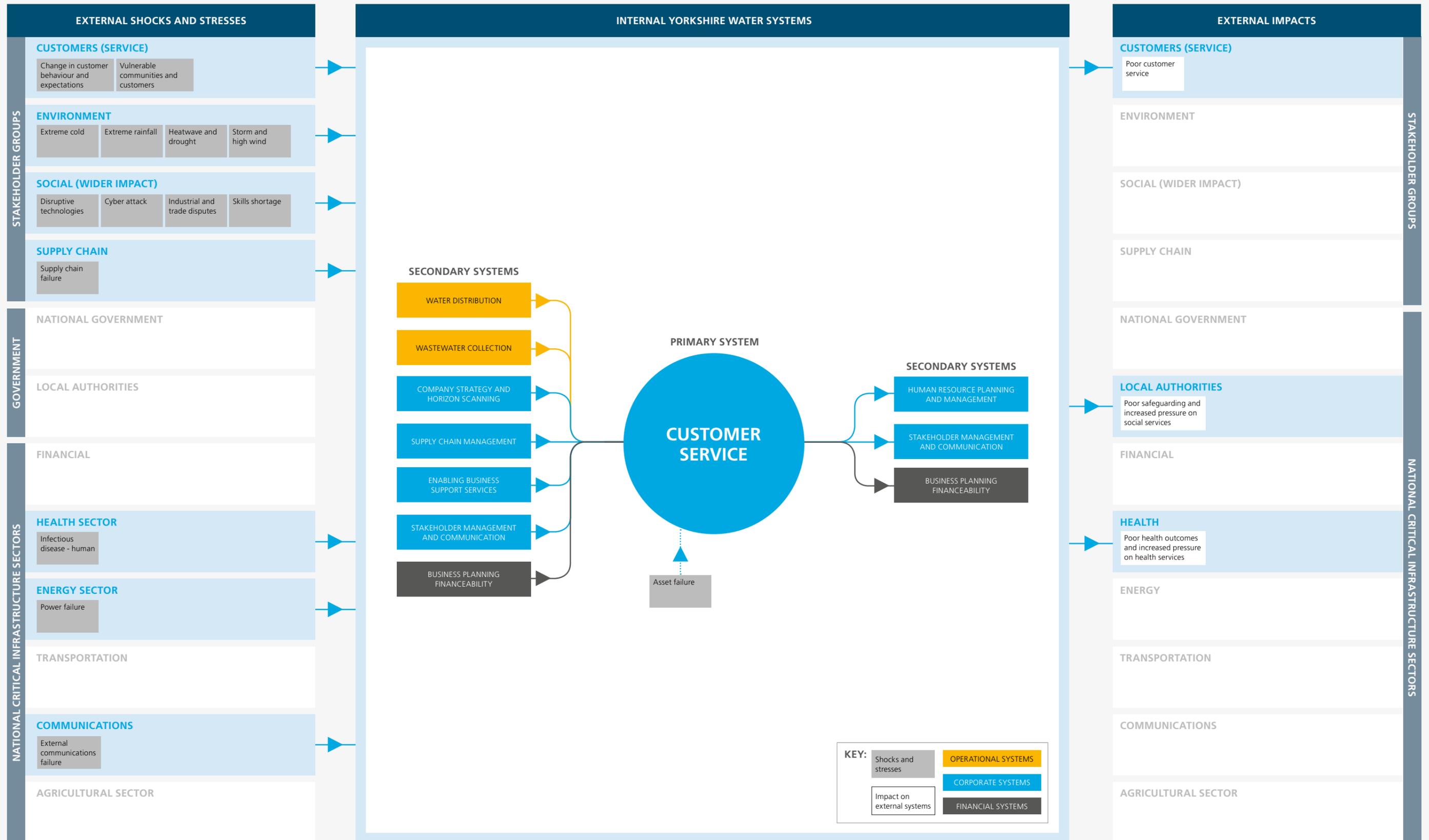
Improving services to developers, as measured by a water industry index.

Improving the customer experience, as measured by a water industry index.

Improving the services provided to customers in vulnerable circumstances.

MATURITY SCALE	YEAR
LEVEL 5: OPTIMISING	● 1989
LEVEL 4: PREDICTABLE	● 2020
LEVEL 3: ESTABLISHED	● 2025
LEVEL 2: MANAGED	● 2050
LEVEL 1: BASIC	
LEVEL 0: IMMATURE	

CUSTOMER SERVICE INTERDEPENDENCE MAP



CURRENT POSITION AND OUR PLAN TO 2025

As a provider of essential public utilities, the resilience of our services is critical to our customers health and wellbeing. All our business functions indirectly contribute to the benefits customers ultimately receive from our services, and we describe each function through the rest of this document. Here in this section, we focus on how we ensure the resilience of our retail services to customers, including customer queries and billing.

ALWAYS AVAILABLE WITH HIGH QUALITY SERVICE

We are committed to providing the level of service our customers expect and value. Our Customer Promise runs to the heart of culture: Be easy to deal with, helpful and friendly, and get it right first time.

Loop, our customer service company, holds the Government Standard for Customer Service Excellence in recognition of our focus on putting customers first. We monitor our performance in comparison to all sectors through the UKCSI.

We have consistently been amongst the best performing utilities and the highest scoring water company in the UKCSI.

CCW independently survey water customers about their satisfaction with our services, consistently showing that over 90% of customers are satisfied with our water services, and around 90% satisfaction with wastewater services.

We offer numerous ways for customers to contact us using the method of their choice. We are committed to maintaining our Yorkshire-based telephone and written contact centre as well as increasing options for online self-service. We have received great feedback about our introduction and escalation of opportunities for customers to request a call back or live chat through our website.

We ensure consistent and quality services through our mature systems and processes, and the training of our customer service teams. We are investing in new technology to support continued advances in our approach, for example we are currently moving to the latest SAP HANA system which will enable even more accurate and integrated handling of customer data and queries. We will also invest in more new customer systems as part of our plan. Ensuring the secure storage of our customers' data is a top priority.

We respond to emergencies using our mature and tested business continuity plans, for example when there are high numbers of customer queries, or high numbers of employees absent due to illness. Through dual-role training we have flexibility to move colleagues to where they are needed, and we have agreements where we can call in temporary support staff.

We also have back-up systems to keep the power and data systems operational should primary sources be interrupted. We discuss our approach to security and emergency planning in the Enabling Business Services section.

TAILORING SERVICES TO INDIVIDUAL NEEDS

To inform our new long term strategy and five-year plan we have completed innovative research to understand the diversity of our customers and how our service (and failures) impact their lives. We have gained a rich understanding of people's differing needs of water, dependent of many factors including for example an individual's culture, religion, wellbeing or illness. We are using this new insight to strengthen the long term resilience of our customer service capability by tailoring our services to meet individual needs. For example, we are training dementia-friendly colleagues who can best support customers with Alzheimer's and other related illnesses.

In the Communications section we explore how we continually engage with our customers and how we are being open in everything we do to ensure strong levels of trust and integrity.



COLLEAGUE INSIGHT

"I have been developing Yorkshire Water's approach to safeguarding customers and ensuring longer-term resilience. Training colleagues to be Dementia Friends is one of the ways we're better tailoring our services to meet the diverse needs of our customers now and in the future"

Ash Roberts, Safeguarding Lead, Yorkshire Water



PROTECTING THE VULNERABLE

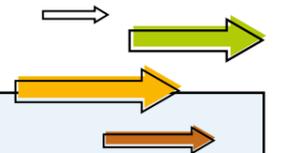
The diversity research we mention above has informed our strategy for customers in vulnerable circumstances. We have hired the water industry's first Safeguarding Officer to lead our approach and drive continual improvement. The role will ensure we protect vulnerable customers as well as our colleagues who can be placed in vulnerable circumstances as part of their job. To prioritise vulnerable communities and customers we have set up a steering group and documented a priority services policy. We are also working closely with external partners to allow for religious, cultural and minority representation, and we have amended our approach so as not to interrupt access to key locations when religious celebrations take place. We have committed to improving awareness of our Priority Services Register (PSR) and satisfaction with the PSR experience.

In the Business Planning Financeability section, we look at how we support customers who are struggling with their bill.

ENSURING RESILIENCE IN THE NEW RETAIL MARKET

As of April 2017, businesses, charities and public-sector customers in England can choose their water and wastewater services retailer. We are working to withdraw from the non-household market to focus on providing quality, resilient and affordable wholesale and household retail services. Until it is sold, we are ensuring our independent retail business is providing high levels of service and resilience. We are currently engaging with potential buyers for our non-household retail business, undertaking comprehensive due diligence to ensure any purchaser can continue to provide a resilient and high quality service.

As a wholesaler to all customers in Yorkshire, we have prepared for the new water retail market to ensure continued service and our compliance with the Competition Act. We have established a new team and robust data, processes and systems to ensure quality and resilient wholesale services to the range of retailers now operating in Yorkshire.



FUTURE DIRECTION

Ensuring the highest standards of customer service in everything we do will always be our top priority. We are embracing latest technologies to help us continually improve. We have a focus on tailoring services to meet a diverse range of individual needs as well as responding to the increasing expectation for us to be a 24/7 business in every aspect of our services. While embracing technology we are also mindful that some customers still prefer traditional approaches, and our need to secure our customer data and services to increasing cyber-threats.

Our approach will continue to evolve in response to the needs and wants of the changing population and societal expectations.

For example, as the population in Yorkshire lives longer, we are adapting our services to meet the needs of the elderly.

In the long term, further markets may be introduced in our value chain, for example in household retail. Such developments present both threats and opportunities to the resilience of Yorkshire's customer service, and we will maintain a watching brief, help support effective national policy and ensure effective preparations.

LAND MANAGEMENT

We work in partnership to manage land to protect water quality and reduce flood risk while also delivering wider benefits for society

Land management practices are critical to the resilience of our water and wastewater services. We lead by example to protect the 28,000 hectares we own, and we work collaboratively with other land owners across Yorkshire. Working with many stakeholders over the last 15 years and more, we have matured conservation measures in response to water pollution from unsustainable land practices.

We have expanded our catchment programmes to help prevent flooding, recently planting 20,000 trees in the Calder Valley as the first of one million to be planted across the region over the next ten years. In addition to supporting our core water and drainage services, our approach to land management also improves resilience by supporting the economy, enabling recreation, protecting biodiversity and storing carbon.

CASE STUDY "BEYOND NATURE" OUR NEW APPROACH TO FARM TENANCIES

In 2015, when we first started thinking about the six capitals approach, we had an opportunity to consider what this could mean for a key part of our land strategy, our tenanted farms. When one of our multi-generational tenancies at a 900 acre site called Humberstone Bank Farm came to an end, we took the opportunity to consider options for the site using a simple sustainability assessment. It showed that managing the site for a natural development of native plants and species would deliver the biggest benefits, and we developed a new approach called Beyond Nature.



Beyond Nature is about working in partnership to demonstrate and deliver sustainable farming that generates food and a stable farm business while also protecting and enhancing nature, water quality and locking away carbon in the land. A local farmer took over the tenancy at Humberstone and is working with us and other stakeholders to try new approaches. Much of the farm is a blanket bog Site of Special Scientific Interest (SSSI) so it is a priority to protect and restore this part of the farm to store carbon and slow rainwater runoff to act as a natural flood barrier. A wide range of birdlife lives on the land and must also be protected.

As part of a new partnership with the National Trust, we have started discussions about how we each approach sustainable farm tenancies, how we might learn from each other and influence national best practice.

To inform our wider land management decisions, we have enhanced the simple sustainability assessment that we started with into a repeatable multi-capital land options appraisal tool that can help us consider the best approach for each of our sites, with the support of quantified data on a range of positive and negative impacts relevant to land.

More recently, we have extended our Beyond Nature programme to more of our farms, and we are working to go even further. Each scheme has a bespoke partnership management plan that reflects local priorities.

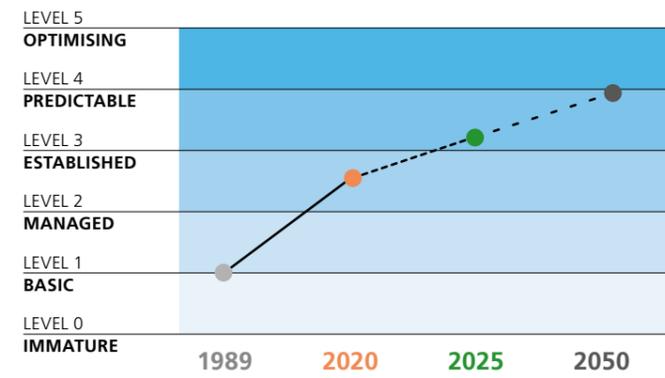


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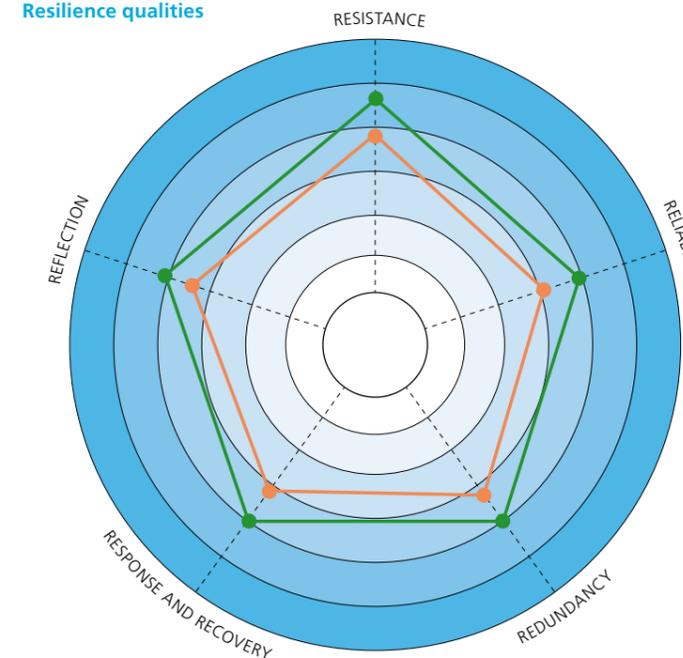
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Resilience through time



Resilience qualities



PRIORITY SHOCKS AND STRESSES

Listed in alphabetical order

- Climate change
- Environmental change
- Environmental pollution
- Land use change
- Political and macro industry change

SUPPORTED PERFORMANCE COMMITMENTS

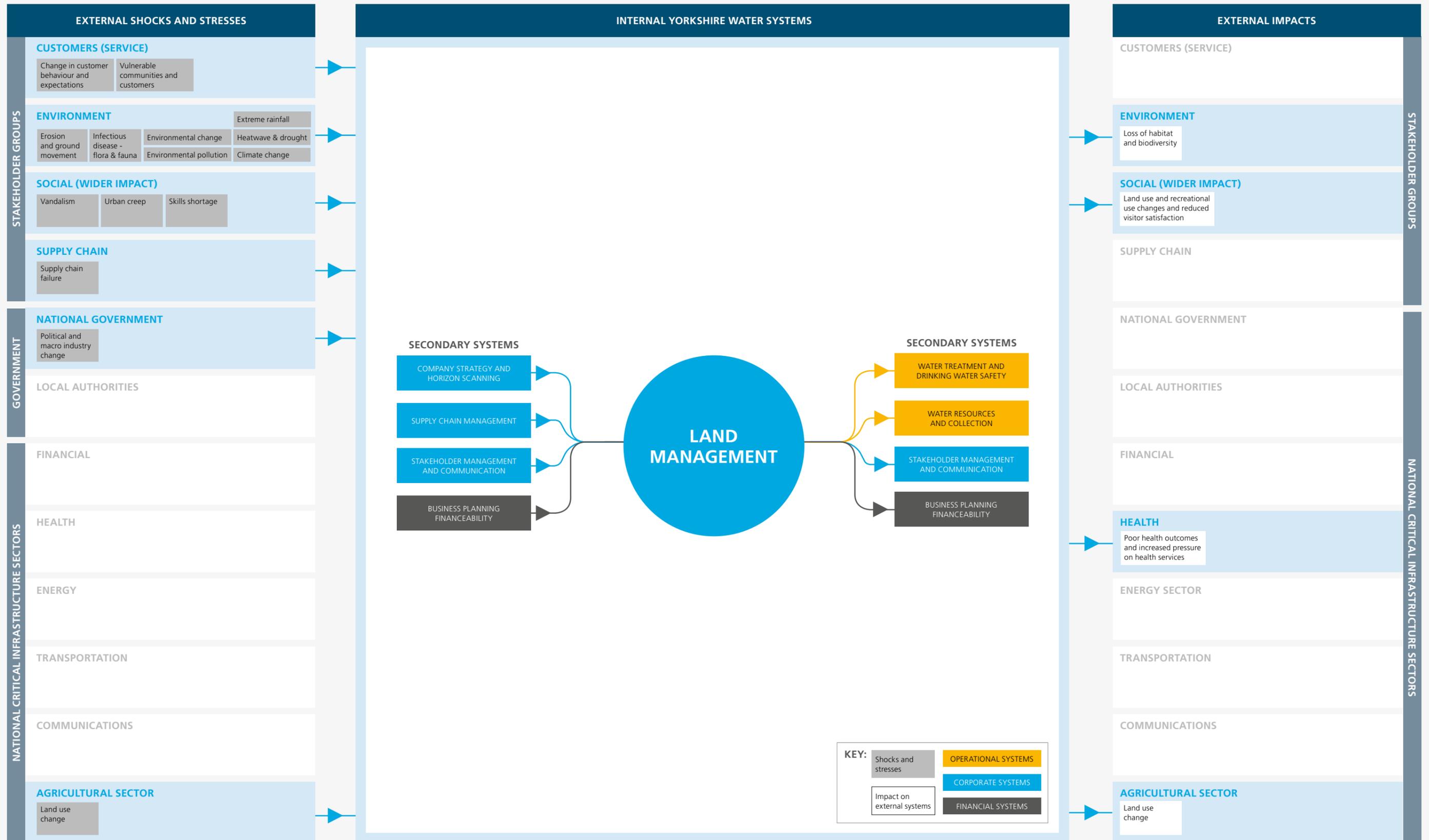
Increasing the area of land we conserve and enhance

Piloting the Natural Capital Operator approach in practice

Improving biosecurity interventions

MATURITY SCALE	YEAR
LEVEL 5: OPTIMISING	1989
LEVEL 4: PREDICTABLE	2020
LEVEL 3: ESTABLISHED	2025
LEVEL 2: MANAGED	2050
LEVEL 1: BASIC	
LEVEL 0: IMMATURE	

LAND MANAGEMENT INTERDEPENDENCE MAP



CURRENT POSITION AND OUR PLAN TO 2025

Sustainable land management by us and others delivers a wide range of social benefits and is critical to the resilience of public water and drainage services.

We are one of the largest landowners in Yorkshire with 28,000 hectares of land across the region. We own about a third of the land from which we source water to supply customers. This ownership enables us to work closely with our farm tenants and other stakeholders to lead by example in our land management practices and actively support resilience. We also work with other land owners and stakeholders across Yorkshire to protect all our sources of water.

PROTECTING WATER QUALITY

As well as abstracting water from rivers and boreholes, we also collect water that runs off Yorkshire's hills into our reservoirs. The quality of the raw water we collect has been deteriorating in many catchments over recent decades, a consequence of pollution and unsustainable land management practices. While we enhance water treatment capabilities to ensure our customers always receive the highest quality drinking water, we also have a range of programmes to address the issues at source to secure long term resilience.

We have developed catchment management techniques that protect and restore landscapes and habitats, building a scientific evidence base with the University of Leeds and others to demonstrate this works and is cost-effective. We provide some examples in the Water Treatment section, and in the case study on our Beyond Nature approach on page 9.

Collaboration and behavioural change is central to the long term approach. We work with policy makers, environmental charities, the agriculture sector and others to lead change.

The Sustainable Futures initiative is unique in the UK in terms of bringing together farmers, global food and drink producers, non-government organisations and supply chain partners - currently involving 190 farmers managing 150,000 acres of Yorkshire. Working with the consultants at Future Food Solutions, we have recently launched the next phase of this programme, called Sustainable Landscapes, with three trials across Yorkshire. A key focus is to collaboratively explore innovative ways to prevent farmland soil being lost to waterways. This helps our resilience by reducing the amount of pesticides, nutrients and soil entering rivers and aquifers. It also helps the farmers involved make their businesses more sustainable and profitable.

REDUCING FLOOD RISK

Land management approaches influence flood risk. Urban growth leads to more impermeable surfaces and faster run off during a storm, whereas green spaces can store water and 'slow the flow'.

We are working in communities across Yorkshire to play a larger role in reducing flood risk. We are expanding and complimenting the traditional drainage network with alternative ways to manage storm water, for example by introducing more Sustainable Drainage Solutions (SuDS) that use and install green spaces to store and slow water. You can find more on this in the section on Wastewater Collection. We have an exciting vision and programme of work to demonstrate sustainable approaches in Hull and East Yorkshire with our 'Living with Water' partners. This is showcased on page 42.

By using our land, and working with other land owners, we are also maintaining and installing natural flood protection in upstream catchments. We have committed to planting a million trees over the next 10 years as a demonstration of the impact we can have. As well as supporting the Government's announcement for the Northern Forest, this will be supported by leaky dams and a host of attributes to help store water, while also delivering other benefits for carbon storage, new recreation opportunities and protecting wildlife. On our land in the Calder Valley we are working with the White Rose Forest partnership to deliver the first stage of our big tree planting initiative.



STAKEHOLDER QUOTE

"Being involved with this Sustainable Landscapes Project, has made me think again about how I manage slugs on my farm. I had not looked at any other option than increasing the levels of Metaldehyde. I am farming differently now since joining the project"

A Yorkshire farmer



CONSERVING BIODIVERSITY AND MANAGING INVASIVE SPECIES

The programmes described above protect and restore habitats and landscapes to protect water quality and reduce flood risk. Healthy habitats are also more resilient to pollution and climate change, supporting long term resilience.

Invasive non-native species (INNS) can present challenges to our activities. Some invasive species have spread rapidly along watercourses to smother native plants during the summer, before dying back in the winter leaving the river bank without stabilising vegetation, and therefore vulnerable to erosion. Other invasive species can damage our infrastructure and operational processes if they are not carefully managed.

We are controlling the spread of INNS by working in partnership and using a three-tier hierarchy.

Prevention

Researching measures to limit the transfer of invasive species and building new biosecurity facilities for staff and visitors.

Eradication

Supporting programmes where there is a realistic chance of invasive species eradication.

Management

Trialling biocontrol measures such as the use of woodland planting to reduce the presence of Himalayan Balsam at treatment works.



Left: Protected species - newt and vole. Right: Invasive species - Japanese knotweed

SAFE, DIVERSE RECREATION AND OPEN ACCESS

For decades, we have been a champion of open access to our non-operational sites. Customers tell us they enjoy and value the recreational opportunities we provide on our land. Our management programme ensures high standards of safety, for example by maintaining paths and signage.

To be resilient, we work for all parts of society in everything we do. We are tackling barriers that restrict access to our recreational sites and we are increasing the range of opportunities to provide something for everyone. In 2017, we gained the 'Good Access Scheme' award from the charity Open Country, in recognition of the work we have done to improve access by removing steps and stiles, and realigning paths to avoid steep slopes. We have also partnered with Experience Community, a not-for-profit community group that has helped in identifying improvements, and arranges regular reservoir rambles for groups of wheelchair and Mountain Trike users. We have plans to continue expanding access opportunities.

STORING CARBON

A lot of carbon is stored in our estate, particularly in our peatland and woodland. Our programmes to protect water quality and reduce flood risk are complementary to carbon storage. We are working to better monitor and further increase the amount of carbon we sequester each year. As a company who is entirely reliant on the stable climate, the reduction of carbon emissions is critical to our long term resilience. As such, we look to lead by example in reducing our emissions. We discuss this further in the Bioresources section.

SECURING OUR PROPERTY AND OPERATIONAL SITES

We own and operate thousands of sites across Yorkshire which house our critical infrastructure and our offices. Ensuring the safe and secure running of these sites is central to our resilience. We discuss our approach to all forms of security in the Section on Enabling Business Support Services.

FUTURE DIRECTION

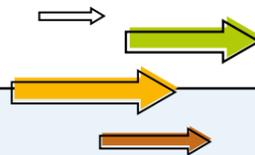
We are expanding our existing land management programmes and introducing new ones to mitigate a legacy of pollution and unsustainable practices that are threatening the resilience of our services. Looking ahead, we recognise the need to further our efforts because this legacy is likely to be compounded by growing pressures to the natural environment from the changing climate, increasing pollution and population growth.

In their very nature, these are long term interventions which can take many years to deliver their full impacts and benefits. We continue monitoring the effects of our approach to inform our evolving land strategy.

Our land presents one of our largest areas of opportunity to grow further value for the society we serve.

We are committed to protecting and enhancing the range of benefits that people take from our land, particularly for water quality, flood protection, nature conservation, recreation and carbon storage. We are using our six capitals approach to better quantify these benefits to inform improved decision making and investment choices.

We are committed to working in partnership and taking innovative approaches to sustainably manage our land, and to influence other land owners to do the same. We are also committed to sharing our research and monitoring data, and working with policy makers to ensure effective legislation and incentive systems. The reform of the Common Agricultural Policy presents a great opportunity to ensure it is best supporting land owners to manage land sustainably for the long term.



CASE STUDY

ASSESSING FUTURE OPTIONS FOR LITTLE DON RESERVOIRS USING AN INNOVATIVE CAPITALS VALUATION TOOL

Yorkshire Water owns 28,000 hectares of land, much of which is open to the public. Our goals are to open up our land to everyone, get more people outdoors, actively protecting the environment, and inspire younger generations to enjoy nature and be active outdoors. To help achieve these goals, we are putting the 'capitals' at the heart of all our decision making. This capitals approach will enable us to quantify the environmental and social impacts of our actions and to make better decisions for the benefit of our customers. It will also enable us to become more resilient to future environmental and social challenges such as environmental change, customer expectations etc.

Consultants at AECOM worked with us to develop a tool that allows us to compare the impacts of various land management decisions across the capitals. The tool was developed by a team of economists, ecologists, and social specialists, and draws on the latest scientific evidence to provide a cutting-edge approach to measuring and valuing social and environmental impacts.

We piloted the tool on one of our sites in the 'Little Don' area which has a range of existing recreational uses, from water sports to bird watching. We are now using the tool to guide the development of the site into a recreational hub for the whole area. The overall aim of the 'Little Don' scheme is to open up more land for recreation, create better quality recreational opportunities, increase diversity and inclusion, and improve the health and wellbeing of our customers and visitors to our land.

During a pilot exercise, we looked at five scenarios to grow the societal value we provide in the 'Little Don':

- Inclusive environment: encouraging all groups to interact with the environment
- Active recreation: planting trees and encouraging sports such as mountain biking
- Active biodiversity: protecting and restoring nature
- Sustainable farming: working with farmers to better balance the needs of the environment
- Sustainable forestry: focusing on tree and hedgerow planting across most of the site

The results suggest that encouraging active sports may have the greatest potential benefits, despite having the highest costs. The results also demonstrate that there are pros and cons to each of the options, and that there can be important trade-offs between goals of encouraging visitor variety, protecting biodiversity, and creating employment opportunities. We have started a discussion with stakeholders in the 'Little Don' area to decide on an approach to managing the site that meets everyone's goals. Beyond the 'Little Don', the capitals tool is being used to help get the most out of the natural environment across all of our land for all users.



WATER RESOURCES AND COLLECTION

We take water from rivers and boreholes, and store it in reservoirs, ready for transport through a network of pipes for treatment and supply to customers.

Yorkshire has one of the most resilient water supplies in the country. We have invested to create a highly flexible grid network that uses Yorkshire's natural mix of water sources to reliably get water to where it is needed.

We are highly experienced at water resource planning for both the short and very long term. We design and implement the best ways to source water to meet demand at the lowest cost while protecting the environment.

Our analysis includes cutting-edge modelling of population growth and climate change, as well as contingency planning for drought and other events. We are one of only two water companies in the country that plan for droughts that are worse than those we have experienced in the past. To create headroom, we use innovative approaches and have set ambitious targets to continually improve water efficiency.

CASE STUDY WATER RESOURCES NORTH - WATER TRADING ACROSS THE UK

Recognising that we have a role to play in supporting not only the resilience of our region, but also the resilience of the UK as a whole, we have taken a lead in setting up Water Resources North. This group comprises representation from water companies in the north of England and key regulators and stakeholders such as the Environment Agency and Natural England.

The group will provide leadership and coordination to support the delivery of long term water resource resilience in the north of England. It will also allow for integrated and consistent consideration of the opportunities that we collectively have, to transfer water to other parts of the country and contribute to enhanced national water resilience.

The group will contribute to joint working on future water resource options, both to inform individual companies' Water Resources Management Plans and long term investment needs which may include joint investment activity.

We envisage that the group will help the water industry articulate future challenges with a consistent voice and assist with customer and stakeholder engagement and understanding of investment priorities as well as provide a forum to share approaches and best practice in water resources planning.

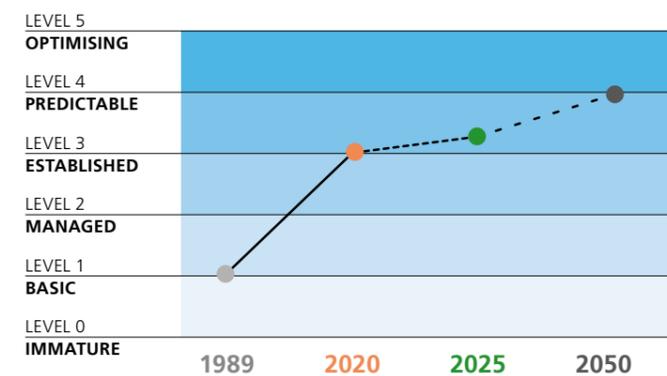


DASHBOARD

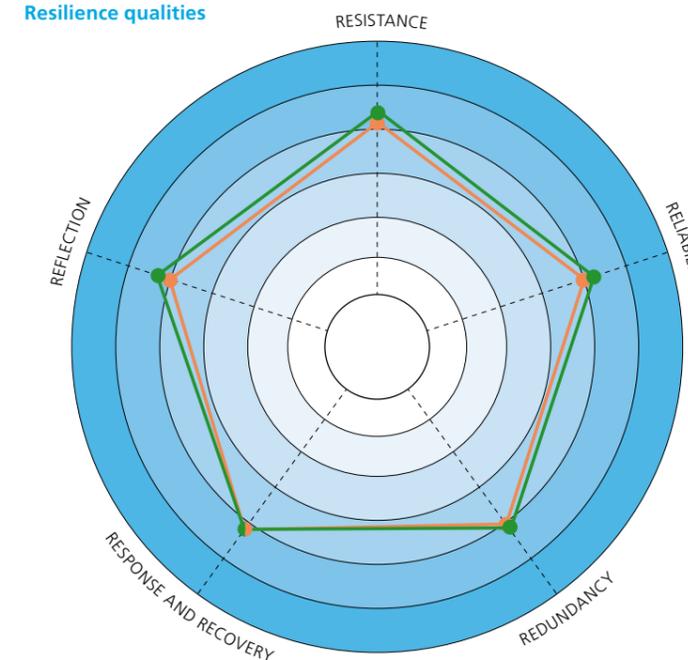
RESILIENCE MATURITY

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Resilience through time



Resilience qualities



PRIORITY SHOCKS AND STRESSES

Listed in alphabetical order

- Ageing infrastructure
- Asset failure
- Climate change
- Heatwave and drought
- Population growth

SUPPORTED PERFORMANCE COMMITMENTS

Increasing the volume of water recycled so we can take less from the environment

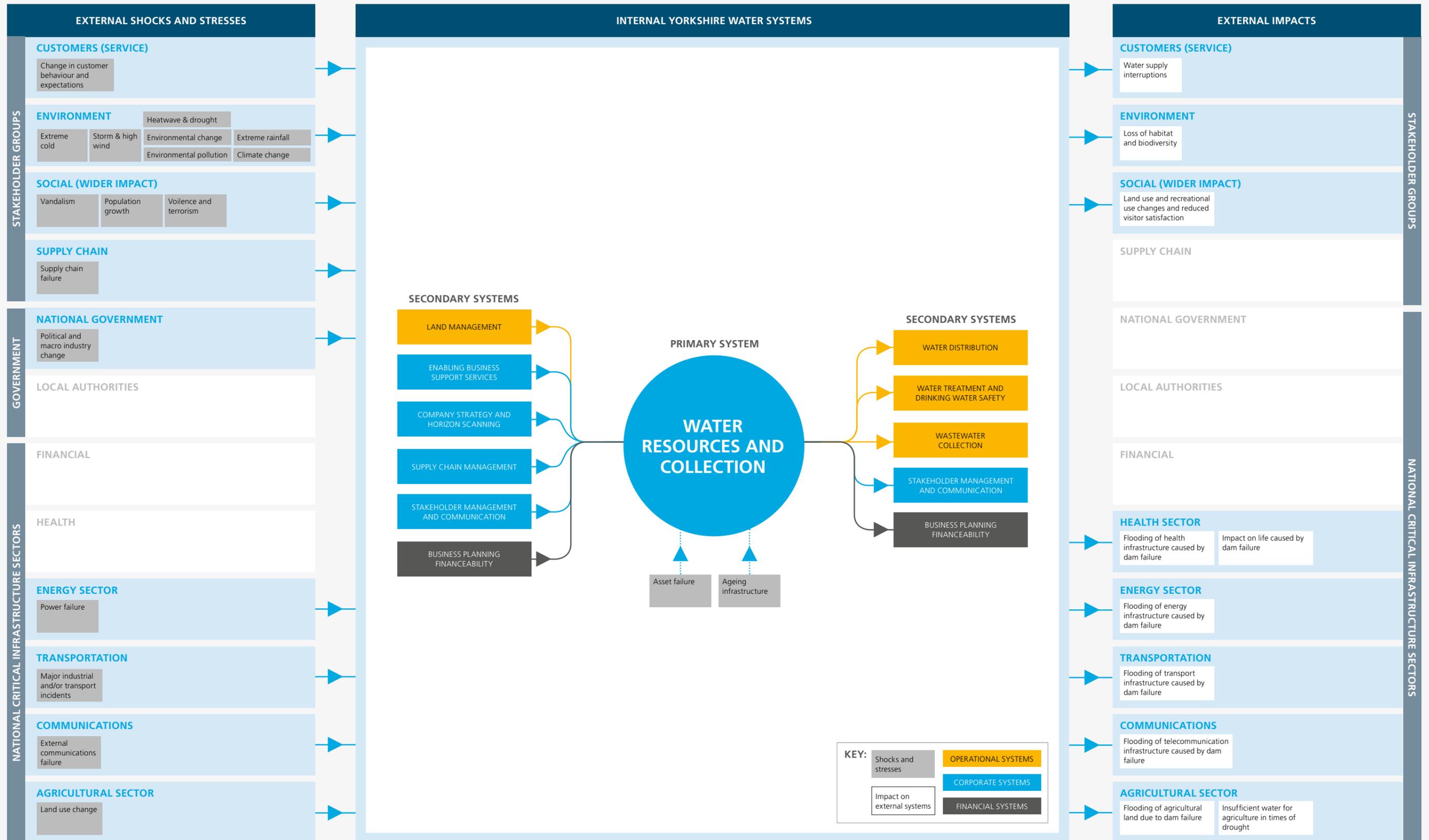
Reducing the average amount of water used by each customer

Reducing the environmental impact of abstractions

Ensuring customers have a very low chance of experiencing severe water restrictions

MATURITY SCALE	YEAR
LEVEL 5: OPTIMISING	1989
LEVEL 4: PREDICTABLE	2020
LEVEL 3: ESTABLISHED	2025
LEVEL 2: MANAGED	2050
LEVEL 1: BASIC	
LEVEL 0: IMMATURE	

WATER RESOURCES AND COLLECTION INTERDEPENDENCE MAP



CURRENT POSITION AND OUR PLAN TO 2025

Our customers consistently tell us that a top priority is the affordable and reliable supply of clean, safe water. We manage our operations, continually invest in the region’s infrastructure and undertake detailed planning to ensure we provide a highly resilient water service for both the short and long term.

SHORT TERM PLANNING AND OPERATIONS

Yorkshire has one of the most resilient water supplies in the country. We take water from a variety of sources, including 133 reservoirs, nine river abstractions and 45 groundwater aquifers. We use an interconnected network called The Yorkshire Grid to move water from where it is available to where it is needed, at lowest financial and environmental costs.

WRAPplan is our Water Resources Allocation Planning model and it has been matured and tested over many years. We use this to produce an optimal plan for sourcing water to meet current demand, factoring in a range of criteria including latest water stocks, safe abstraction limits, the weather forecast and the energy needed to move water around. Typically, we run WRAPplan on a weekly basis, but in times of emergency we can increase this to every 15 minutes if needed.

Our process is highly automated with remote monitoring and control systems. This is overseen by our trained and experienced colleagues to ensure effective governance and timely interventions as necessary. Inspections, maintenance and enhancement of assets are undertaken following routine operational activities and cyclical asset management surveys and risk assessments.

In times of drought and other periods of high water demand, we use our drought plan and escalation procedures. The drought plan includes a detailed assessment of the supply and demand options we might use to maintain supplies through an event as it unfolds. The plan reflects the financial cost and environmental consequences of options and defines how best to act with incremental escalation to match the severity of an event. The plan is agreed with the Environment Agency (EA) and other stakeholders to enable rapid implementation of options when the time comes. We update the drought plan every five years to ensure it is based on latest available information and innovations.

You can find our latest drought plan at: www.yorkshirewater.com/resources

LONG TERM PLANNING AND INVESTMENT

Our Water Resources Management Plan (WRMP) describes how we will continue to ensure sufficient water to supply customers over the next 25 years, and beyond, in the face of challenges such as climate change, population growth and environmental pressures. You can also find our latest WRMP at the website above, including a detailed overview of the methodology and options considered.

Our WRMP demonstrates how we maintain these high levels of resilience and service:

- Temporary Use Bans (TUBs), such as hosepipe bans, no more frequently than 1 in 25 years on average (4% probability in any one year)
- Drought Orders no more frequently than 1 in 80 years on average (1.3% probability in any one year)
- Emergency restrictions, such as rota cuts and stand pipes, no more than 1 in 500 years on average (0.1% probability in any one year).

The resilience of our water supply was recognised in an independent assessment published in late 2016 - Water UK’s Water Resources Long term Planning Framework. This stated we plan:

- “to a higher level of resilience than any other part of the country”
- “for resilience to droughts that are worse than those seen in the historic record”, one of only two water companies to do this.

Find out more by visiting: www.water.org.uk/water-resources-long-term-planning-framework

We update our WRMP every five years to determine the best long term plan to ensure supply meets demand based on latest information. We have been innovative and ambitious in our WRMP to ensure the ongoing resilience and affordability of Yorkshire’s water resources and supply service.

We use our WRAPsim model to simulate scenarios to help this process. We complete cutting-edge climate change modelling of 20 scenarios to consider the likely range of impacts on supply and demand from a drier climate and increasingly variable weather. In our role representing the UK water sector on the user group for the next iteration of UK climate projections, we have carried out a demonstration project to trial how we could assess drought risk using the new dataset when it is released in the coming months.

We also complete detailed analysis of expected population changes across different parts of Yorkshire, with the best evidence showing one million more people are expected in the region over the next 25 years.

We work with the EA to understand where we need to reduce the water we abstract to leave enough for the natural environment. We have also worked closely with the EA, and other organisations including the University of Leeds, to understand the risk and mitigation options associated with invasive non-native species and water transfers between catchments.

Recognising that we have a role to support national as well as regional water resilience, we have set up Water Resources North. This group brings together regulators and water companies from the north of England to coordinate affordable, resilient and sustainable water resources. The group will ensure a joined-up and consistent consideration of the opportunities to transfer water between regions to enhance national water resilience.

FUTURE DIRECTION

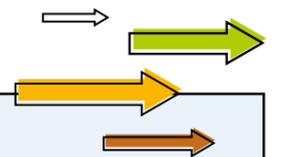
Our WRMP details how we will make sure that we continue to provide a secure supply of high quality water in the short, medium and long term, projecting up to 40 years into the future.

The key challenges that we have identified, and address in our forward planning, are:

- A Yorkshire population that is projected to increase by one million by 2045
- A projected loss of 100 MI/d (million litres per day) of water resources by 2045, due to climate change
- Ongoing environmental pressure to reduce the amount that we abstract
- Ensuring that we can continue to provide high levels of resilience to meet high levels of service, against a backdrop of maintaining bills at a level that is affordable for all our customers.

To help address these challenges we also see opportunities to innovate and work in partnership. For example, the case study on page 17 shows how we already trade water with our neighbours and are working to develop this further.

Replace this sentence with: Our plan includes a strong focus on reducing leakage and customer demand for water because this delivers multiple benefits and supports the most sustainable way of securing resilient supplies. We also have a range of new supply options in Yorkshire if and when they are needed. We examine our numerous ways to continue improving water efficiency in the Water Distribution section. Should we need them in the long term, our plan also considers how we might access additional water resources.



WATER TREATMENT AND DRINKING WATER SAFETY

We transport around 1.3 billion litres of water each day from the environment through a network of pipes and storage facilities to 48 water treatment works where we make it clean and safe to drink.

We operate mature treatment processes to reliably produce enough drinking water to meet demand, to the highest quality that meets tight regulatory standards.

Our trained operators and automated processes use extensive monitoring and remote-control technologies to check the quality of water supplies and take action when needed to guarantee safety and high standards. We design headroom and flexibility into our treatment capabilities so we can maintain supplies when problems occur.

We use a mature twin-track strategy to ensure the supply of clean and safe water despite deteriorating quality of the water we take from the environment in some locations. We are treating the problem at source by working in partnership on long term programmes to conserve water catchments. Where needed, we are also investing in extra treatment processes at the works to secure the quality of customers' water supplies.



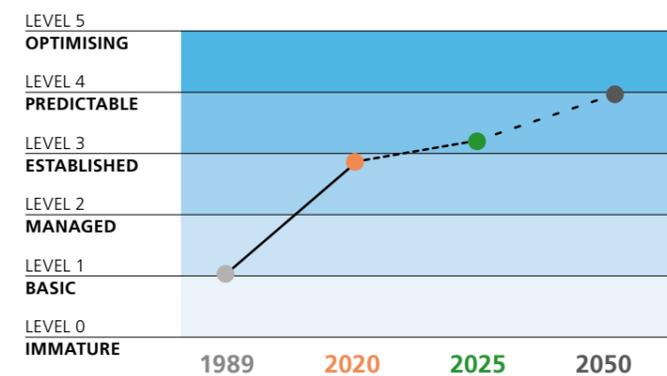
Haisthorpe Water Treatment Works

DASHBOARD

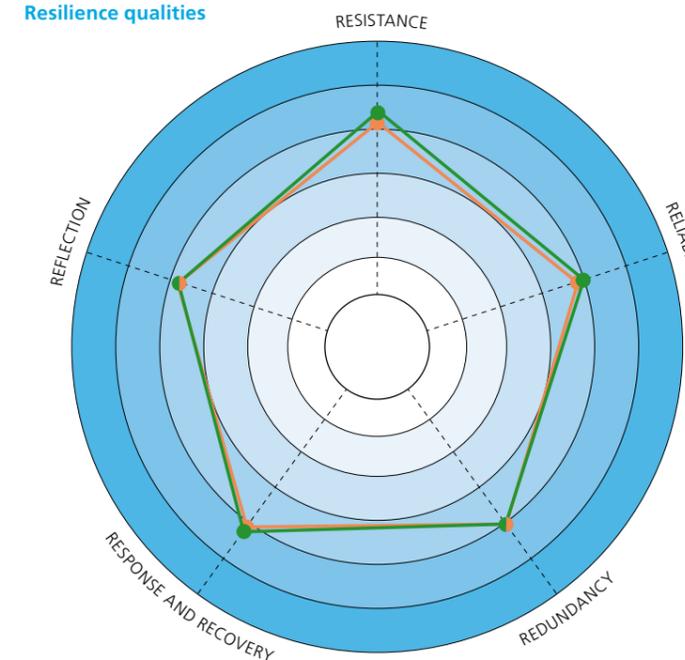
RESILIENCE MATURITY

We have assessed our resilience maturity at four time periods and of five qualities of resilience. We have given each a grade from immature to optimising, following the the maturity scale in the British Standard for Organisational Resilience (BS 65000).

Resilience through time



Resilience qualities



PRIORITY SHOCKS AND STRESSES

Listed in alphabetical order

- Ageing infrastructure
- Asset failure
- Climate change
- Environmental pollution
- Power failure

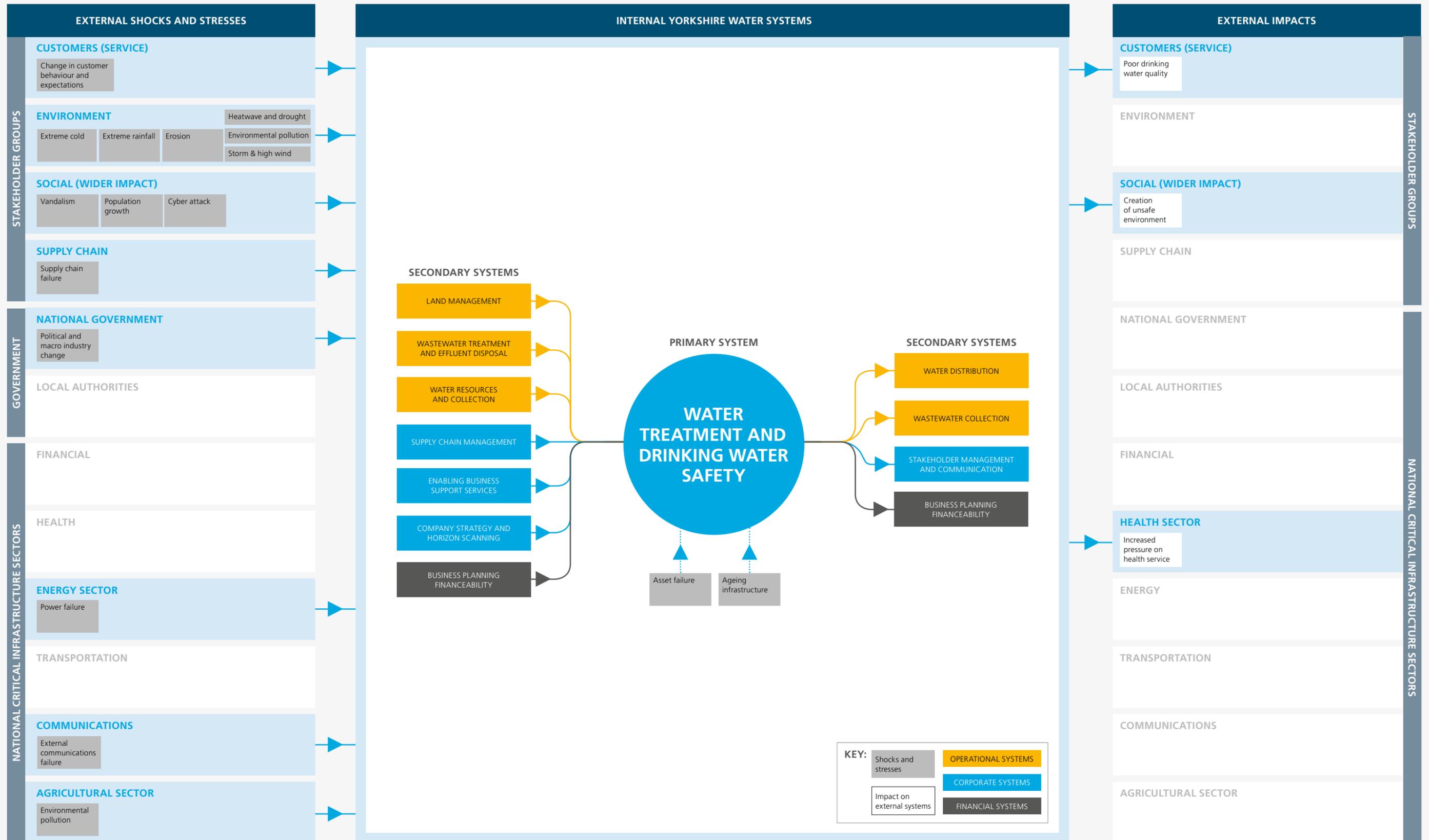
SUPPORTED PERFORMANCE COMMITMENTS

Ensuring the highest levels of water quality compliance

Reducing the temporary loss of maximum water treatment capacity

MATURITY SCALE	YEAR
LEVEL 5: OPTIMISING	1989
LEVEL 4: PREDICTABLE	2020
LEVEL 3: ESTABLISHED	2025
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WATER TREATMENT AND DRINKING WATER SAFETY INTERDEPENDENCE MAP



CURRENT POSITION AND OUR PLAN TO 2025

We protect public health by ensuring our customers can rely on safe drinking water, free from harmful micro-organisms, bacteria or chemicals. Customers consistently rank this as our highest priority.

We discuss how we ensure there is sufficient water in the Water Resources and Water Distribution sections of this report. Here, we examine how we protect drinking water quality. Our approach runs from source to tap with long term catchment management programmes to protect sources of Yorkshire’s drinking water, combined with operational and investment activity at the works and in the supply network to guarantee drinking water quality when customers turn on their taps.

Drinking water quality in Yorkshire is consistently excellent with over 99.9% of hundreds of thousands of samples meeting stringent regulatory standards. As a measure of improving resilience, we have seen continued reduction in the number of times that customers contact us about their drinking water quality, down from over 10,000 contacts in 2015/16 to 8,100 in 2017/18.

The critical nature of our water service is reflected in strict legal requirements which are monitored and enforced by the Drinking Water Inspectorate (DWI) who require 100% compliance. Every five years we complete detailed analysis using latest available information to produce a Water Quality Plan to define how we will ensure quality and compliance in the most efficient and effective way. We provide this plan and a ‘Long term Statement on Drinking Water Quality’ to the DWI.

GUARANTEEING HIGH QUALITY DRINKING WATER

The effective operation and maintenance of our water treatment works is vital to the safe supply of water. We train and develop our staff and follow mature and tested procedures to ensure a consistently high-quality approach, supported by extensive monitoring of water quality to check standards. Our Integrated Management System (IMS) helps ensure a robust approach by maintaining a documented repository of latest policies and undertaking internal and independent audits which identify opportunities for continual improvement.

We are always maintaining and enhancing our treatment works capacity and capabilities to secure resilient supplies. We incorporate new treatment processes where the quality of incoming water has deteriorated and presents a risk to outgoing drinking water supplies. For example, at the end of 2017 we completed substantial investment at Rivelin Water Treatment Works to secure the drinking water supply to the City of Sheffield.

The physical protection of our works is a priority. We use site security measures such as CCTV, secure fencing and guarding of the sites, as well cyber security of IT systems. Our approach is governed by the national Security and Emergency Measure Directions (SEMD).

We ensure resilient supply chains for chemicals, energy and other essential parts of the treatment process. We discuss this in the Supply Chain Management section of this document.

We investigate every instance of suspected deterioration of water quality to learn lessons and put in place actions to prevent recurrence. We share the outcome of our investigations with the DWI and health authorities. Many issues are associated with third party activity or the private fittings within individual customer properties. We explore our work on the network and with customers in the section on Water Distribution.

We have mature emergency plans in place for when problems occur. For example, our ability to respond was tested in July 2016 when E-coli was found in water supplies to around 3,600 customers in villages near Doncaster. This incident was caused by a local chicken processing plant that modified its pipework without notifying us to inspect it, as it is legally required. The DWI praised our ‘swift’ and ‘appropriate’ actions to minimise the risk to public health and the rapid steps we took to share our learning with other water companies. During the incident we distributed more than 100,000 bottles of water to customers affected by the disruption. We also put in place physical barriers to prevent future contamination of the water network from this plant.

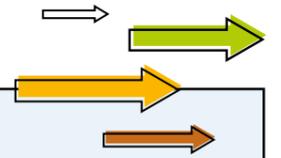
Disruptions like strikes, industrial action, transport and security incidents have been considered in our Company Incident Management and business continuity plans. These provide a high amount of resilience and enable a quick response and recovery.

PROTECTING RAW WATER QUALITY

The water we source from across Yorkshire is deteriorating in many areas because of unsustainable land management practices, pollution and climate change. We have a long history of working in partnership with land managers to implement innovative programmes to protect and enhance land across Yorkshire to secure the long term resilience of our sources of water. For example, we work with the agricultural sector to minimise the use of metaldehyde, a chemical found in slug pellets, which gets into our rivers. We have also commenced a trial catchment project to improve our understanding of the sources of nitrates and identify appropriate agri-environmental options to reduce the leaching of nitrates into aquifers.

Peat moorlands are the source for a large proportion of drinking water in Yorkshire. Water from degraded peatland requires extra treatment to remove contaminants picked up in the runoff from eroded soils. We work in partnership to maintain and restore parts of Yorkshire’s peatland by re-introducing native plants, managing invasive species and blocking human-made drains to slow the water flow and restore the water table. Through our collaborative working, we are increasingly active and effective in peatland management and are growing the amount of land being restored. However, there is also much more to do, by us and others, to fully protect raw water quality.

Also refer to the Land Management section for further information.



FUTURE DIRECTION

Ensuring the ongoing quality of our drinking water supply at an affordable price is our highest priority. We strive to achieve 100% compliance with relevant standards, however this is a challenging goal when it involves interventions in customers’ homes and businesses, and there are growing pressures from pollution, climate change and other factors. We are committed to expanding existing programmes, innovating new approaches and further embracing partnership working to meet this challenge.

Over the longer term there is potential for disruptive technologies and techniques which may offer opportunities that guarantee water quality at lower cost financially and environmentally.

For example, the development of technology that would enable local treatment for a street, or even household, could increase resilience by removing the need for large central water treatment works which are energy and chemical intensive. However, this type of community-level approach would need careful management and strict legislative standards to ensure the resilience benefits. Such a development could also improve sustainability and resilience of water resources, enabling customers to more efficiently use different grades of water to better suit the needs of different activities.

WATER DISTRIBUTION

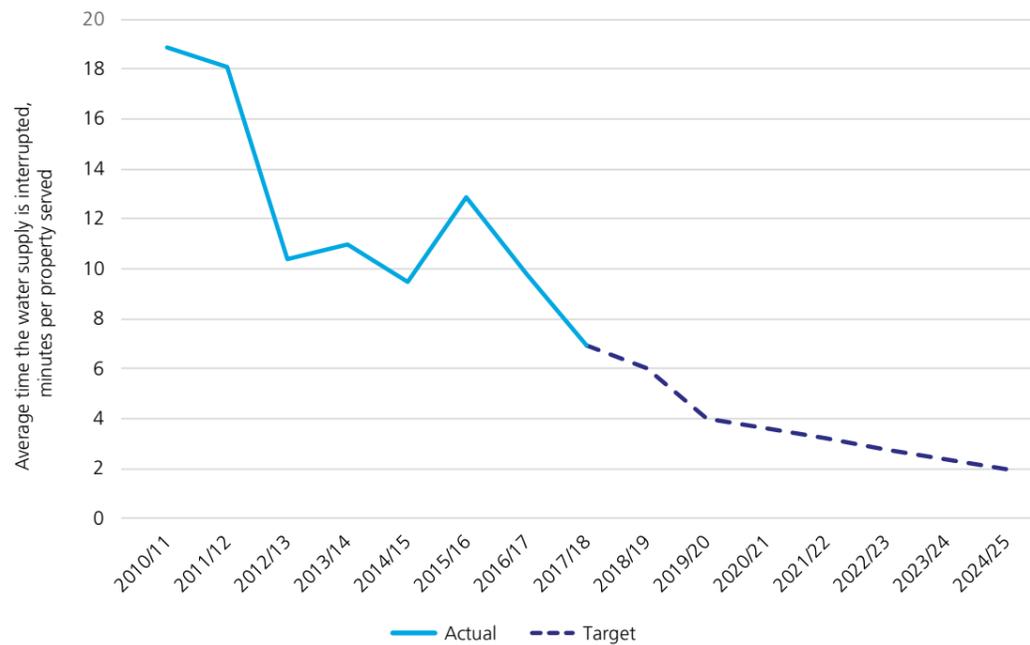
We manage a network of 31,000km of water mains to deliver clean and safe drinking water to around 2 million properties and 140,000 business premises across Yorkshire.

We have invested to create one of the most resilient water supplies in the country. Our flexible grid network allows us to move water around Yorkshire to help balance supply with demand. This provides many alternative distribution options when needed, for example during the recent harsh winter in early 2018 and the drought this summer.

Listening to our customers, and working closely with them, we have commenced an ambitious and innovative programme to be much more water efficient.

Having already almost halved the amount of water that is wasted through leakage since 1995, we have escalated resources and applied latest technologies to help us go much further. We are working to reduce leakage by a further 40% by 2025. We are also expanding our long-standing programmes of education and support services to customers that help them use less.

INTERRUPTIONS TO THE PUBLIC WATER SUPPLY

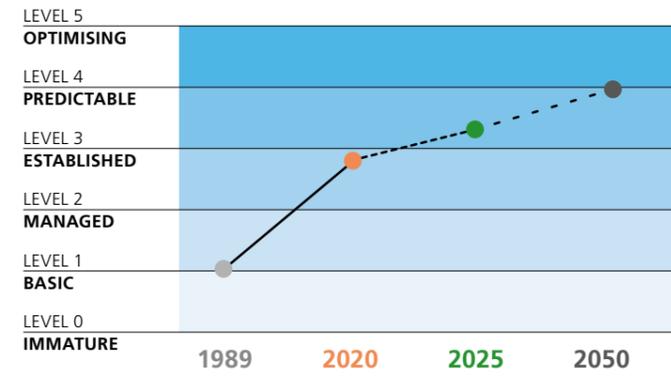


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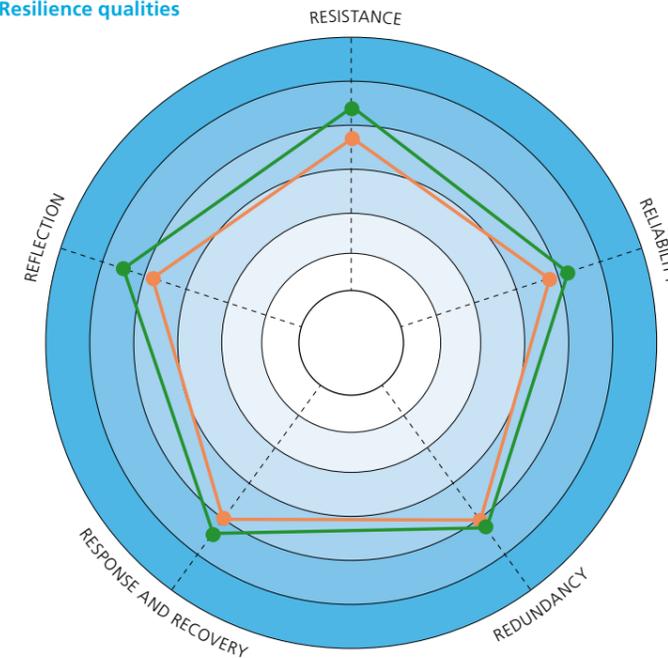
RESILIENCE MATURITY

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Resilience through time



Resilience qualities



PRIORITY SHOCKS AND STRESSES

Listed in alphabetical order

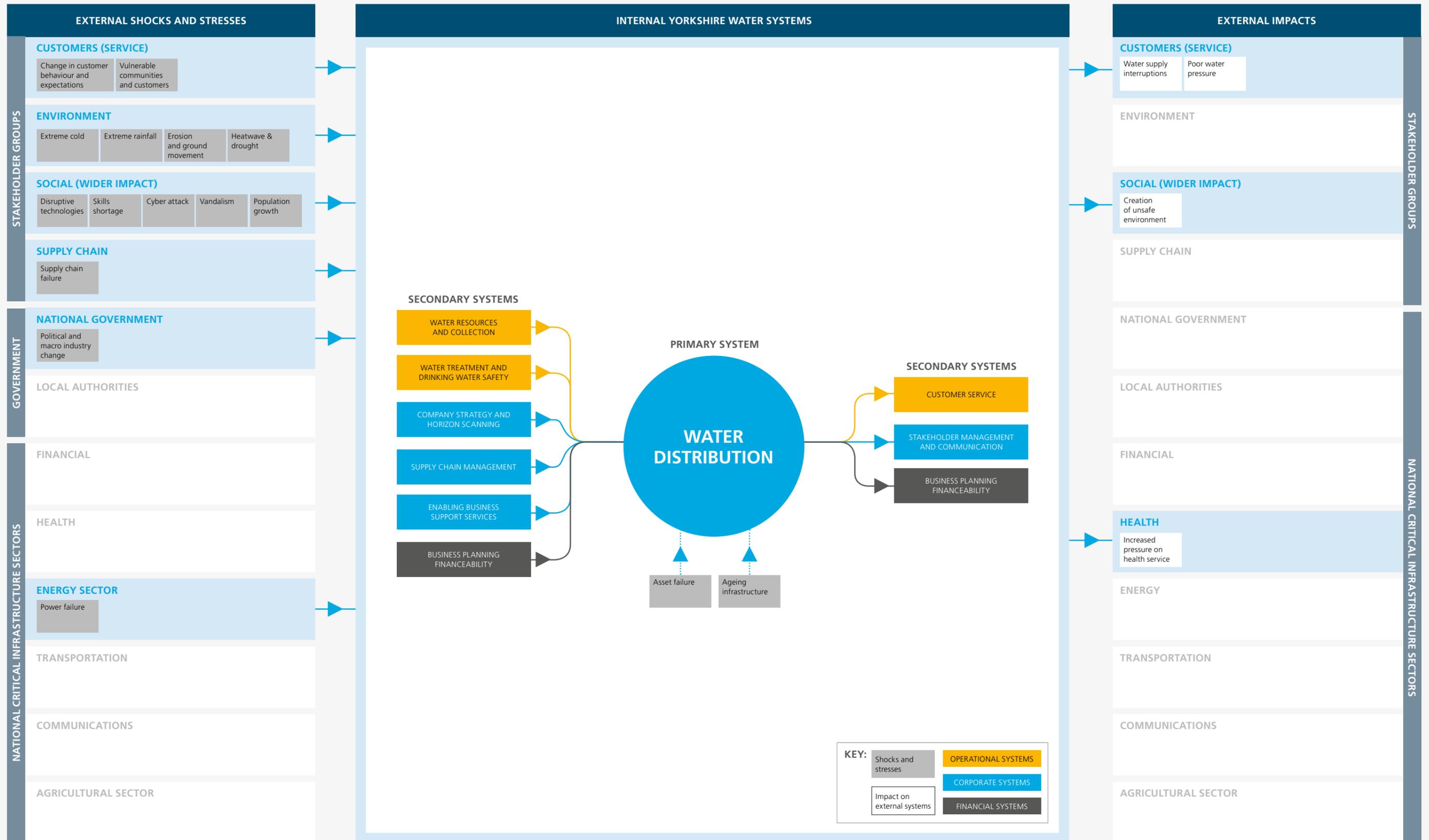
- Asset Failure
- Ageing infrastructure
- Extreme cold
- Heatwave and drought
- Population growth

SUPPORTED PERFORMANCE COMMITMENTS

- Reducing** supply interruptions
- Reducing** the amount of leakage
- Repairing** water mains
- Repairing** residential supply pipes
- Ensuring** satisfactory water pressure
- Reducing** customer queries about the taste, odour or appearance of their drinking water

MATURITY SCALE	YEAR
LEVEL 5: OPTIMISING	1989
LEVEL 4: PREDICTABLE	2020
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WATER DISTRIBUTION INTERDEPENDENCE MAP



CURRENT POSITION AND OUR PLAN TO 2025

We have matured our operations and invested in our water network to improve the reliability of our water supply to customers, reducing the number of times we interrupt supplies and the length of time an interruption lasts. As a measure of our resilience, we have ensured no widespread disruptions to supplies since the drought in 1995 and 1996. We offer one of the most resilient water supplies in the country and we want to protect this and go further. For some customers, even a short duration interruption with advance notice can be highly disruptive.

THE GRID - A HIGHLY RELIABLE DISTRIBUTION NETWORK

In response to the disruption to water supplies during the drought of 1995 and 1996, we have invested to create a highly flexible network called The Yorkshire Grid. This enables us to make the most of Yorkshire's natural mix of water resources and move water around Yorkshire to meet customer demand. Following a recent extension on the east coast, The Grid now reaches 99% of the Yorkshire population to provide enhanced resilience.

Once treated drinking water leaves the works, it is put into the sealed water network for safe and reliable distribution to homes and properties. We are continually monitoring, maintaining and enhancing the network to ensure its resilience.

Should a water main fail, for example because of a burst, we have alternative options to seamlessly maintain supplies. For example, our largest communities are served by more than one main and we have rapid response options where interruptions do still occur. We can quickly setup over pumping arrangements to bypass a broken section of network and resume supplies, and as a minimum we provide bottled water to maintain basic needs. We maintain a register of customers who are likely to need extra help so we can give them priority assistance when needed.

To inform our latest plans, we have undertaken an in-depth study of the system's vulnerability and flexibility to understand the system-wide resilience of the Grid. The study has covered the water supply of 1.8 million properties, 80% of our customers.

The levels of resilience we plan for are shown in the Water Resources section, where we also highlight how independent assessment by Water UK confirms our industry leading resilience standards.

ENSURING WATER QUALITY RIGHT TO THE TAP

We discussed in the Water Treatment section how we ensure clean and safe drinking water leaves our treatment works. Here we explain how we ensure quality until the water comes back out of the system at a customer's tap.

The drinking water quality we provide is consistently very good, with over 99.9% of samples meeting tight legal standards. To maintain and enhance this figure we undertake a range of activities. For example, we flush water mains to improve the colour and taste of water. This involves proactively flushing water through our mains at a higher than normal speed to remove the sediment that gathers on the inside of the mains over time.

Drinking water quality is measured at the tap and customer's pipework in their properties can cause problems so we have ongoing programmes to help. We proactively replace lead pipework, and the long term trend in the levels of this key health indicator in water continues to drop. We also work with large manufacturers to ensure that only 'Water Resources Advisory Scheme' approved taps and fittings are supplied.

LEAKAGE FROM THE WATER SUPPLY NETWORK



CASE STUDY LEAKAGE

Reducing leakage enhances resilience by creating headroom between water supply and demand. It also means less water has to be taken from the environment and less energy and chemicals are needed in treatment and distribution. About two thirds of leakage is from the public distribution network and the other third is lost from customers' supply pipes. We have almost halved the volume of water lost through leakage since 1995 and we report performance in our annual report on our website.

Leakage varies with the seasons, with a significant peak in the winter. We had significant increases in leakage during The Best from East earlier in 2018, and also during the widespread snow and cold in the winter of 2010/11. Over the spring and summer we generate headroom in our leakage reduction so that we have contingency for a hard winter. Our Winter Plan describes how we take a stepped approach that escalates as necessary to ensure an effective operational response to cold weather. There are three trigger levels in the Winter Plan – Winter Operations, Winter Escalation and Winter Emergency. The trigger levels for each of these are based on performance against the leakage target (ahead, on track, or behind), temperature and the number of repair and maintenance jobs that are outstanding.

In recent years, annual targets for reducing leakage have been set using a nationally agreed methodology called the Sustainable Economic Level of Leakage (SELL). The SELL is based on the principle that the cost of reducing leaks should be less than the cost of replacing that water from another source. In other words, it is not economically feasible to eliminate leakage entirely because the cost of finding and fixing small leaks can be excessive compared to the volume of water lost.

In our plan to 2025, we will reduce leakage by 40%. This will support resilient supplies and deliver a range of wider benefits. This means saving 122 million litres a day (ML/d) to get it down to no more than 175ML/d.

We have already started towards our plan, releasing extra resources and recruiting more leakage inspectors. We are deploying new leakage detection technology to find and fix leaks more quickly - we want to reduce the average detection time from three days to three hours. We have already installed 4,500 acoustic loggers and are installing another 31,000 to help identify leaks more quickly. A million litres per day of leakage has been found using 600 network listening devices installed in Huddersfield and use of drones on the York to Selby trunk main. We have also released 75 million lines of data from our flow meters and held 'open innovation' events to enable analysis and fresh thinking about how we can further reduce leakage.



IMPROVING WATER EFFICIENCY

To ensure the ongoing resilience of Yorkshire’s public water supply, it is a priority to substantially further improve water efficiency. This is needed to grow headroom so that we can supply an expected one million more customers over the coming decades, in the changing climate. One of our Big Goals is to meet this growing need without taking more from the environment.

Customers also play a critical role in water efficiency. We have always engaged with customers to help them save water. For example, in 2017/18 we gave away 30,345 free water saving packs and increased our education activities.

Average consumption per person in Yorkshire is amongst the lowest in the country and shows a trend of reduction. In 2017/18 it was down to 135.9 litres per person per day from 141.7 litres in 2015/16. We will be doing much more of this by expanding existing programmes and introducing innovative new approaches.

We are working with large industrial users of drinking water to identify activities where they could use lower grades of water to support resilience, save money and protect the environment. This initiative in combination with better recycling at our treatment works will offset 0.5% of current demand, creating enough extra drinking water for 18,000 new houses without abstracting any more water from the environment.

More information can be found on the dedicated water efficiency section of our website at: www.yorkshirewater.com/save

CUSTOMER QUOTE

“I can’t believe that, a quarter of everything just lost? And we’re paying for that? It can’t be right”

A household customer in Leeds



Water pipe replacement

WE PROVIDE A RANGE OF WATER SAVING ADVICE AND SUPPORT

Free leakage repairs on all domestic supply pipes which are not under buildings. We also offer help for the repair of commercial supply pipe leaks.



Advice and information is provided through communication campaigns, at events, in our written communications, social media and on our website. We also run education centres for schools and provide information packs for teachers and their pupils.



Free water saving devices like tap aerators and shower timers are provided to households, student accommodation and community groups. In 2018 we will pilot a home audit and improvement installation service at 500 customer properties. If the trial is successful the service will be expanded.



Free water meters are provided to household customers on request. Meters provide a financial incentive to use less water. We are currently trialling a project to proactively target up to 100,000 customers that we think could save money on their bill by switching to a meter.



FUTURE DIRECTION

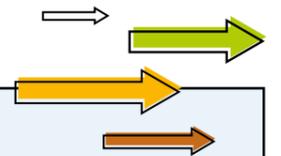
Through our long term plans we are ensuring we can continue to maintain and enhance the distribution network and every part of our water supply service. Our plans will ensure we mitigate the risks from the challenges presented by the growing and changing population, climate change, and the need to better protect the environment.

While we have more supply options if needed in the long run, our focus is on driving a step change in water efficiency, both in our operations and customers’ use of water. Our assessments have shown this delivers a wide range of benefits for customers and is the most sustainable approach to securing long term water resilience. One of our Big Goals is to meet the needs of the growing population without taking more from the environment.

Over the long term a range of opportunities exist to support the continued delivery of an affordable and resilient water service in Yorkshire.

For example, we will increasingly:

- Support customers to use less water by using latest technologies, working together in their properties, and using tailored engagement that works for the individual.
- Replace use of precious drinking water with lower grades of water where that is appropriate and safe. New options will be increasingly available from storm water that has been stored upstream in catchments to prevent flooding, and from reuse of treated wastewater.
- Charge customers based on the water they use. Customers tell us this is right and we forecast the number of households in Yorkshire with meters will increase from around 50% today to 84% by 2045.
- Use technology to increase management options to improve visibility of the underground water network, help identify, fix and prevent bursts and leaks more quickly, and monitor water use at a more granular level.



WASTEWATER COLLECTION

We manage the public drainage network to protect human health and prevent flooding and pollution by taking sewage and surface water out of harm's way, ready for treatment.

We have greatly improved the reliability of our drainage service, cutting pollution and flooding from sewers. We have made ambitious commitments to go much further by 2025 and we have already increased investment and started towards this. We are embracing technology and working with customers to transform our approach because we cannot simply build ever larger sewers - that would be neither financially or environmentally affordable.

We work collaboratively with many stakeholders to ensure both joined-up long term plans and effective responses to extreme weather events. By applying our cutting-edge drainage modelling, we are prioritising resources and developing holistic multi-agency catchment-wide plans that include the most effective mix of traditional engineering and innovative 'blue-green' solutions that work with the natural environment and local communities.

CASE STUDY RESILIENCE TO FLOODING 'SLOWING THE FLOW' IN THE CALDER VALLEY

Communities in the steep-sided Calder Valley have experienced a history of flooding. As part of a multi-agency response which includes traditional flood management interventions, we are also pioneering a natural flood management plan. As well as reducing flood risk, the plan will deliver wider benefits for biodiversity, carbon and recreation.

Landscape improvements will re-introduce wetlands to slow the flow of water, restoring 43 hectares of blanket bog to keep the moorland like a sponge, and 60 hectares of environmental improvements such as 'leaky dams'. To extend the impact of our plan even further, we have been working with the National Trust on neighbouring land to implement similar improvements.

In partnership with local residents, Treeresponsibility and the White Rose Forest, we are well on our way to planting 200,000 trees as one of the measures to help slow the flow of water during periods of heavy rainfall. This is the first stage of delivering our commitment to plant one million trees in Yorkshire over the next ten years.

Alongside this landscape project, we have trialled the reduction of water levels in some of our reservoirs above Hebden Bridge to allow for flood storage. To inform whether a longer-term change to reservoir operation would be appropriate, we have been working with the Environment Agency and Defra to examine if this approach can safely support flood management without negatively affecting water security or the environment.

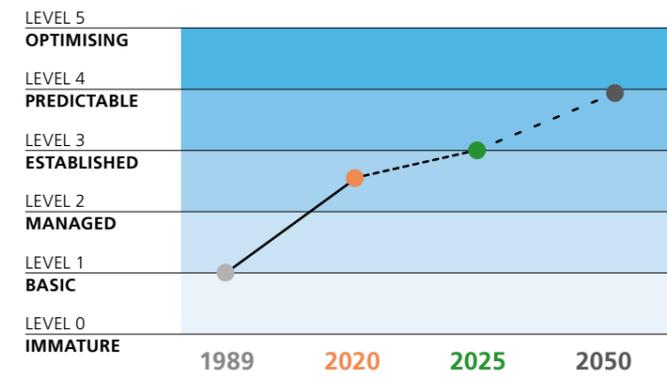


DASHBOARD

RESILIENCE MATURITY

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Resilience through time



Resilience qualities



PRIORITY SHOCKS AND STRESSES

Listed in alphabetical order

- Ageing infrastructure
- Asset Failure
- Change in customer behaviour and expectations
- Extreme rainfall
- Population growth

SUPPORTED PERFORMANCE COMMITMENTS

Reducing flooding from the sewers of homes and businesses

Reducing flooding from the sewers of public spaces

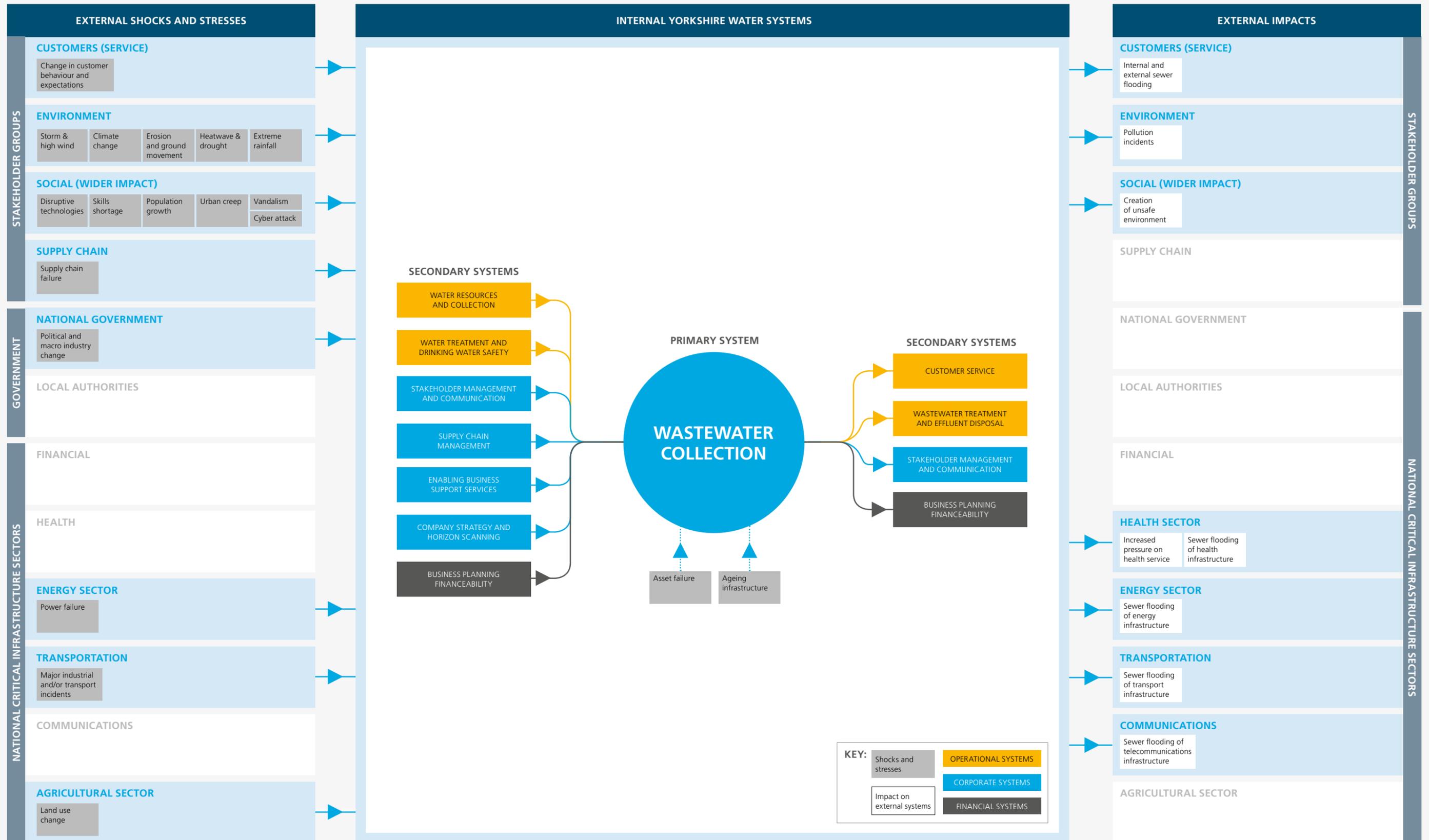
Reducing the number of times sewers collapse

Removing or attenuating surface water run-off from the sewers

Reporting on the proportion of the population protected from sewer flooding up to a rainfall event that occurs, on average, once every 50 years

MATURITY SCALE	YEAR
LEVEL 5: OPTIMISING	1989
LEVEL 4: PREDICTABLE	2020
LEVEL 3: ESTABLISHED	2025
LEVEL 2: MANAGED	2050
LEVEL 1: BASIC	
LEVEL 0: IMMATURE	

WASTEWATER COLLECTION INTERDEPENDENCE MAP



CURRENT POSITION AND OUR PLAN TO 2025

Our drainage service is essential to human health and the environment. We manage around 30,000km of sewers, 2,500 pumping stations and 2,100 emergency relief outfalls called Combined Sewer Overflows (CSOs) to take sewage and surface water out of harm's way. We have significantly reduced sewer flooding and pollution through targeted investment and operational activities. However, the resilience of our drainage service is under pressure with increasing demand on ageing pipes from a growing population and urban development, and the increasing frequency and severity of extreme weather.

Reducing the risk of flooding from all sources is a national priority following the impact to local communities from the many extreme storms of recent years. Our main focus is to reduce flooding from the sewers and customers have told us this is important to them. We are also using our land to 'slow the flow' upstream. We also want to further reduce pollution, and our stakeholders and regulators confirm this continues to be important.

MAINTAINING THE PUBLIC DRAINAGE SYSTEM

Traditionally, we use a range of operational and investment responses to provide an efficient and effective drainage function to minimise flooding and pollution from the sewers. For example, operationally we jet sewers and remove blockages to keep them clear, and we provide stand-by pumps in case of a problem with the main ones. To minimise pollution we install fine screens on CSOs and increase sewer capacity where they overflow too often. Where flooding is a problem, a typical investment response might be to increase the capacity of sewers and pumps. However, simply increasing sewer capacity is increasingly unsustainable because of the cost of the required energy and finite materials. Therefore, we are using latest technologies, working in partnership and trying innovative solutions.

We are installing thousands more remote sensors to better monitor the network and respond more quickly when problems occur. We use the data from these sensors in our advanced modelling techniques to simulate the network and test what happens in different weather and population scenarios, and the impact of different operational and investment interventions. This is increasingly helping us to address failures before they impact the customer or the environment.

Over the last ten years we led the industry in building cutting-edge models called Drainage Area Plans for much of Yorkshire. We also developed integrated models for areas like Hull, working with local authorities and the Environment Agency (EA) who also have roles in managing flooding. We are now further advancing our approach with Strategic Drainage Management Plans (SDMPs) in Sheffield, Leeds and the Upper Aire Valley. SDMPs involve working in deeper partnerships to produce joined-up plans for a drainage catchment that deliver multiple benefits. We are increasingly co-funding solutions in partnership with other flood management agencies and ensuring aligned investment plans to reduce flood risk in the most cost-effective way.

By 2025, we will complete the implementation of Drainage and Wastewater Management Plans. We have already commenced the process by identifying 18 Strategic Planning Areas. The next steps involve the completion of an initial risk based screening for each Area and ultimately the production of specific vulnerability and resilience assessments.

To inform our plan to 2025 and beyond, we have carried out a comprehensive resilience study to identify combinations of events and asset failures that could impact our wastewater collection assets and our drainage service. Using this, we have developed high level resilience plans for the top 11 asset/event combinations using the Cabinet Office's model for effective infrastructure resilience.



CASE STUDY THE LIVING WITH WATER PARTNERSHIP

In 2013, Hull City Council launched the City Plan for Hull – a 10-year regeneration strategy which sets out to transform the city physically, culturally and reputationally. Since then, Hull has hit the national and international stage as UK City of Culture 2017 and has seen investment of more than £3 billion from the public and private sectors.

Yet, despite this renaissance, the city's surrounding geography and the challenges of climate change mean that, outside of London, Hull remains the most at-risk city from flooding in the UK - much of the City of Hull and the surrounding area sits below sea level. However, Hull was built around water; it is one of the area's biggest assets. By working together, we can not only reduce the risk from flooding, we can also bring wider benefits to the area.

Following the extreme storms of 2007, thousands of people and properties felt the impacts of widespread flooding. In response, we have been instrumental in setting up the Living with Water partnership in Hull. The Hull and Haltemprice Integrated Strategic Drainage Board is a ground-breaking initiative in collaboration with the Environment Agency, Hull City Council and East Riding of Yorkshire Council, which aims to transform our relationship with water.

Significant progress has already been made, including the completion of Bransholme pumping station by Yorkshire Water, reducing the flood risk to 15,000 properties.

Featuring six giant "Archimedes screw" storm water pumps, the new and improved pumping station has around four times greater capacity and can transfer the equivalent of an Olympic swimming pools worth of storm water into a storage lagoon in less than two minutes. An investment like this has helped us increase our wastewater collection resilience capacity and provide adequate protection to the City of Hull.

The Living with Water partnership is also prioritising sustainable solutions that work in harmony with the environment and provide benefits to local residents, such as 'aqua-green' spaces which soak up water like sponges, then release it slowly, reducing the pressure on storm drains and sewers.

We have appointed a Head of Resilience for East Yorkshire to support the Living with Water partnership and create an exemplar resilient city in Yorkshire. We are currently working with our partners and the Rockefeller Foundation to trial a global standard for water resilience assessment of urban systems. Hull is the only city in the UK and Europe and one of five globally selected for this pilot trial. We have ambitions to extend the learning across Yorkshire.

Find out more and watch a video of the story so far at www.livingwithwater.co.uk



WORKING WITH PARTNERS AND THE ENVIRONMENT

To ensure sufficient capacity for sewage, we are working with others and with nature to reduce the amount of rainwater entering sewers. The rainwater can instead be kept in the natural environment and put to good use for biodiversity, recreation and aesthetic value. For example, we recently delivered four schemes in partnership with Leeds and Hull Councils which reduced the risk of external and internal flooding to 13 properties by removing surface water from our network. We are making a performance commitment to disconnect at least 40 hectares of drained land from our sewer system by 2025. We explain more on these ‘blue green’ approaches in the case studies on the Living with Water partnership on page 42. Our commitment to plant one million trees is outlined in the main document and in the Land Management section.

Customers have an important role in the resilience of the drainage system through their behaviours. Sewers have never been designed for many of the things that are put down them. In particular, things like wet wipes and nappies combine in the sewer with fats, oils and greases to cause blockages that we need to remove to prevent flooding and pollution. We have an increasing range of engagement and intervention programmes to work with customers on these issues. For example, our successful community collection pilot in Bradford.

RESPONDING IN AN EMERGENCY

To ensure an effective response during a flooding event we work closely with other organisations, particularly the EA. For example, we share equipment and have colleagues in each other’s control centres to ensure a coordinated approach. We also prepare for, and stress test, our preparedness for emergency situations by running multi-agency exercises with the EA, local authorities and emergency services.

Learning from past events, we have invested in a range of emergency response equipment for flooding and other extreme events, including a fleet of 4x4 vehicles that can operate in such conditions, and demountable defences that can rapidly be installed in areas that need them.

We describe in the Communications section how we engage with customers to support them during a flooding event, for example highlighting weather likely to cause flooding and preparations that can be taken, and updating on the status of services and where to access help.

WHY IS LIVING WITH WATER IMPORTANT?

“10 years after the 2007 floods there has been a great deal of progress on flood resilience in Hull, but climate change means the goal posts are constantly moving and we need to think differently about how we approach the challenge. We cannot continue to simply build bigger and bigger sewers, we need to look at more sustainable solutions.

The history of Hull and Haltemprice is tied to the opportunities for connectivity and trade offered by the water environment, but over the years the city has moved away from those roots. We want to work with communities to rediscover the city’s relationship with water and shape a successful, sustainable city that is ready for the future”

Nevil Muncaster, Director of Asset Management for Yorkshire Water

STAKEHOLDER QUOTE

“They’ve created a very Hull-specific team to work on PR19 and to work on the ‘Living with Water’ partnership, and that’s really forging the way.”

An employee at a local council

FUTURE DIRECTION

Pressures on the resilience of the drainage network will only increase over the coming decades with the growing population, urban development and age of sewers. Recent experience and best evidence for future climate change shows this will be compounded with shortening return periods, meaning that we need to plan for more extreme and more common storms.

The only sustainable response which will affordably protect society is the continued focus on innovation and partnership approaches that work with the environment rather than trying to control it. Combined with traditional approaches where they remain the most effective approach, and taking a risk-based approach, we will be able to maintain and improve resilience over the long term with the support of our customers.

Technology and innovation will also play a critical role over the long term, as it will across all parts of our business. We will continue to embrace technologies that can increase remote visibility and control of the network. Our continued leadership in cutting-edge modelling techniques will help us assess risk and develop the best solutions for each local circumstance.

Local communities will have an increasing role in the resilience of their public drainage service. For those that want, they will be able to act as ‘citizen regulators’ through our open sharing of data about the network’s performance. We will need to further expand our engagement programmes to work increasingly closely with customers, perhaps more commonly helping them in their properties, to effectively minimise misuse of the sewers.

We expect that CSOs will become unacceptable in the long term. Our strategy is working towards an aspiration to eradicate them, with one of our Big Goals to protect the environment by eliminating pollution and flooding from the sewer network. To support this, we will dramatically increase our work to disconnect surface water from the sewers, keeping surface water available as a valuable resource and prioritising space inside the sewers for sewage. This will facilitate sustainable development in Yorkshire’s communities.

To ensure sewer disconnections do not simply transfer the flood risk, we will have an increasing role in managing Yorkshire’s environment. We will expand our already substantial ‘natural capital’ programmes further to deliver even greater benefits. The Living with Water vision and plan we have developed in partnership with communities and agencies in Hull will become increasingly relevant to communities across Yorkshire and more widely. Our multi-agency plan to address flood risk in and around Hull is one which will take many years to implement in full, and our approach will evolve over time in response to latest evidence and best practice. We will openly share our learning from the current pilot of the City Water Resilience Framework with Rockefeller Foundation and Arup in Hull, and apply this learning to other communities across Yorkshire and beyond.

WASTEWATER TREATMENT AND EFFLUENT DISPOSAL

We protect Yorkshire's rivers and coasts by treating and safely recycling sewage and wastewater back to the environment.

Yorkshire's rivers and coasts are the healthiest they have been since the industrial revolution thanks to our investments to substantially reduce pollution, combined with action by others. We are continuing to invest to provide capacity for the growing population, to comply with latest legal requirements, and to support wildlife in the changing climate.

We are working innovatively to further protect and improve river life while reducing the energy demand and carbon emissions of traditional wastewater treatment processes, for example using river restoration and fish passes. We also need to further improve the resilience of our wastewater treatment processes to flooding.



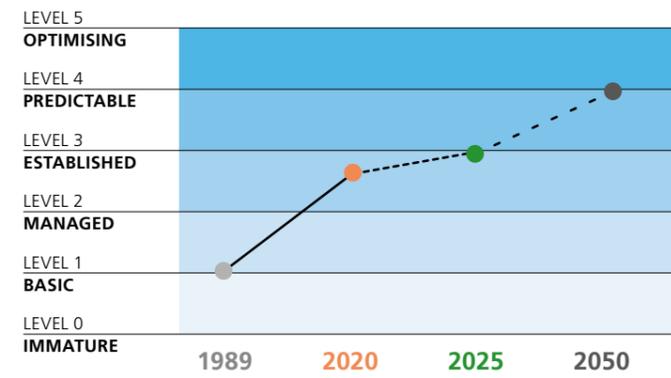
The Yorkshire coast at Scarborough

DASHBOARD

RESILIENCE MATURITY

We have assessed our resilience maturity at four time periods and of five qualities of resilience. We have given each a grade from immature to optimising, following the the maturity scale in the British Standard for Organisational Resilience (BS 65000).

Resilience through time



Resilience qualities



PRIORITY SHOCKS AND STRESSES

Listed in alphabetical order

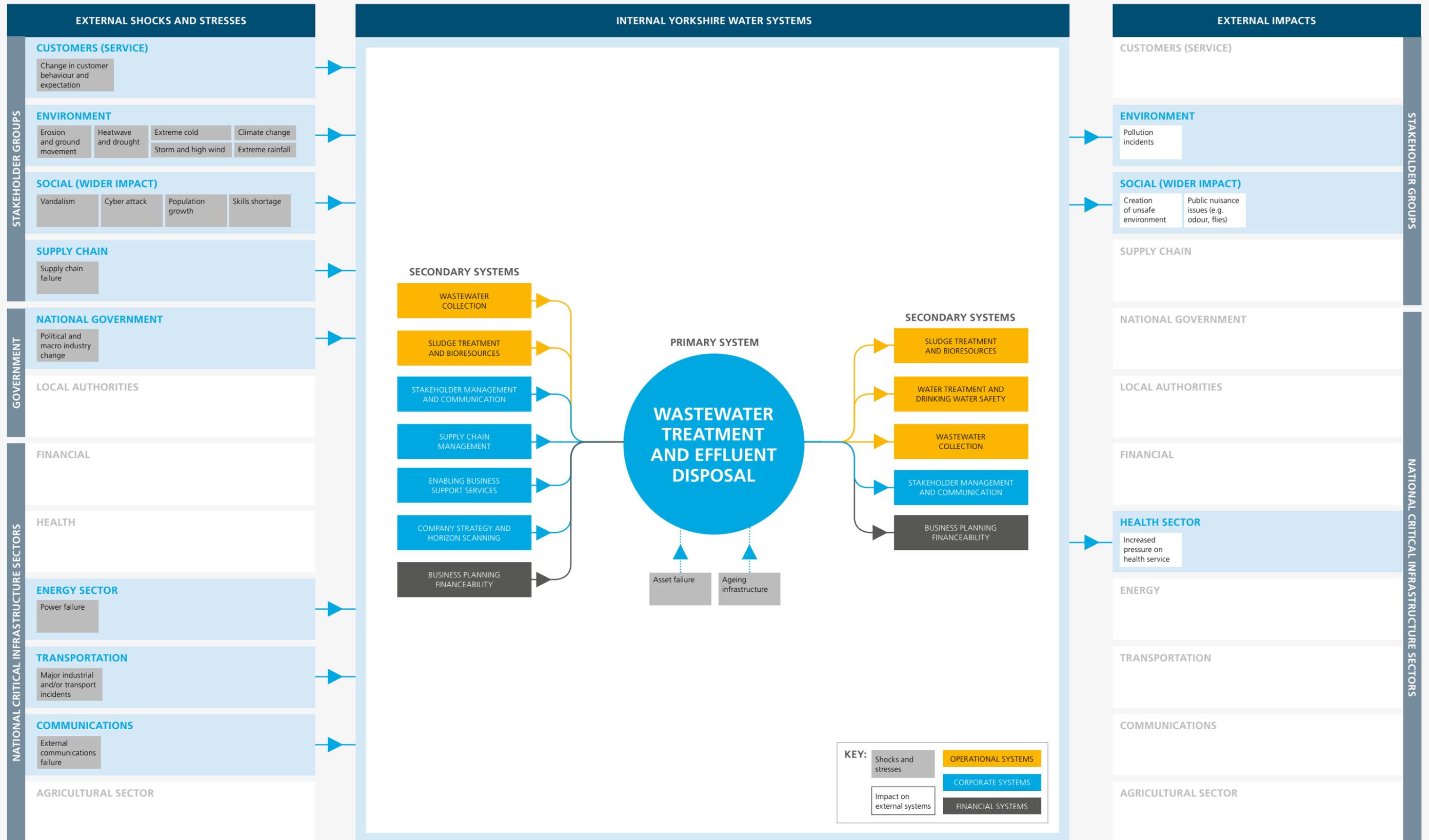
- Ageing infrastructure
- Asset failure
- Extreme rainfall
- Population growth
- Skills shortage

SUPPORTED PERFORMANCE COMMITMENTS

- Increasing** the length of river we improve
- Reducing** the pollution we cause
- Meeting** the requirements of our effluent discharge permits
- Meeting and exceeding** legal standards for bathing waters

MATURITY SCALE	YEAR
LEVEL 5: OPTIMISING	● 1989
LEVEL 4: PREDICTABLE	● 2020
LEVEL 3: ESTABLISHED	● 2025
LEVEL 2: MANAGED	● 2050
LEVEL 1: BASIC	
LEVEL 0: IMMATURE	

WASTEWATER TREATMENT AND EFFLUENT DISPOSAL INTERDEPENDENCE MAP



CURRENT POSITION AND OUR PLAN TO 2025

Treating wastewater and returning it safely back to rivers and coasts is at the core of our day-to-day business. Following our investments, and work by many others, the rivers and coasts in Yorkshire are the cleanest they have been for hundreds of years. We consistently achieve very high levels of compliance with our discharge permits. Incidents of pollution from our wastewater processes have greatly reduced. However, we need to go further to provide sufficient capacity for the growing population and to manage threats from flooding and coastal erosion. We also need to help the resilience of river life in the changing climate.

MAINTAINING WASTEWATER TREATMENT WORKS

We use a range of measures to ensure the reliability of our Wastewater Treatment Works (WwTW). For example, we use remote monitoring and control technologies to optimise processes and intervene if problems occur. Our teams regularly visit sites to check processes and carry out maintenance activities. We train our colleagues and document processes to enable high standards and continual improvement.

We are experienced at maintaining wastewater standards for a growing population. This will continue to be a priority with Yorkshire expected to grow by a further 1 million people by 2045. We undertake regular growth planning studies and liaise with local authorities to determine where we need to develop capacity.

However, there is no legal requirement for water companies to be consulted about development plans, and all development has an automatic right to connect to the sewer network, regardless of its capacity. This challenges our ability to optimally provide capacity. We monitor development plans and communicate with local authorities to mitigate the risks. As we described in the Wastewater Collection section, we are also working to take surface water out of our system so we can better accommodate growth.

We have analysed the risk of coastal erosion to our assets to identify where we need to monitor or invest. For example, we are currently relocating Withernsea WwTW away from a rapidly eroding cliff.

We have recently invested £110m in assets along Yorkshire's coastline to improve bathing water quality. This contributed to all but one of Yorkshire's bathing waters achieving 'Good' or 'Excellent' standard in 2017. We work with other stakeholders to support bathing waters and the role they play in the local economy.

Many of our WwTWs have been flooded during recent extreme storms, like those over the Christmas period of 2015. In severe cases, the damage can take months to fully repair, resulting in a temporary lowering of environmental protection. Because WwTW are inherently prone to flooding, being located by rivers, we consider our approach carefully and include options which allow fast response and recovery. For example, when repairing a works after flood damage, we can raise critical electrical assets above the levels of inundation that were experienced so that they are less likely to be damaged next time. We have assessed the flood risk facing our WwTW and how we can best protect them through operational and investment responses. Note, we discuss our role in helping reduce flood risk in the Wastewater Collection section.

Disruptions like strikes, industrial action, transport and security incidents have been considered in our incident management and business continuity plans. These provide a high amount of resilience and enable a quick response and recovery. We explore this in the Enabling Services section.

CUSTOMER QUOTE

“You don't think [where it goes] when you flush your toilet”

A household customer in Sheffield

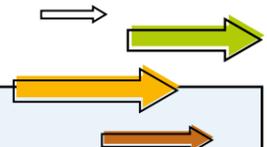
ENHANCING WASTEWATER TREATMENT WORKS

We need to do more to comply with latest statutory requirements, particularly the Water Framework Directive (WFD) and Urban Wastewater Treatment Directive. These legal duties aim to further enhance river life and restore them to as close to a natural state as practically possible. Healthy habitats and wildlife are more resilient to the changing climate and other pressures.

We have included in our plan to 2025, a substantial programme of capital investment at our WwTWs to meet latest legal requirements. This accounts for almost a fifth of the cost of our plan, with a large proportion focused on removing phosphorus at our works. Phosphorus can pollute watercourses when levels are too high. Our investment in phosphorus removal may deliver small ecological benefits by improving the chemical status of rivers, but this comes at disproportionate costs, both financially and environmentally.

From a resilience perspective, this is not a sustainable long term approach. New assets and processes can be complex to run and will need substantial chemicals and energy, and result in a large carbon footprint. The financial cost will also increase customer bills, adding pressure to the poorest in society. Because of tight compliance deadlines we will have little opportunity to develop innovative approaches that might help mitigate these downsides.

We believe there are more sustainable and resilient ways to deliver further ecological improvements in rivers and secure legal compliance with. We are discussing an alternative approach with our regulators and legislators to protect rivers without the need for financially and environmentally costly capital solutions. Our approach is called Catchment Sense and builds on our experience improving river quality, for example installing fish passes to restore fish migration routes to spawning grounds, and trialling river restoration techniques.



FUTURE DIRECTION

Effective wastewater treatment will be of increasing importance to the health of river and coasts as they need to cope with growing pressure from the changing climate. We will invest and innovate to ensure continual improvement at our works, meeting the needs of the growing population. For rivers and coasts to be fully resilient, wider society will also need to tackle other forms of water pollution, for example in runoff from farms and roads, and we will support these efforts by further expanding our catchment management programmes.

It is essential to long term resilience and sustainability that we protect and improve the water environment without consuming finite resources and emitting large carbon emissions.

We have already made good progress in reducing our carbon emissions, and we will go further by working innovatively and collaboratively with stakeholders. This will enable us to find more effective and affordable ways of increasing the lengths of rivers improved across Yorkshire.

A modern WwTW can be a sustainable and resilient demonstration of the circular economy in action. By getting more from water, waste and land resources at a works, they can provide a range of value creating activities and support green growth in communities. We are trialling an exciting new approach at our Esholt WwTW in Bradford which has the potential for expansion to other sites.

SLUDGE TREATMENT AND BIORESOURCES

We transport sewage sludge from wastewater treatment works to sludge treatment plants for processing to recover calorific and nutrient value, and safely dispose or recycle leftover material.

We make valuable products from sewage sludge by renewably generating an increasing proportion of own large energy needs, and by recycling precious nutrients to land in place of petrochemical fertilisers. Approximately 70% of our sludge is now converted to energy through anaerobic digestion and we are investing to go even further.

We have developed an innovative bioresources model to help us analyse the most cost-effective and resilient approach to sludge treatment and recycling. We are embracing market solutions to help us maintain and improve this business function while reducing cost.

We have successfully reduced our operational carbon emissions by around a third over the last 10 years and we are committed to going much further.

AN INNOVATIVE BIORESOURCES RESILIENCE MODEL

We have developed and applied an innovative bioresources model with historic data and future forecasting to produce a strategy with the optimal mix of solutions to ensure sufficient capacity and

to be sufficiently resilient, in the most cost-effective way. Our approach identifies a mix of solutions to ensure a resilient approach.

Resistance
 We have considered flood and cold weather protection where appropriate.

Reliability
 We propose an enhanced maintenance approach and the reduction in impact events this might deliver.

Redundancy
 We plan the provision of additional capacity in key locations.
 We have considered the ability of our assets to manage greater throughput by altering certain operational parameters.

Response and recovery
 We have considered the facilities that allow us to remove sludge quickly from systems and import it back easily into the treatment network.

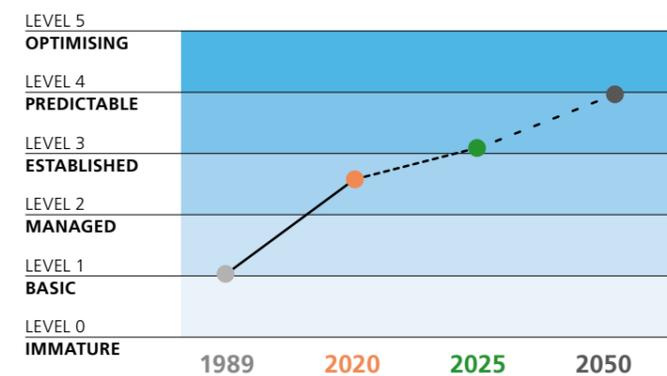
Reflection
 The model captures the learning from past events.
 We will iterate and evolve our resilience model as our understanding of past and future events develops to become a live tool for resilience planning and optimisation.

DASHBOARD

RESILIENCE MATURITY

We have assessed our resilience maturity at four time periods and of five qualities of resilience. We have given each a grade from immature to optimising, following the the maturity scale in the British Standard for Organisational Resilience (BS 65000).

Resilience through time



PRIORITY SHOCKS AND STRESSES

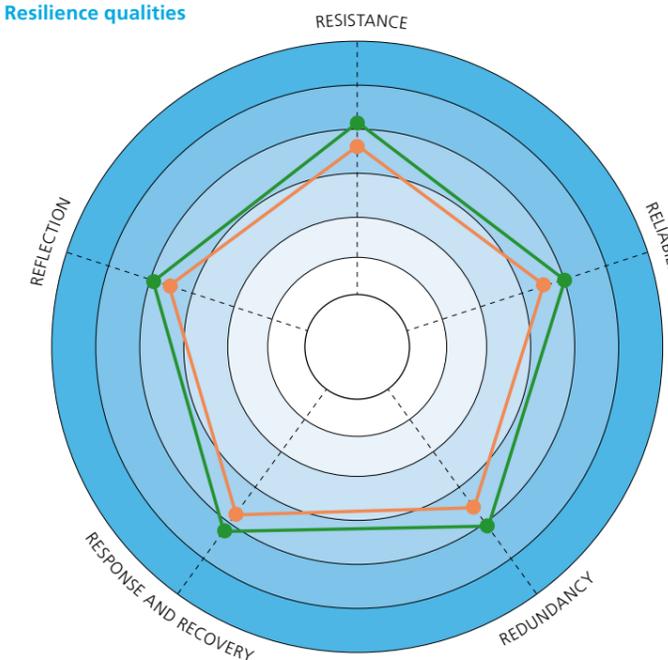
Listed in alphabetical order

-  Ageing infrastructure
-  Asset failure
-  Climate change
-  Extreme cold
-  Political and Macro industry change

SUPPORTED PERFORMANCE COMMITMENTS

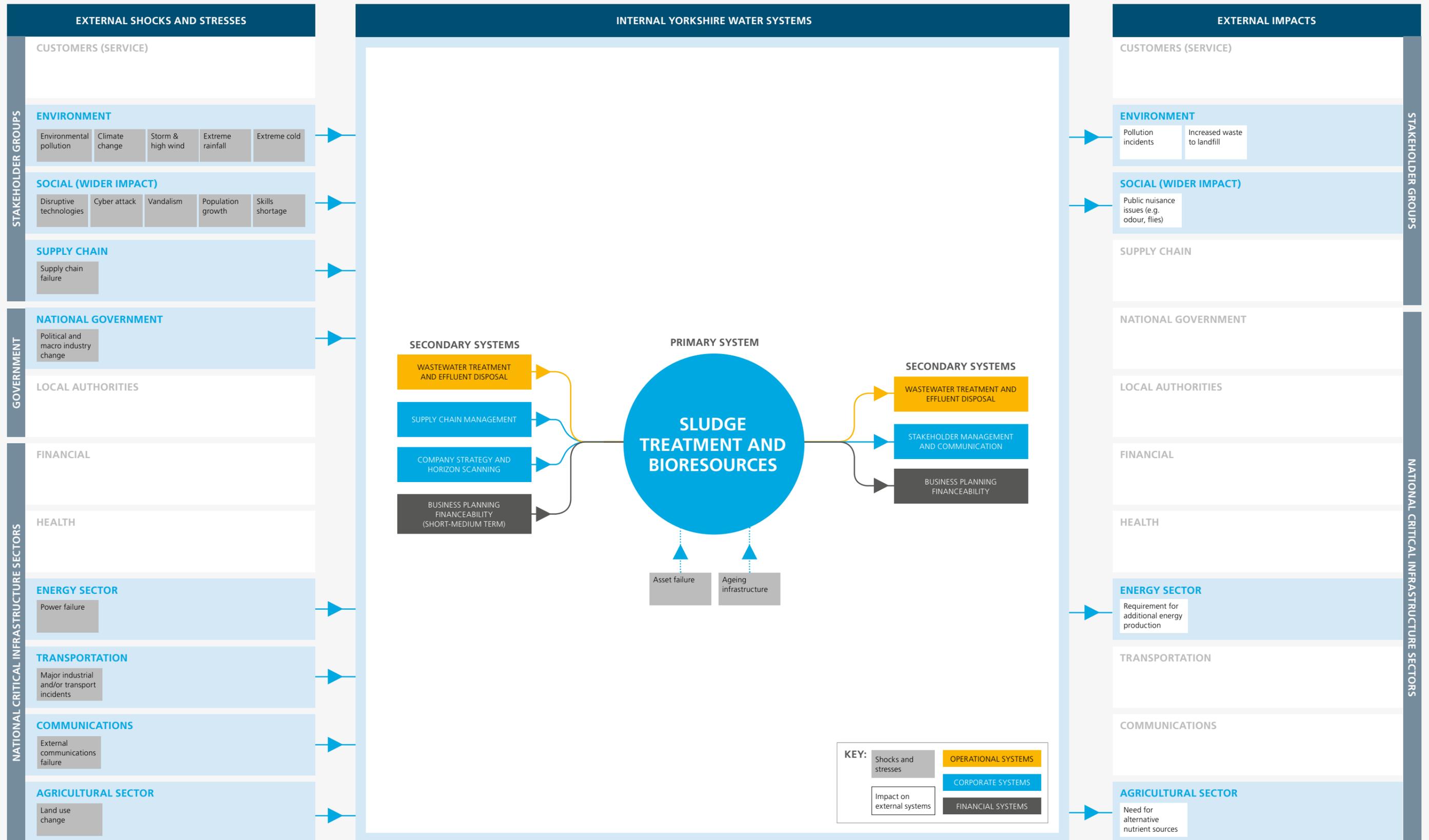
- Achieving** Biosolids Assurance Scheme (BAS) accreditation
- Increasing** the renewable energy we generate
- Creating** new value from under-used or waste resources
- Reducing** our carbon emissions

Resilience qualities



MATURITY SCALE	YEAR
LEVEL 5: OPTIMISING	● 1989
LEVEL 4: PREDICTABLE	● 2020
LEVEL 3: ESTABLISHED	● 2025
LEVEL 2: MANAGED	● 2050
LEVEL 1: BASIC	
LEVEL 0: IMMATURE	

SLUDGE TREATMENT AND BIORESOURCES INTERDEPENDENCE MAP



CURRENT POSITION AND OUR PLAN TO 2025

Water and wastewater treatment processes produce sludge that needs careful management to protect those processes and the environment. We manage around 150,000 tonnes of sewage sludge every year at 33 sludge treatment centres.

This sludge is now called a 'bioresource', meaning that it is a valuable renewable resource because of its calorific and nutrient content. Approximately 70% of our sludge is converted into renewable energy through anaerobic digestion, and we are investing to increase this to 100% in the next few years. Generating our own energy supports our operational resilience by making us less reliant on the national grid. We also recycle treated sludge to land as an alternative to petrochemical fertilisers. This process is strictly controlled and independently regulated to ensure a quality approach that does not cause pollution.

Experience shows that a combination of events can test the resilience of our bioresources processes. For example, over recent years we have managed reliability, flooding and safety issues. Looking ahead, acute shocks such as extreme weather events and chronic stresses such as ageing assets present risks to the resilience of our bioresources activities. Recognising that we need to do better, we are taking bold steps to enhance the efficiency and resilience of our approach.

EMBRACING MARKETS

We are embracing the sludge treatment market as part of an industry-wide effort to drive efficiency, boost resilience and deliver further innovation within the water sector. We are offering more opportunities for third-party companies to enhance how we transport, treat and recycle sludge.

As part of our activities to engage with organisations interested in working with us, we recently held two Bioresources Supplier Day events in April and June 2018. These engaged with potential suppliers on our aspirations for the bioresources business and how we are looking to the market to support us in delivering better outcomes. We have also openly published data on our bioresources activities. You can find out more at: www.yorkshirewater.com/bioresources

To help us reduce costs and improve our approach and its resilience, we have identified four market goals, shown below.

An increased focus on trading will support affordability and resilience, as creating trading agreements with other providers will both deliver efficiencies and reduce risk by making available additional capacity. Avoiding building additional in-house capacity will also benefit the environment.

New technologies and expertise brought by third parties will engender innovation, improve performance and provide additional resilience. Market testing 80% of our bioresources capital programme has suggested delivery of significant efficiencies, which have been built into our plan.

Incentivising development of the market, or different market behaviours, will enable us to achieve our outcomes in a more sustainable way, resulting in a more resilient solution and development of new approaches.

Finally, collaborating with others will allow us to trial new innovative approaches and target efficiencies we could not manage alone.

FOUR MARKET GOALS FOR BIORESOURCES

Pursue increased trading to deliver efficiencies and reduce the need for capital expenditure

Utilise third parties to introduce improved technologies and approaches

Stimulate and develop the market to help achieve our outcomes

Collaborate to do more than we could alone

REDUCING CARBON EMISSIONS

Limiting climate change by reducing global carbon emissions is critical to our resilience as an organisation whose public services fundamentally rely on the weather and climate. Our climate change strategy recognises our need to lead by example in reducing our substantial carbon footprint so that we can have credibility when encouraging others to do the same. Furthermore, reducing carbon can go hand in hand with reducing financial cost and finite materials by driving innovation.

We have a large operational footprint, particularly from the energy we use to pump and treat water. We have successfully reduced our operational emissions by around a third over the last ten years, by being more energy efficient and supplying more of our energy from low carbon sources. We are generating an increasing proportion of our own low carbon energy from our bioresources, and also wind and hydro power. Our approach has also kept costs down for customers, avoids energy price volatility and reduces our reliance on the national grid. We continue to invest in renewable energy generation and energy efficiency, and will soon use all our sewage sludge for this purpose, and examining further opportunities for solar power and other forms of renewable on our land. We are also working to reduce the impact of our fleet, switching to electric vehicles where they are suitable and investigating hydrogen fuel options.

We also have substantial emissions embedded in the assets we build and maintain, and in our supply chain. We have been introducing new ways of working to better measure and manage these emissions. This encourages innovative thinking in our capital solutions, with deeper investigation of less traditional options like those involved in blue and green solutions, and even options which require no building at all.

As a large land owner with substantial areas of carbon rich peatland and woodland, we store a large amount of carbon in our land. We are currently developing a measurement process so that we can inform our management approach to maximise the carbon we are storing in our land. Our commitment to plant 1 million trees over the next ten years and our ongoing programmes to protect and restore peatland will support carbon sequestration.

We have committed to formally measuring and publishing all these forms of emissions, and reducing our total carbon footprint.

You can find our climate change strategy on our website at www.yorkshirewater.com/climatechange

FUTURE DIRECTION

Over the longer term there are a range of challenges and opportunities facing the resilience of our bioresources function. Our focus on markets will enable an agile response that evolves over time to deliver the most efficient and effective approach. In fully embracing the use of markets, we can benefit customers, the environment and society by improving performance, delivering efficiencies and reducing our impact on our surroundings.

A continued focus on energy efficiency and self-generation will help support our resilience by mitigating risks from increasing and volatile energy prices, and growing pressure on the national grid's resilience.

We will continue to explore how we can produce more renewable energy from sludge, for example building on our research and development of Advanced Thermal Conversion (ATC). With our land and water assets we are also investigating many other opportunities for renewable technologies.

By further expanding our application of the principles of the circular economy, we will ensure a sustainable approach which maximises the value that can be created from sewage sludge. For example, it may become cost-effective to recover finite resources like phosphorus.

COMPANY STRATEGY AND HORIZON SCANNING

We continuously review the opportunities and threats facing our business to shape our short term approach and long term planning and strategies.

Resilience is inherent throughout our long term strategy and five Big Goals. Our overall company strategy is supported by a range of more detailed strategies. Together, our strategies and Big Goals shape everything we do and run to the heart of our corporate culture, ensuring resilience is always a top priority.

We evolve our strategies and day-to-day activities to ensure we are always acting on latest information to maintain and enhance resilient services.

Our specialist colleagues use mature business processes and advanced technology to continually monitor, assess and report our performance and the latest evidence on the opportunities and threats facing our business. This insight is used at all levels within the business, and ultimately governed by our Board, to enable timely interventions, inform our plans and revise our strategies.

CASE STUDY THE DECISION MAKING FRAMEWORK (DMF)

An efficient and best value plan requires making the right decisions about what to invest in and when to do it. The whole life cost associated with any investment needs to be considered as well as any wider benefit that a solution may have on society. These principles have been at the heart of our planning for many years and we have further embedded them in our new Decision Making Framework (DMF). The DMF is a business-wide process and way of working, supported by a cutting-edge IT system, which we use to ensure affordability and resilience of our business and services by delivering the biggest benefits to customers at the lowest cost.

The DMF is built around a new Service Measure Framework which has been developed internally and with customers to identify the key reasons that we invest. Our decision making is based on the change that an investment will deliver in these service levels. In addition to considering the costs and benefits of possible interventions, the DMF is risk based, quantifying the frequency, probability, severity and impact of every decision. Considering all these factors together in an integrated and holistic way, enables us to understand and prioritise operational and investment needs to determine the optimal approach.

We have embedded into the DMF our six capitals framework. In addition to valuing customer willingness to pay and financial benefits to Yorkshire Water, we consider the wider benefits of our decisions including their impact on the environment (natural capital), people (human capital) and society (social capital). We have mapped a change in each service measure to one or more of the 6 capitals and deployed specialist economic resources to obtain monetary unit rates where there is sufficient confidence to do so. The approach helps us understand the impact of existing asset failures and the benefit we retain by fixing them, as well the ability to evaluate more creative long term, enhanced environmentally friendly solutions. We are applying it as a framework across our whole investment programme not just as an assessment on individual schemes.

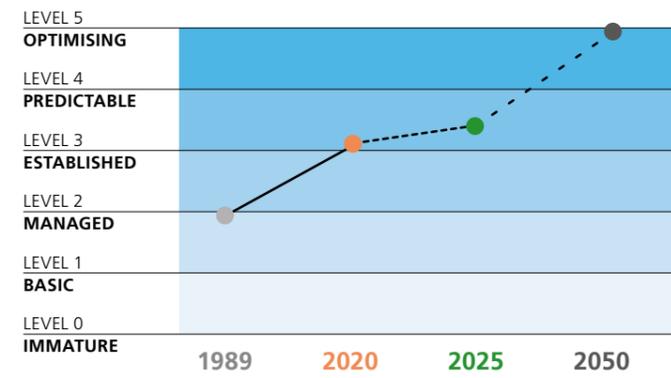


DASHBOARD

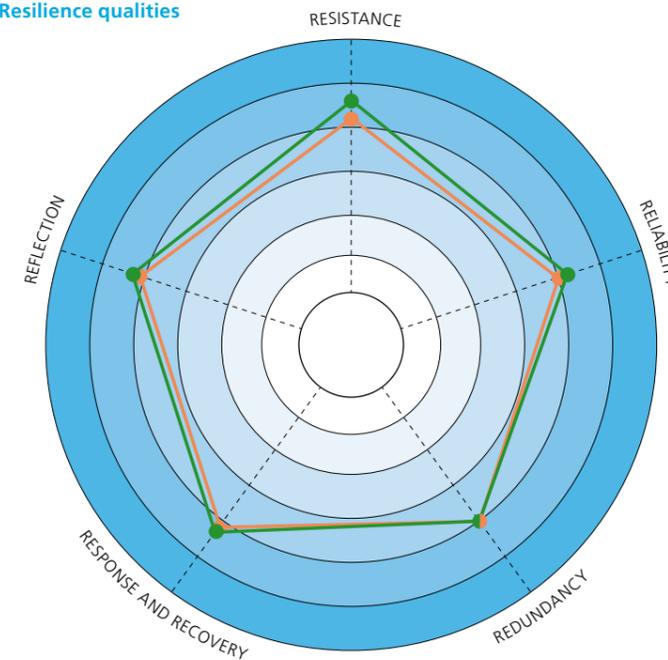
RESILIENCE MATURITY

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Resilience through time



Resilience qualities



PRIORITY SHOCKS AND STRESSES

Listed in alphabetical order

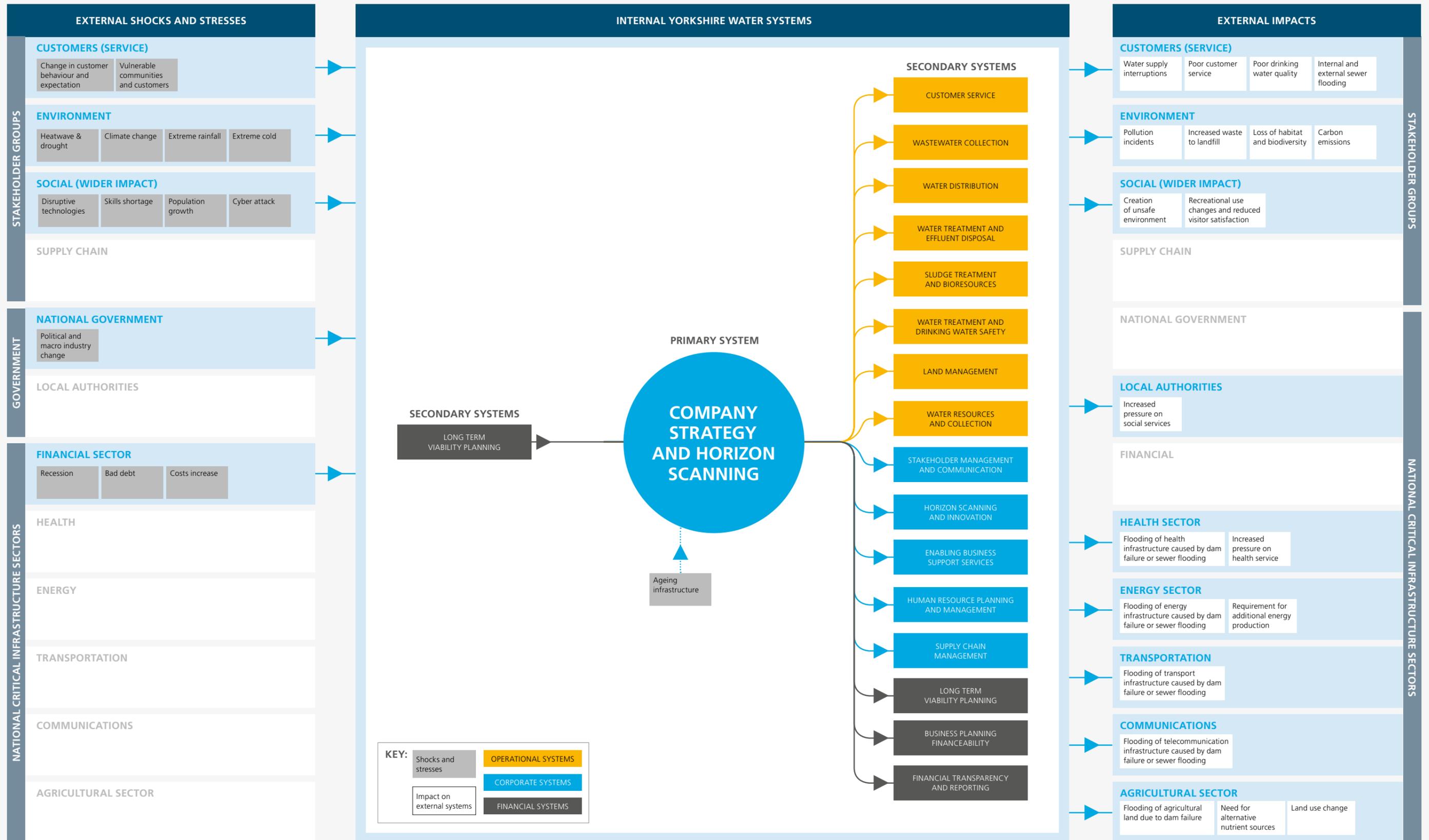
- Change in customer behaviour and expectations
- Climate change
- Political and macro industry change
- Population growth
- Vulnerable communities and customers

SUPPORTED PERFORMANCE COMMITMENTS

The resilience of the system contributes to the achievement of all our performance commitments through identified interdependences.

MATURITY SCALE	YEAR
LEVEL 5: OPTIMISING	1989
LEVEL 4: PREDICTABLE	2020
LEVEL 3: ESTABLISHED	2025
LEVEL 2: MANAGED	2050
LEVEL 1: BASIC	
LEVEL 0: IMMATURE	

COMPANY STRATEGY AND HORIZON SCANNING INTERDEPENDENCE MAP



CURRENT POSITION AND OUR PLAN TO 2025

OUR LONG TERM STRATEGY AND BIG GOALS

We maintain and work towards a long term strategy to secure the longevity of our business and the resilience of our services. Resilience is inherent within our corporate strategy, culture and vision: Taking responsibility for the water environment for good.

Every five years we update our 25-year strategy based on a review of our performance, the latest evidence on future economic, social and environmental trends, and engagement with our customers. We observe and closely monitor 12 key trends shaping our business and services, such as population growth, climate change, and changing customer behaviours. As part of our ongoing engagement, we have spoken at length to our diverse customers and stakeholders to understand their needs and values, and how this may change in the future.

We have undertaken extensive analysis, engagement, planning and testing to ensure our long term strategy is addressing the challenges and embracing the opportunities of a changing Yorkshire to ensure the efficient and effective resilience of our services. At the heart of our strategy we have developed and agreed five Big Goals with our customers. These encompass our main resilience challenges and how we are responding to them. Together, our Big Goals and long term strategy shape everything we do to ensure our continued delivery of great, affordable services. Our strategy is available at www.yorkshirewater.com/biggoals

AUDIT FINDINGS

“It should be acknowledged that YW is the first company in the Water Industry to invite the Cabinet Office EPC to review their Organisational Resilience programme and this is an example of leading good practice in this area.”

UK Cabinet Office - Emergency Planning College, BS 65000 report, Base-Line Review of Organisational Resilience, May 2018

ENABLING STRATEGIES AND PLANS

To support the delivery of our corporate strategy, we produce and maintain a range of more detailed strategies and plans that define the activities and investments we will undertake to maintain robust, high quality services. These strategies and plans ensure that individual operational and investment choices all complement each other towards our overall long term direction. We complete extensive analysis and use latest evidence and approaches to ensure the best outcomes at the lowest cost. Resilience lies at the heart of all these strategies and plans.

Our most important plans and strategies are updated cyclically to respond to latest developments and are closely scrutinised by regulators to ensure high standards. These include our:

- **Price Review business plan** - detailing how we will maintain and enhance high quality and affordable services over the next five and 25 years
- **Water Resources Management Plan (WRMP) and Drought Plan** – detailing how we will maintain water supplies over the long term and through short term emergencies. We discuss this further in the Water Resources section.
- **Water Quality Plan and Long term Statement on Drinking Water Quality** – detailing how we will maintain and enhance the quality of drinking water to ensure it is always safe and wholesome. We discuss this further in the Water Treatment and Water Distribution sections.

We also have many internal strategies on areas of priority, including each part of our core operations and critical functions like supply chain and finance. We are developing a cyclical strategic planning process for drainage and flood management that is a parallel to the mature approach used in water resources planning. We call this Strategic Drainage Management Plans (SDMPs) and we discuss this further in the Wastewater Collection section.

HORIZON SCANNING TO INFORM OUR APPROACH

We have mature processes and a company leadership structure that analyse and review latest internal and external developments and use this insight to shape strategies, inform investment choices and focus operational resources.

We monitor the ‘mega-trends’ shaping our business and services by gathering the latest projections from expert sources like the Office for National Statistics. At our last review we identified 12 strategic forces, including: technological developments; the national and global economy; and, societal behaviours and expectations. We also collaborated with PwC to look at how water and wastewater services may evolve under six scenarios, with the publication available at www.yorkshirewater.com/resilience

We have used the data and learning to shape our long term strategy, WRMP, business plan and performance commitments.

We have developed a decision-making framework that considers the six capitals which define the essential resources on which we rely, not just financial and manufactured which is traditionally the focus.

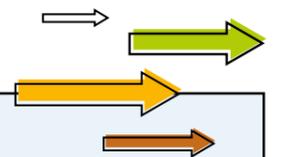
This helps us ensure the broad impact on our customers, stakeholders and the environment are fully considered in our business decisions. Having applied this approach in the optimisation of our new business plan, we are now working to embed this technique within our delivery of the plan by shaping the detailed design of solutions.

We hold internal incident reviews to learn from incidents and identify improvements.

GOVERNING OUR MANAGEMENT OF RESILIENCE

Our Board structure enables the integrated approach required to treat specific risks and to manage cross-cutting resilience. Board Committees include: investment; audit; remuneration; health, safety and environment; social value; and, innovation, IT and data. The corporate governance section in our Annual Report and Financial Statements details the Board structure and the role of each committee in managing risk and resilience.

Our risk management processes are overseen by a risk committee. To actively manage our risks and prioritise our actions, this committee reviews the latest outputs of our ongoing process to monitor emerging risks, and reviews our approach to priority risks.



FUTURE DIRECTION

Horizon scanning will remain an ongoing task. We will continue applying the insight we gain to evolve our strategies and the delivery of our plans to ensure we always respond to latest evidence and customer expectations. We will also seek to innovate improved ways of gaining and applying the most up to date and comprehensive knowledge to best effect.

The development of our new resilience framework enables us to further enhance the way we govern our business and services. We have already started, and will continue to, embed this new capability within our standard business processes, bringing together our many areas of good practice in managing resilience and aligning with our existing approach to risk management.

To support this, we are expanding our existing risk committee to become the risk and resilience committee. This will provide the senior-level body for oversight of our approach to whole-business resilience, aligned seamlessly with our approach to risk.

We are further developing key strategies, including the Decision Making Framework and Strategic Drainage Management Plans we mentioned earlier. You can find more details on our plans for these on pages 57 and 61, respectively.

SUPPLY CHAIN MANAGEMENT

We procure a wide range of goods and services for our operations, including critical resources and support functions.

Our specialist procurement teams use our established business process and risk-based model to manage the short-term events and long term trends that are influencing our supply chains. We test the market to source the goods and services we need at the best value and from responsible suppliers.

Through our tendering, contracts, ongoing engagements and assurance, we ensure a best practice approach to the sustainability and responsibility of our supply chains. We work in partnership with our suppliers to address short and long term resilience challenges.

CASE STUDY MANAGING RISKS IN MODERN SLAVERY

Modern slavery is a key issue for Yorkshire Water in ensuring that it works with an ethical and resilient supply chain. In our Modern Slavery Act (MSA) Statement, Yorkshire Water made a commitment to include MSA clauses in all Terms & Conditions, tenders and new vendor requests. Further we committed to up-skill the Yorkshire Water Procurement & Contract Management Team on the MSA. We have communicated to all high risk suppliers providing an overview of the legislation, stating our intent and future expectations. For those contracts deemed to be of high risk, we include a specific right to audit against the obligations of the Modern Slavery Act 2015.

In line with this commitment, we worked with the Wilberforce Institute for the Study of Slavery and Emancipation (WISE) of the University of Hull to identify risks of modern slavery with suppliers with whom we have an annual spend over £50,000. This work focussed on direct operations and supply chains in the UK and abroad.

Working with WISE, we conducted further research on the parts of the business and supply chains where there is a risk of slavery and human trafficking taking place, and the steps the company will take to assess and manage that risk.

To develop an appropriate risk assessment, and to identify key sectors and suppliers where there is the highest risk of modern slavery, WISE conducted a risk rating of 525 suppliers with whom we currently spend over £50,000. WISE developed a full report containing an individual assessment of each supplier covering modern slavery risks in the industry, region, product and/or service.



WISE also developed a set of Key Performance Indicators (KPIs) that can be embedded within the existing KPI framework used by our procurement and contract teams. These KPIs will help us track suppliers' performance in addressing Modern Slavery risks.

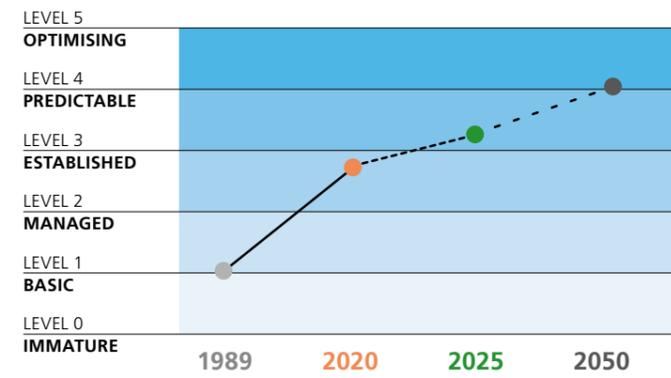


DASHBOARD

RESILIENCE MATURITY

We have assessed our resilience maturity at four time periods and of five qualities of resilience. We have given each a grade from immature to optimising, following the the maturity scale in the British Standard for Organisational Resilience (BS 65000).

Resilience through time



PRIORITY SHOCKS AND STRESSES

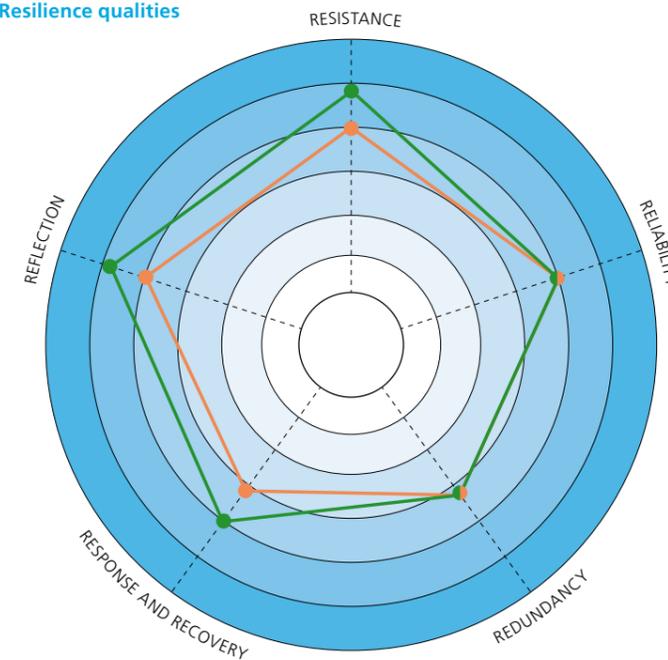
Listed in alphabetical order

- Climate change
- Costs increase
- Extreme rainfall
- Natural disasters
- Supply chain failure

SUPPORTED PERFORMANCE COMMITMENTS

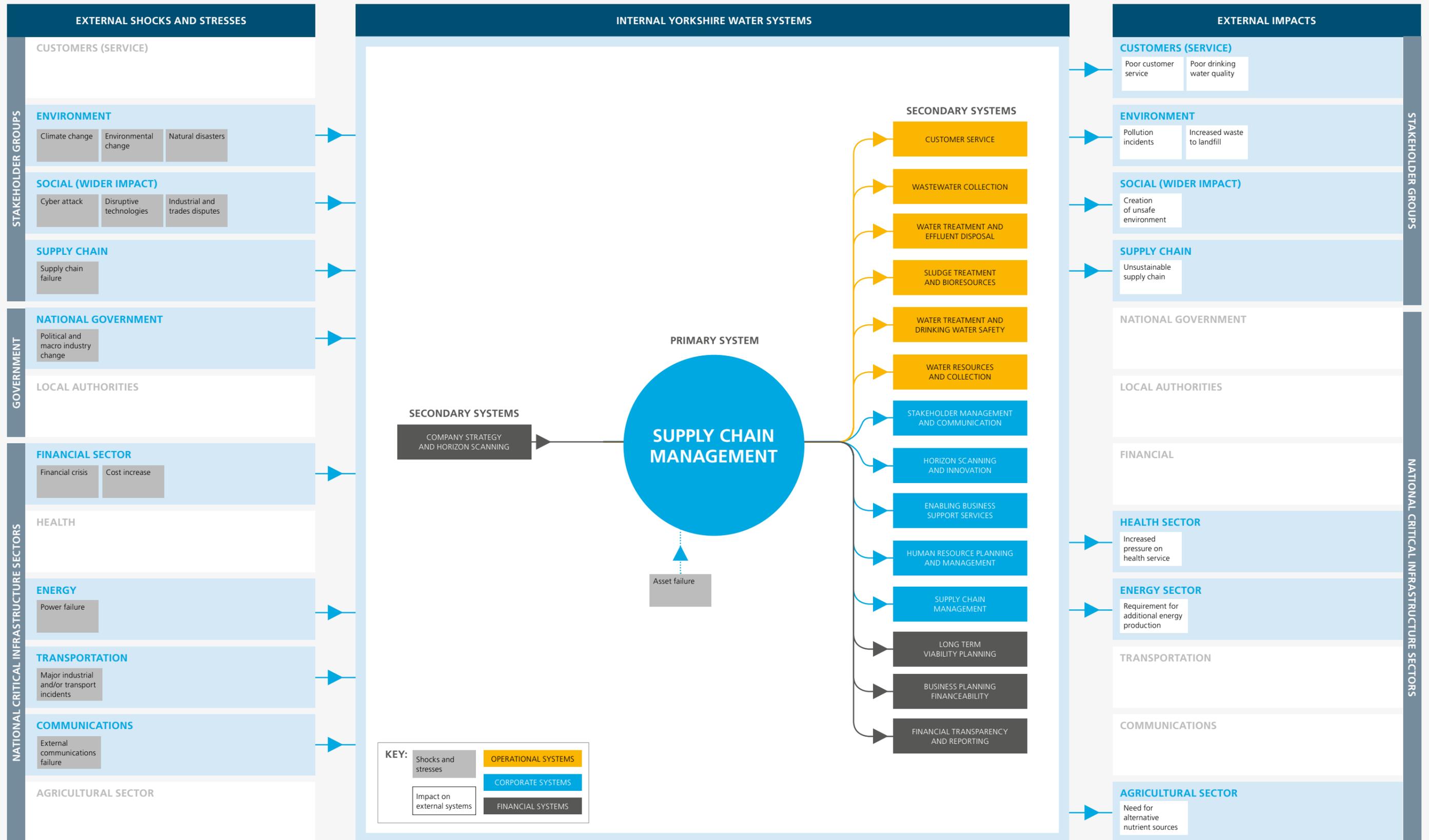
The resilience of the system contributes to the achievement of all our performance commitments through identified interdependences.

Resilience qualities



MATURITY SCALE	YEAR
LEVEL 5: OPTIMISING	1989
LEVEL 4: PREDICTABLE	2020
LEVEL 3: ESTABLISHED	2025
LEVEL 2: MANAGED	2050
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LEVEL 0: IMMATURE	

SUPPLY CHAIN MANAGEMENT INTERDEPENDENCE MAP



CURRENT POSITION AND OUR PLAN TO 2025

We manage a large and complex supply chain to responsibly source the broad range of goods and services we need to support our operations, using markets to secure the best value from reliable suppliers. We need to procure critical resources like chemicals and energy, and critical support functions like the delivery of capital investment and maintenance operations.

ENSURING ROBUST SUPPLY CHAINS

Many short-term events and long term trends can influence our supply chains and require considered and ongoing management and planning. Availability and prices for some goods can be highly volatile. Events can interrupt critical elements of our supply chain, such as extreme weather, civil unrest or financial crisis. Over the long term, finite materials are reducing in their availability, increasing in cost and will ultimately become unavailable.

To effectively respond to these challenges, we have developed a good understanding of our critical dependencies and we have an established business process for supply chain management. The Procurement & Contract Management team has developed a procurement risk model for assessing and managing supply chain risks. Our model considers key risks across economic, social and environmental aspects, such as climate change, cyber security, human rights and safety standards, financial stability and cost sensitivity. This approach allows us to prioritise the management of our supply chains based on the criticality of purchase, supply risk and complexity.

We employ specialist Category Buyers and Contract Managers to lead our approach to our most critical goods and services, working closely with subject matter experts across the business to strengthen our supply chain management. To ensure an effective approach, our Buyers develop long term plans, maintain understanding of the market and respond to short-term business needs.

We rely on limited sources of supply for some critical materials, for example some of our chemicals. Robust planning is required to respond to resource shortages and cost increases. During the cold winter of 2009/10, we faced difficulties accessing remote treatment works and ensuring essential chemicals could be delivered. We took immediate action during the event to ensure ongoing operations and we have revised our standard approach having learnt from the event.

To help us streamline and standardise our practice, we have recently reviewed and consolidated our supply chain. At the same time, we control our exposure to any single supplier through managing the proportion of total work each contract represents.

We work in partnership with our supply chain to address long term resilience challenges and we want to go further here. For example, there are large greenhouse gas emissions embodied in our supply chain and we are working to monitor and reduce these.

ENSURING RESPONSIBLE PROCUREMENT

The responsible sourcing of goods and services is an important part of resilience because this helps ensure the long term security of supplies and reduces the risk of unexpected interruptions.

We assess a wide range of sustainability considerations on a risk-based approach as a standard part of our tendering process for all new contracts, screening out those that do not meet our high standards. We embed best practice contractual requirements and we check compliance through a range of assurance controls.

Our sustainable supply chain policy applies to everyone we work with and articulates a consistent approach with straightforward expectations. Our policy can be found at: www.yorkshirewater.com/sites/default/files/thekeldagroupsustainablepolicy.pdf

We have taken steps to assure there is no slavery or human trafficking occurring within our organisation or its supply chains. We publish annual statements on our approach and latest improvements at: www.keldagroup.com/corporate-responsibility/modernslavery-act-transparency-statement.aspx

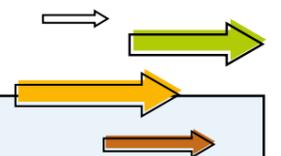
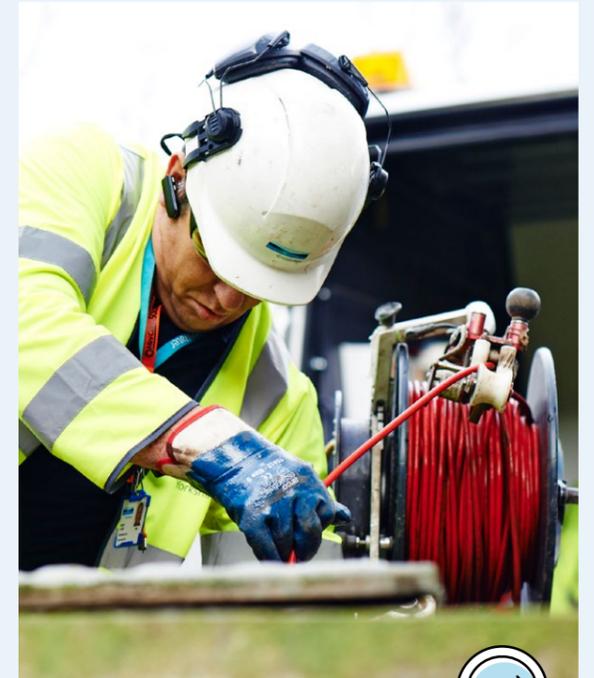
CASE STUDY

A NEW PARTNER TO SUPPORT OUR STRATEGIC PLANNING

We face many strategic challenges and need to invest in our intellectual capital both internally and with our supply chain. To appropriately position the business, we have invested in our skills and resources, growing our ability in many engineering and scientific disciplines. This allows us to operate as an intelligent client when working with the supply chain.

In 2017 we took the innovative approach of appointing a Strategic Planning Partner (SPP). The intention of this arrangement is to partner for the long term with an innovative, highly skilled, well connected and experienced organisation at the strategic planning phase of our business. The partner will support our continued maturity as an intelligent client, helping us rise to current and future challenges.

Our appointed partner is Stantec, an organisation with a global reach that has access to expertise across a diverse range of disciplines. The key focus of the partnership is on innovation in our approach to resolving risk; exploiting new technology, partnership working and use of markets. This arrangement replaced ad-hoc and transactional use of consultants and has a commercial model which incentivises the delivery of results rather than the creation of ideas. All ultimately leading to exceptional service to customers and a resilient asset base.



FUTURE DIRECTION

The resilience of our procurement is an ongoing and increasing priority. There are growing pressures to our increasingly complex and global supply chains from a range of factors, including the depletion of finite resources, increasing demand from growing populations, and increasing risk of extreme events from climate change and geopolitical instabilities. As a result, we will continue to monitor latest developments, train and develop our specialist buyers, and advance our procurement risk model.

We will increasingly apply our six capitals approach to better understand and monitor the indirect impact we have through our supply chain choices. We will use our growing insight to inform our long term strategy and drive continual improvement.

In response to the depletion of finite resources and changing climate, we will continue and expand our efforts to minimise our consumption and find alternative processes which are more sustainable for the long term. We will lead by example in areas of priority and encourage and support progress with our suppliers.

Partnership approaches will help us maintain and improve the resilience of our supply chain. We will work with our supply chain to ensure security of essential supplies, reduce demand for depleting natural resources and to enable a cycle of social, economic and environmental improvements. We encourage a similar message to be passed through the supply chain by everyone we work with.

ENABLING BUSINESS SUPPORT SERVICES

We undertake a range of activities to support the effective delivery of our services, including for example, facilities management, IT and both physical and cyber security.

We use a best practice approach to ensure our resilience, known as ‘three lines of defence’. We apply this model to ensure our security, including cyber, information, physical site security and for our personnel. Our Integrated Management System and internal audit teams review the effectiveness of our approach to a range of resilience priorities to drive continual improvement and ensure Board-level visibility.

We have a mature Incident Management Framework and Business Continuity Plans to support our effective response to any incident as it develops.

CASE STUDY BUSINESS PROCESS MANAGEMENT (BPM)

We continually strive to enhance our performance and improve the efficiency with which we deliver our services. To achieve this, we have taken a look at how we work as a company and which are the most important process within Yorkshire Water. We have implemented a Business Process Management (BPM) system that will reflect how our business units interact, relate and depend on each other. It will also help us to sustainably change certain aspects of our business structure.

Using a BPM maturity model will contribute to the efficient and effective delivery of our services and supports successful delivery of business change such as the SAP upgrade programme. In addition, it will assist us to enhance our business processes so we can become more resilient to customer needs, change management and regulatory requirements.

BPM is a proven method for us to understand, manage and improve the way we work. The method requires everyone in the business to play their part, ensuring we are creating the right environment to make it easy to do the right things in the right way.

BPM is as systematic approach to making an organisation’s workflow more effective, more efficient and capable of adapting to a changing environment. That means:

- Processes are performed in a repeatable way that can be managed
- Relationships between teams are established
- Requirements and commitments documented.

The Object Management Group’s BPM Maturity Model has 5 levels¹. Our objective is for all teams to achieve BPM Maturity Level 2 by 2020.

To ensure the sustainability of BPM, a ‘Continuous Improvement’ community has been created, made up of colleagues from around the business, that come together once a month to learn about BPM and share how they have been using it in their work as improvement professionals. As part of this community, we are developing tools and techniques to improve the way we operate in order to create a standard toolkit, or a ‘Yorkshire Water Way’ of improving our processes.

¹ www.omg.org.spac/BPMM/1.0/PDF

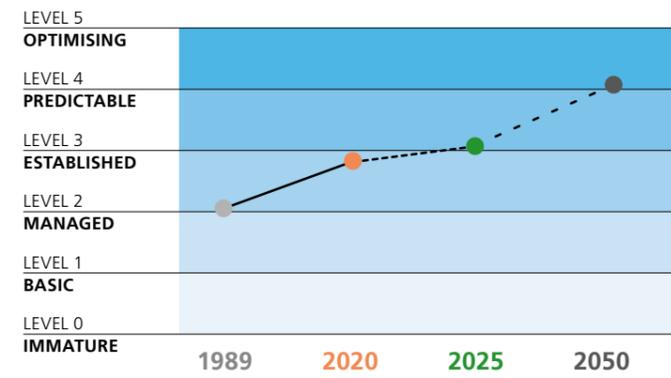


DASHBOARD

RESILIENCE MATURITY

We have assessed our resilience maturity at four time periods and of five qualities of resilience. We have given each a grade from immature to optimising, following the the maturity scale in the British Standard for Organisational Resilience (BS 65000).

Resilience through time



Resilience qualities



PRIORITY SHOCKS AND STRESSES

Listed in alphabetical order

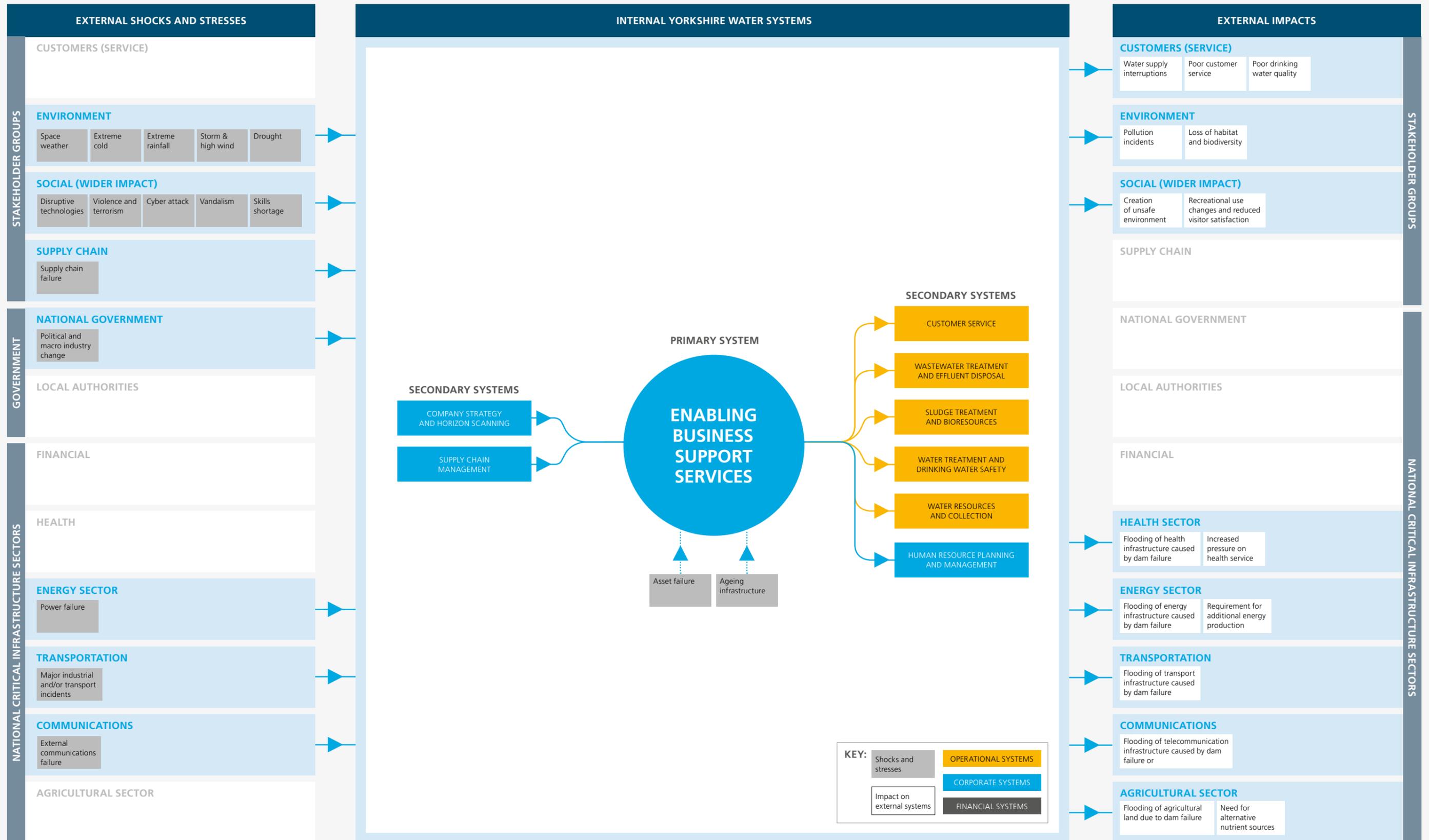
- Cyber attack
- Disruptive technologies
- Power failure
- Supply chain failure
- Vandalism

SUPPORTED PERFORMANCE COMMITMENTS

The resilience of the system contributes to the achievement of all our performance commitments through identified interdependences.

MATURITY SCALE	YEAR
LEVEL 5: OPTIMISING	● 1989
LEVEL 4: PREDICTABLE	● 2020
LEVEL 3: ESTABLISHED	● 2025
LEVEL 2: MANAGED	● 2050
LEVEL 1: BASIC	
LEVEL 0: IMMATURE	

ENABLING BUSINESS SUPPORT SERVICES INTERDEPENDENCE MAP



CURRENT POSITION AND OUR PLAN TO 2025

We recognise that enabling services such as security, IT and facilities are critical support functions to our operations. Therefore, their resilience is fundamental to the services we provide.

THREE LINES OF DEFENCE

We apply a best practice ‘three lines of defence’ approach to ensure a high level of resilience. Our three-level security policy and framework sets out our governance structure for cyber, ICT (information, communication and technology), physical asset and personnel security. We apply a risk management process and use our Security Risk Register to ensure the appropriate level of protection for the inherent risk, prioritising resources to critical systems. We cyclically review these risks and inspect our assets with established hazard reporting procedures. We deliver training, reporting and pattern analysis on physical asset security to ensure that policies and processes are followed.

Using the continual improvement cycle of Plan, Do, Check, Act, we manage an Integrated Management System (IMS) to provide second line confidence that policies and procedures achieve our internal, regulatory and legal requirements. An ongoing programme of internal inspections are undertaken with improvement actions identified and closed out. To ensure the highest standards our IMS is certified and independently assured to the best practice international standards for asset management, environmental management and quality management.

To enhance our governance of resilience, we have recently aligned our IMS to the British Standard for Organisational Resilience (BS 65000). As part of this process, we asked experts at the Cabinet Office Emergency Planning College to assess the maturity of our approach, finding areas of strength and highlighting opportunities for improvement which we are implementing.

We also use a range of other best practice standards to support our approach. We align our information security management procedures to ISO 27001. A range of information and cyber security projects are further improving the control environment, to ensure compliance with the General Data Protection Regulation (GDPR) and the Network and Information Security Directive (NISD). We are leading a national water industry group in work with Defra to define good practice guidance on the NISD.

To strengthen the long term resilience of our enabling services, we have invested in research and advisory programmes for IT and cyber security to identify and manage disruptive technologies. Capacity management is applied at the design stage of any service improvements to consider service availability over the asset life. We have also incorporated redundancy into our IT system through preventative measures such as data storage rotation and separate back up data centres.

Our internal audit function provides a third line of defence, with an ongoing programme to examine our effectiveness on a range of resilience matters. To support the independence and effectiveness of this activity, we use a co-sourcing arrangement of internal and external expert auditors, currently PwC. The priorities of our internal audits are agreed at Board-level by our Audit Committee and Risk Committee, and the findings reported to them to shape the company activities and strategy. Trends from IMS audits and inspections are identified and emerging risks are fed up to Internal Audit team and into the risk management process.

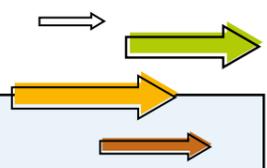
“**AUDIT FINDINGS**
 “There is evidence that the current crisis management approach is moving towards a wider view across all YW’s critical business activities. More work is required to develop synergies between the organisation’s business resilience and crisis management capabilities.”
UK Cabinet Office - Emergency Planning College, BS 65000 report, Base-Line Review of Organisational Resilience, May 2018”

CONTINGENCY AND EMERGENCY PLANNING

Our Incident Management Framework provides a staged response to ensure the effective allocation of resource to any incident. As necessary, different levels of management team are established to implement plans and dynamically manage an unfolding incident.

The Incident Management Framework works in conjunction with Business Continuity Plans (BCPs) to ensure that critical services can continue in the event of a disruption. We have a Board-approved business continuity policy and follow the requirements of ISO 22301, the International Standard for Business Continuity. We have developed BCPs for critical activities across the business. These plans are placed at a tactical level and cover control measures that are focused on operational threats.

We work with multi-agency resilience forums that operate in Yorkshire to develop effective emergency response plans and have a rolling programme to test critical systems and processes through site specific as well as cross-system stress testing. We also have process in place to allow us to carry out reviews post a major incident to re-assess security levels and consider additional controls.



FUTURE DIRECTION

We recognise that the security threat is ever present and is rapidly evolving, particularly in digital and cyber security. We will continue to strengthen our physical, information and cyber controls and response plans, supported with a strong security culture and awareness.

We have a Digital Transformation Strategy to inform and enable business processes which are understood, efficient and effective, delivering tailored services to our customers which are resilient, innovative and great value for money. Our ongoing investments in technology are central to our corporate strategy and create a wealth of benefits, particularly our new Decision Making Framework and company-wide upgrade to the latest SAP S/4 HANA system.

Our growing maturity in Business Process Management (BPM) will allow us to improve our ways of working by increasing the clarity, robustness and consistency of implementation. We also plan to increase our IT security and improve our resilience to cyber security threats.

We will continue to review our support functions and how we approach them to manage latest threats and opportunities. We are embracing technology, innovation and partnership working to ensure an efficient and effective approach.

HUMAN RESOURCE PLANNING AND MANAGEMENT

We support and manage the people that work for us to ensure our ability to safely, effectively and efficiently deliver our activities now and for the long term.

Our people are critical to our resilience. We have undertaken a major cultural and behavioural programme to reinforce the top priority of health, safety and wellbeing. We use mature processes and systems to ensure a reliably high-quality approach throughout the colleague lifecycle, from recruitment into the business, ongoing training and development, through to a managed departure from the business.

We manage long term and emergency plans to ensure we always have access to the skills and experience we need to maintain and enhance our business and the essential services we provide. This is of growing importance with the national shortage in technical skills and our increasing reliance on them throughout our operations.

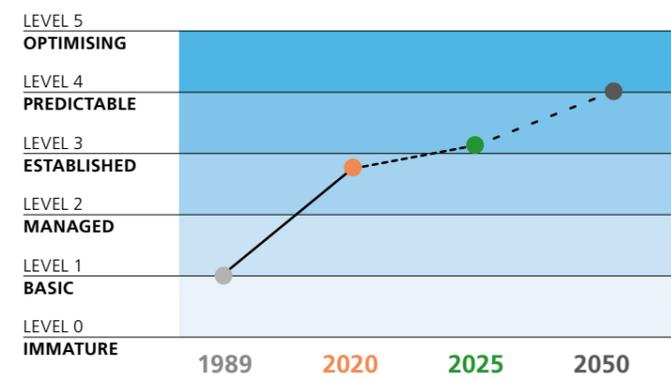


DASHBOARD

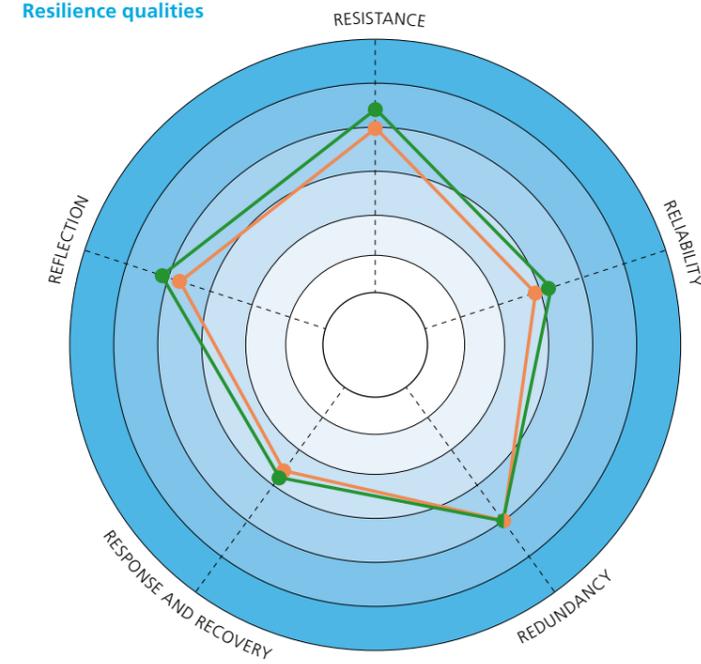
RESILIENCE MATURITY

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Resilience through time



Resilience qualities



PRIORITY SHOCKS AND STRESSES

Listed in alphabetical order

- Extreme cold
- Extreme rainfall
- Infectious disease - human
- Skills shortage
- Storm and high wind

SUPPORTED PERFORMANCE COMMITMENTS

The resilience of the system contributes to the achievement of all our performance commitments through identified interdependences.

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LEVEL 5: OPTIMISING	1989
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HUMAN RESOURCE PLANNING AND MANAGEMENT INTERDEPENDENCE MAP



CURRENT POSITION AND OUR PLAN TO 2025

Our Human Resources (HR) Team are an integral part of Yorkshire Water as they link our people needs to our strategic plan and vision. Robust human resource planning and management improves resilience and service.

SAFETY AND WELLBEING

We are committed to the physical and mental wellbeing of colleagues. Our Health and Safety Team support and lead the business in driving the highest standards, working closely with our HR Team.

The roll out, company-wide, of our health and safety strategy is making good progress, and has achieved a high level of engagement with our colleagues across the business. We embedded our ten Life Saving Rules, and set them in the context of a Fair Culture which responds to health and safety behaviours to create an atmosphere of trust. We are seeing positive improvements in the level of reporting of both incidents and near misses. This is indicative of both an improving awareness of health and safety issues and the development of a more open culture.

Through the continued work on our Health and Safety Improvement Plan (H&SIP) we have implemented a new incident investigation and lessons learned process to enable us to better learn from, and prevent reoccurrence of, accidents. In addition, improvements were made in assessing our operational safety risks through the introduction of a mobile "Point of Work Risk Assessment" phone app that allows easy access for all colleagues. We have made further investment in process safety management to understand the risks of major accident hazards and implement control measures.

A key theme of our H&SIP is competence, managing variability and risk through a job family and role based approach. We have identified the mandatory safety training requirements for all roles. We have also developed a clear policy that allows us to manage competency assessment and assurance.

The automation of the 'Authorisation to Work' process, which our new SAP system will enable, is a priority. This provides a robust process of ensuring colleagues are demonstrating the right competencies and scheduled the right work.

Over the last twelve months, the level of lost time injuries has decreased but it remains higher than is desirable as any level of injury is unacceptable in a truly safe organisation. This remains a key area of focus with health and safety a standing item for discussion at the weekly executive meeting.

Training is provided to managers so they can assess the risk, and identify and manage stress. A GP has been commissioned to deliver training to managers about common mental health problems, how to recognise them and how to provide support. An independent psychiatrist is also available to support colleagues.

MAINTAINING SKILLS AND RESOURCES FOR THE SHORT AND LONG TERM

We use mature processes and systems to ensure a reliably high-quality approach throughout the colleague lifecycle, from recruitment into the business, ongoing training and development, through to a managed departure from the business. It is only through continual investment to develop our peoples' skills that we can deliver quality, resilient service to customers.

We work against a backdrop of significant challenges such as a competing environment for limited skilled human resources, and the need to plan for an ageing workforce and emergency situations. To ensure that appropriate resources are always in place, we have a suite of emergency and succession plans, and a company-wide competency framework. We plan our resource needs through a 5-year business planning process to ensure staffing remains sufficient and competent to achieve the organisation's objectives.

We have expanded our apprenticeships, increasing from nine in March 2017 to 110 in March 2018 by maximising our use of the Apprenticeship Levy. Anticipating future needs, we have introduced apprenticeships in environmental conservation, chartered surveying, construction site management, water process technicians and business administration. We have also continued our graduate recruitment programme.

We are focused on the national shortage of skills in Science, Technology, Engineering and Maths (STEM). We joined others to form the Energy and Utilities Skills Partnership, launching the Workforce Renewal and Skills Strategy for the utilities sector to help address the skills gap. We are also making local links with schools, colleges and universities, for example holding week long workshops for groups during Women in Engineering Week to show what future careers might entail at somewhere like Yorkshire Water.

Diversity and inclusion is important to our long term resilience to ensure we support civil society and attract a broad range of views and experiences to get the best results. In 2016, we became the first water company to receive the National Equality Standard (NES), recognising good practise in diversity, equality and inclusion. We have four areas of focus: Gender, Ethnicity, Ability and Sexuality.

We have continued to invest in female leadership development programmes to address under-representation. For example, we have put 20 colleagues through the Forward Ladies programmes each year over recent years. Through our recruitment choices over recent years we have made our executive team much more gender-balanced.

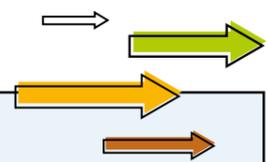
Most of our colleagues have completed equality training and most of our managers have completed training to recognise and address unconscious bias.

We recognise that emergency response to events such as extreme weather could lead to staff carrying out their roles differently, or covering for roles for which they are untrained. Our Incident Management Procedure follows industry best practice and we continuously review our business practices to enable our people to be more agile to the needs of incidents or extreme events. We have trained many of customer service teams in dual-roles, for example.

Epidemics and strikes could also disrupt our human resources, and we have developed plans to support our response to these situations. We maintain good relationships with our colleagues and unions through ongoing communication and consultation.

We review our approach after all extreme events that significantly challenge our operations to identify and implement improvements.

Our supply chain partners are an extension to our directly-employed workforce, with some of our most strategic partners co-located in our offices. We work closely on all people matters with our supply partners to facilitate a joined-up approach where we can learn from each other and share resources.



FUTURE DIRECTION

Our people make Yorkshire Water and they will always be critical to the resilience of our services. It is our never-ending priority to support, manage, train and develop all of our team to ensure a safe approach, minimum levels of competency and striving to let people reach their potential.

Safety and wellbeing will always be our number one priority. This will require growing effort to effectively maintain resilience despite an ageing asset base and an ageing workforce. We have a range of activity already under way and plans to advance our approach to manage these matters.

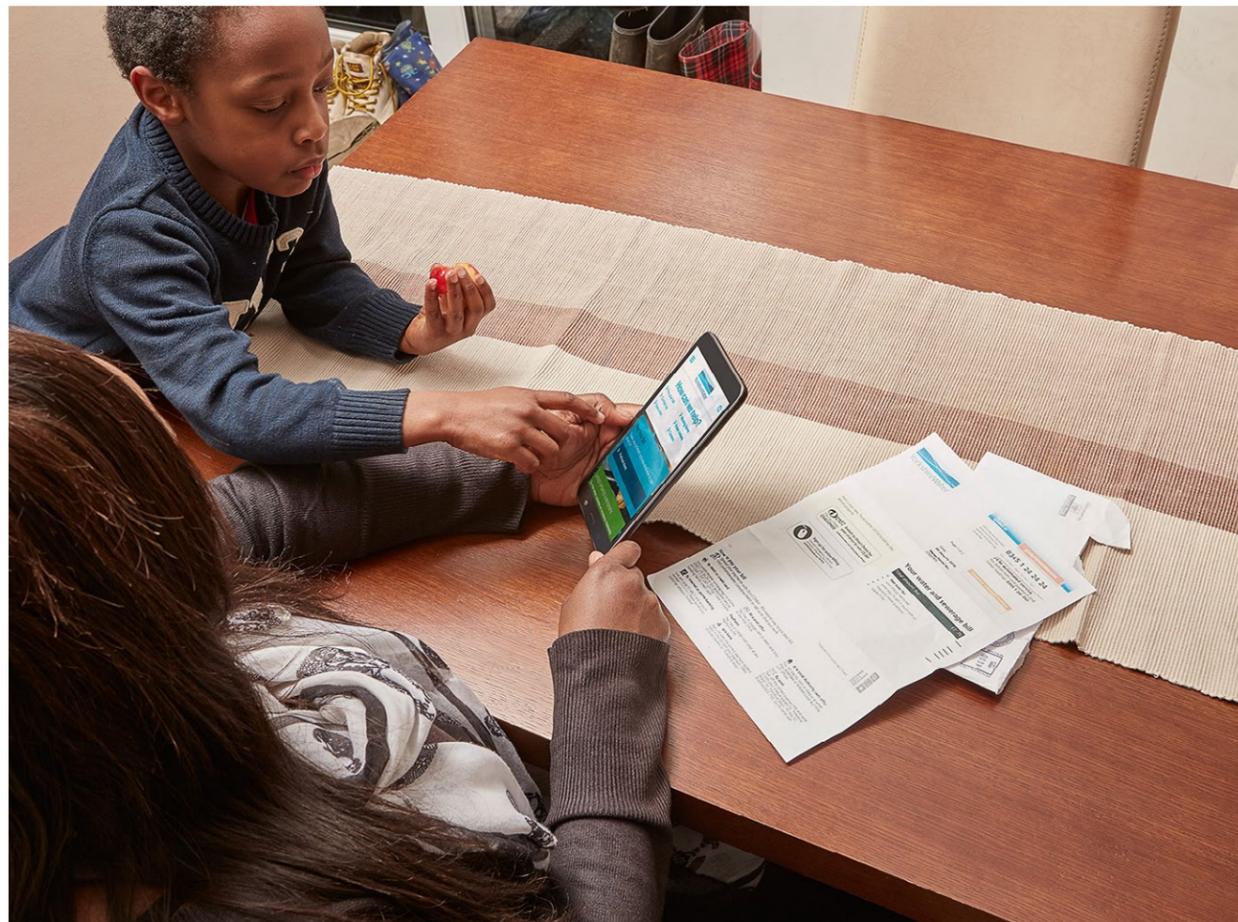
We are becoming an increasingly technical business supported by highly trained and specialist roles. With a growing national shortage in STEM skilled people, we observe the need to invest and work in partnership with a range of institutions to build STEM skills in Yorkshire and nationally.

STAKEHOLDER MANAGEMENT AND COMMUNICATION

We continually engage with customers and stakeholders to shape our approach, share information, resolve queries, and collaborate for mutual benefit.

We are engaging with customers and stakeholders more than ever before, recognising that strong relationships are critical to resilience. We have undertaken extensive and innovative customer research to inform our latest plans. We have piloted new ways for customers to help secure resilient and affordable water and wastewater services, for example with new ways to be water efficient and protect sewers.

We are also working in a greater depth and breadth of partnerships to deliver the best outcomes at the lowest prices. Trust and integrity are central to our resilience and we have taken steps to lead the water industry in being 'open by default', and we have plans to go much further.

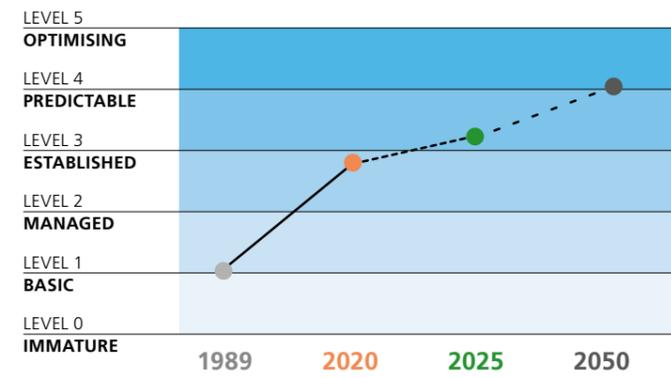


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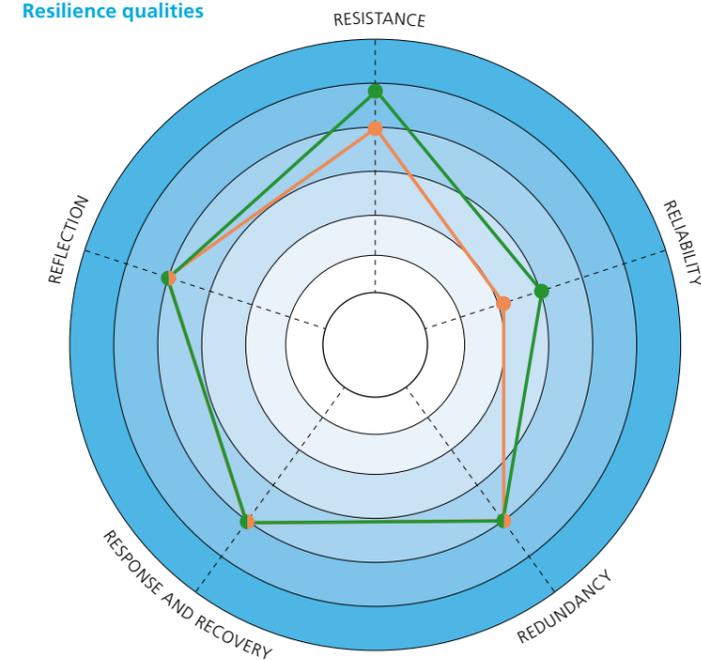
RESILIENCE MATURITY

We have assessed our resilience maturity at four time periods and of five qualities of resilience. We have given each a grade from immature to optimising, following the the maturity scale in the British Standard for Organisational Resilience (BS 65000).

Resilience through time



Resilience qualities



PRIORITY SHOCKS AND STRESSES

Listed in alphabetical order

- Change in customer behaviour and expectations
- Disruptive technologies
- Extreme cold
- Extreme rainfall
- Heatwave and drought

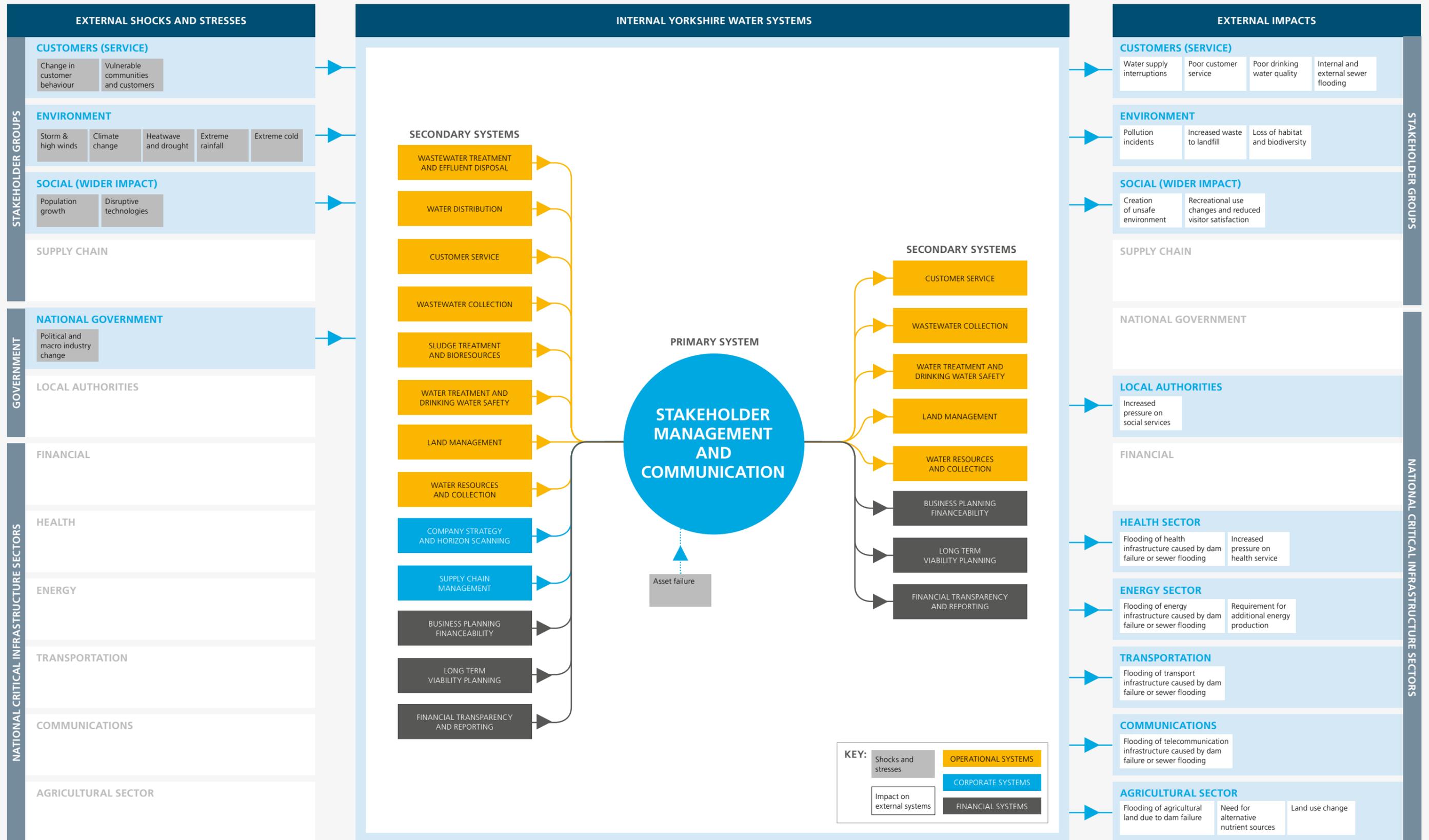
SUPPORTED PERFORMANCE COMMITMENTS

Increasing the number of projects we deliver in partnership

Increasing the amount of education we provide

MATURITY SCALE	YEAR
LEVEL 5: OPTIMISING	● 1989
LEVEL 4: PREDICTABLE	● 2020
LEVEL 3: ESTABLISHED	● 2025
LEVEL 2: MANAGED	● 2050
LEVEL 1: BASIC	
LEVEL 0: IMMATURE	

STAKEHOLDER MANAGEMENT AND COMMUNICATION INTERDEPENDENCE MAP



CURRENT POSITION AND OUR PLAN TO 2025

Customers and stakeholders are an indispensable part of resilience. More than ever before, they have helped create our strategy and they have key roles in co-delivering it with us. Working together, we can respond to short and long term challenges in a way that is resilient and affordable, providing services and solutions that offer the best value for money.

CO-CREATING RESILIENT PLANS

We continually engage with our customers and stakeholders to understand our effectiveness and to shape our approach. To ensure our latest plans have a strong focus on resilience, we have undertaken more engagement than ever before, using new and innovative ways to do it. We discuss this in the main report on page 25.

CO-DELIVERING RESILIENT SERVICES

Through their actions, or inaction, customers and stakeholders have a substantial influence over the resilience of water and wastewater services, and it is our job to help them understand and implement good approaches. We already undertake a lot of activity in this area and our plans will grow this further.

We work with customers to promote water efficiency. For example, we provide free water saving packs and a range of advice to households. To escalate this, we will be piloting a household audit and retrofit service later in 2018. We have also committed to finding ways for industrial customers to, where safe, switch from using drinking water to non-potable alternatives. We explain more about our many water efficiency programmes in the Water Distribution section.

We work with customers to protect sewers. For example, in Bradford we have undertaken a highly successful trial asking residents to collect waste cooking oils in tubs rather than pouring them down the sink. These containers are collected from doorsteps and the oil turned into renewable energy. The income supports the local community centre and we have seen a sharp drop in sewer blockages. We are expanding this scheme to other communities in Yorkshire where there are persistent problems with blocked sewers from fats, oils and greases.

We provide advice, face-to-face education and awareness campaigns to help customers understand and prepare for a range of resilience issues. Through our education programme, we invite customers and stakeholders onto our operational sites and we go into schools and community groups. We raise awareness and promote behavioural change through knowledge sharing on topics such as the value of water and its conservation, and using sewers wisely to prevent blockages. We have substantially increased this type of education over recent years, reopening an old centre and opening a brand new environmental centre. We have made a commitment to go even further by 2025.

We also work with a wide range of stakeholders to support ongoing resilience. We work in partnership to deliver solutions on the ground, for example to conserve land to protect water quality, and to deliver sustainable drainage schemes. We also collaborate with academic institutions, other water companies and others to share and develop new best practice. We are substantially increasing the depth and breadth of our collaboration, measured through our Working With Others performance commitment.

CLEAR AND RELIABLE COMMUNICATIONS

To make sure we are easy to contact and our communications are easy to understand and high quality, we train our people and use mature processes and systems. We have developed bespoke and tailored plans for the communication of resilience issues such as interruptions to services, and preparations for extreme cold or flooding.

We use stakeholder mapping to understand who is affected by each issue and tailor our engagement channels based on their circumstances and needs. For example, we consider those with hearing or reading difficulties, and those whose first language is not English. We also take special measures for those in vulnerable circumstances.

We are increasingly able to tailor our communications to local communities to make them more effective. By enhancing our customer segmentation model and using latest technologies to target communications we can improve resilience with more impact in supporting customers during both proactive campaigns and reactive emergencies.

We have put a lot of work into our written communications to ensure they are easy to understand for the target audience, and are accurate and comprehensive. We have worked with the Plain English Campaign to make our Annual Performance Report easy to read, receiving a Crystal Mark for the Performance Summary and Data Assurance Summary. In our Annual Report and Financial Statements, we secured the best practice Global Reporting Initiative Core Standard as a demonstration of our transparency on all matters of priority to our stakeholders. Our assurance plan shows how we check our information to make sure that what we publish is correct. This is available at: www.yorkshirewater.com/reports

We provide a range of ways for customers to contact us at the time they want and in the way that works for them. We discuss this in the Customer Service section.

Effective communications can be critical during an emergency. Our communications team support every incident with internal and external communications. Following Ofwat's review of the water industry's management of the hard winter in early 2018, they recognised how our engagement contributed to our response. We made advance contact with customers and used customer segmentation data to target certain areas. We utilised paid social media promotion to geo-target customers in certain areas and reach beyond those who follow our social media channels.

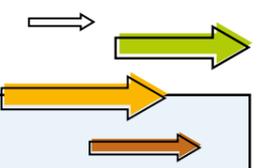
We have a process in place to review and improve communication plans based on learnings from previous events and external benchmarking such as other water companies and the Water UK Communications group.

SECURING TRUST AND DEMONSTRATING INTEGRITY

It is essential to our resilience that we maintain high levels of trust in our abilities to deliver our services with integrity so that society supports our plans and takes action when we highlight the need to do so.

We track reputational risk and mitigation measures, which informs decision making at Board level. We have established a Board-level Social Value Committee to ensure our focus on the society we serve. This Committee is monitoring our reputation dashboard and the delivery of our long term strategy, informing action to ensure we are always acting as a leading responsible business.

One of our five Big Goals is to be open and transparent. We are working to implement our new 'open by default' policy by 2020, and have already made improvements including simplifying our financial structure and sharing substantial amounts of operational data through the Open Data Institute.



FUTURE DIRECTION

We will continue to engage and consult with our customers and stakeholders to shape our long term strategy to meet their needs and wants. With growing long term pressures, the need to work together is increasingly important to secure the resilience and affordability of water and wastewater services. The need to continually demonstrate the growing value we are offering to society is also important to our resilience.

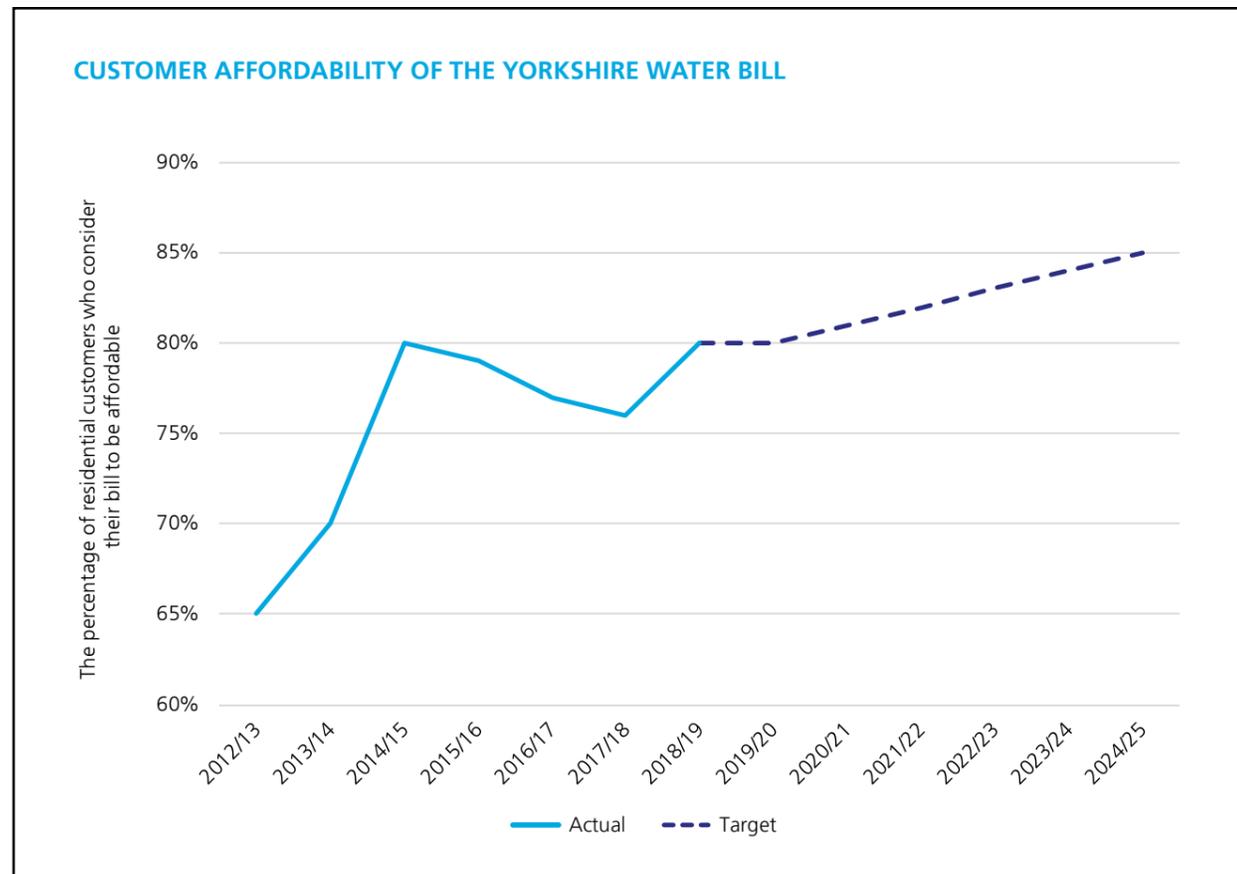
Evolving technology and societal expectations will shape our approach, moving towards increasingly local and bespoke engagement, and also increasing transparency across every part of our business to enable the 'citizen regulator' and fresh perspectives. We have already started in areas like Hull with charrettes. We will increasingly engage with local communities about the solutions they want to see and their role in delivering them. This will ensure the continued delivery of highly resilient water and wastewater services.

BUSINESS PLANNING FINANCEABILITY

We manage our costs and secure the funding needed to run our business and deliver our services for today and long into the future.

We are consistently one of the most efficient water companies in the UK, keeping our costs down to ensure customer water bills remain affordable. We provide a range of support packages for customers who struggle to pay. We also use industry leading and innovative approaches to recover debt from those that will not pay.

We borrow money to support the resilience of our assets and services, using a broad portfolio of options to manage financial risks. We monitor levels of gearing to ensure sufficient headroom, and have taken steps to strengthen our balance sheet.

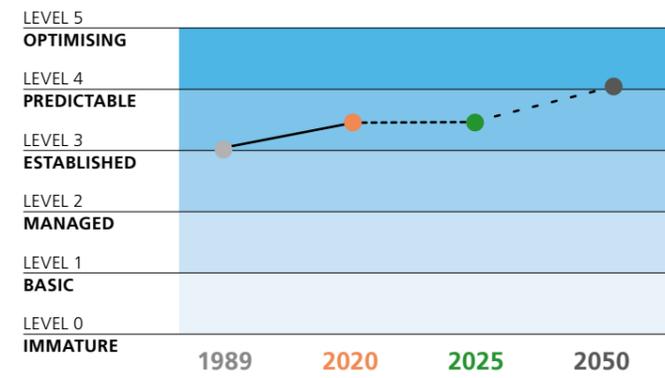


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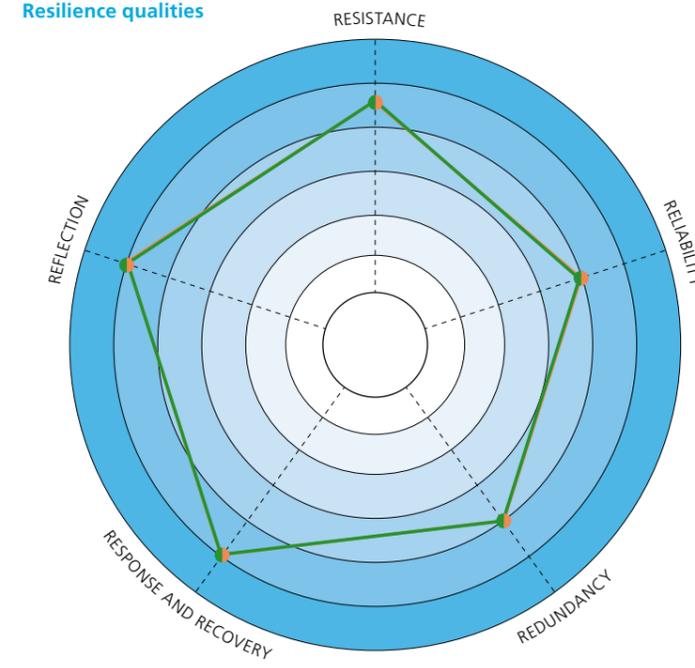
RESILIENCE MATURITY

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Resilience through time



Resilience qualities



PRIORITY SHOCKS AND STRESSES

Listed in alphabetical order

- Costs increase
- Extreme cold
- Extreme rainfall
- Financial crisis
- Heatwave and drought

SUPPORTED PERFORMANCE COMMITMENTS

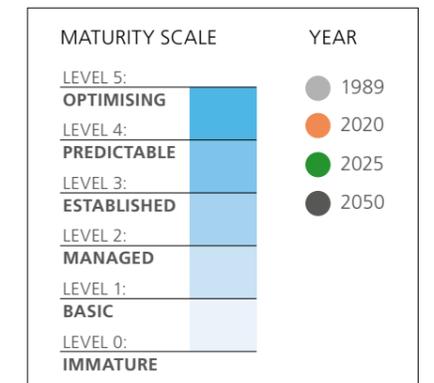
Increasing the number of customers who find their bill affordable

Increasing the number of customers we help with financial support for their bill

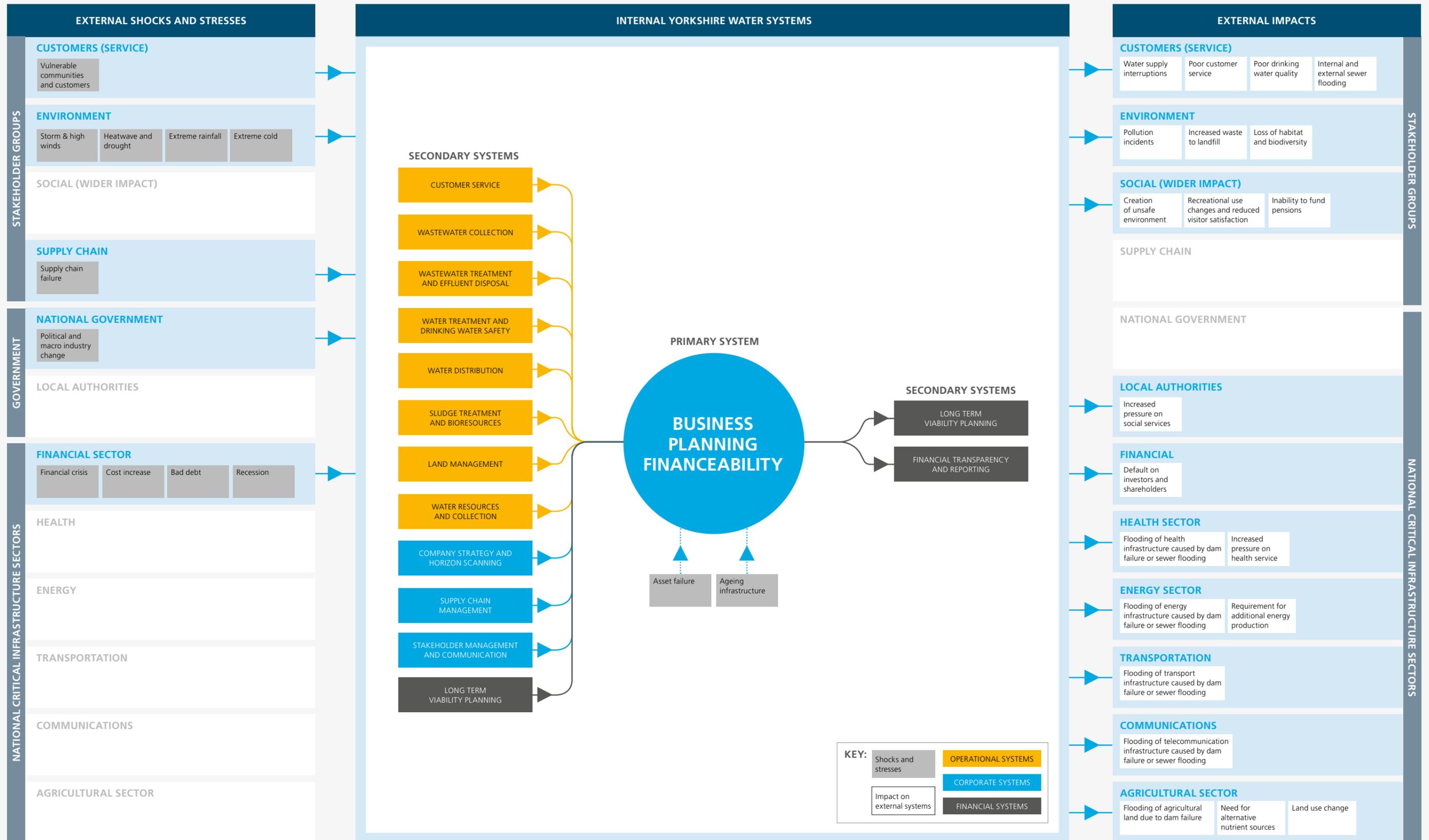
Increasing the percentage of properties verified as voids

Reducing the number of households receiving service that were unrecorded on our billing systems

Reducing the cost of unrecovered residential bills to all customers



BUSINESS PLANNING FINANCEABILITY INTERDEPENDENCE MAP



CURRENT POSITION AND OUR PLAN TO 2025

In this section, we provide an overview of how we ensure our financeability to support our resilience. Financeability means we manage our finances carefully to make sure we have enough money to maintain the business and our services. You can find more detail in our Annual Report and Financial Statements (ARFS) where we publish full details. This is available at www.yorkshirewater.com/reports

We also explore our long term financial planning and stress testing in the Long Term Viability section.

SECURING INCOME AND ENSURING WATER BILLS ARE AFFORDABLE

We rely on the income from customer water bills to fund the business and the services we provide. To secure this income we have mature billing and debt collection processes. We also keep our water charges low and support those who struggle to pay to ensure the ongoing affordability of our services.

To keep water charges low for customers we keep our operating costs down by finding efficiencies, being innovative, and through strict governance processes. We have consistently been one of the most efficient water companies in the UK. Our average customer water and wastewater bill was £373 in 2017/18, the second lowest in the UK. We increased average bills by less than the rate of inflation in 2017/18 and will cap any rises in our average bill to no more than the value of the Retail Price Index (RPI) every year until at least 2019/20.

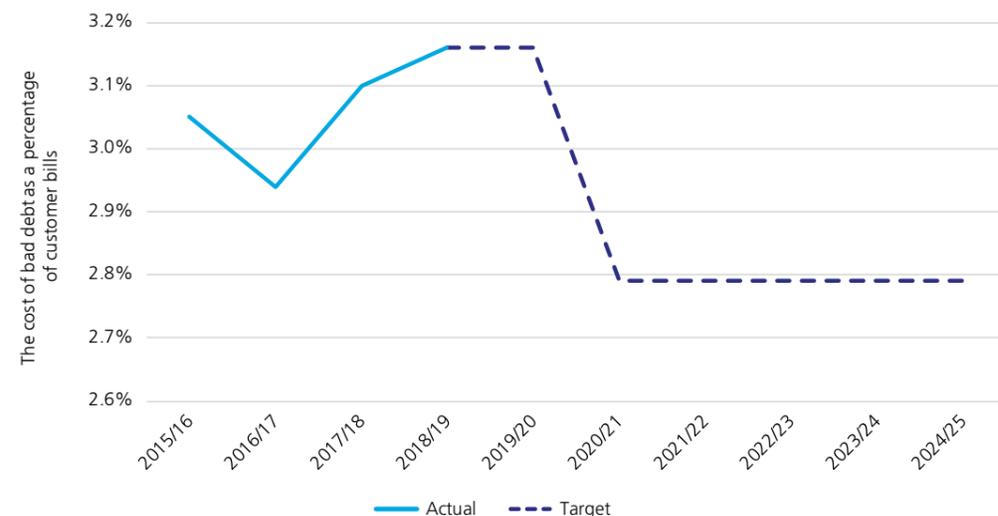
A recent independent survey of water customers by the Consumer Council for Water found that 76% of customers agreed our water service was “value for money”, and 79% for our wastewater service.

Many customers struggle with the cost of living and we offer a range of support packages to help. For example, our ‘social tariff’ scheme called Water Support is aimed at customers whose household income is assessed as being “low” and have a bill over a set threshold (2017/18: £420). Under the scheme a customer’s bill will be capped at the cost of the average Yorkshire Water bill. We have further increased the number of customers we help through our support packages, up from nearly 23,000 customers in 2015/16 to 28,853 in 2017/18.

Failure to recover customer debt puts pressure on our financeability and on water bills for paying customers. To minimise the cost of bad debt we operate a range of schemes designed to help customers who genuinely struggle to pay their bill while having strong processes for debt collection. We are amongst the best in the industry at debt management, with the cost being 3.10% of the average bill in 2017/18. We use innovative approaches to keep low the cost of bad debt and we are committed to bringing this down further to no more than 2.79% from 2020.

To avoid cost shocks from unusual and unexpected events we manage contingency funds and secure insurance.

THE COST OF BAD DEBT



BORROWING MONEY TO KEEP BILLS LOW

We borrow money to invest in our assets and to support our financial resilience. This helps operational resilience by enabling sufficient investment in our assets while keeping customer bills low and spreading the cost over time. Any new funding is raised by the treasury department in accordance with approved board policies and procedures. We maintain a broad portfolio of debt, diversified by source and maturity, to manage risks and meet projected funding requirements.

Levels of gearing are monitored and forecast on a regular basis, and are reported in the ARFS. We ensure sufficient headroom in our gearing in case we need to borrow money to respond to unforeseen events.

We have taken measures to strengthen our balance sheet and reduce gearing, including:

- Paying no and low levels of dividends to our shareholders in recent years. We have a flexible distribution policy to provide financial headroom and ensure distributions are fair and appropriate.
- Selling other companies within the Kelda Group in which Yorkshire Water belongs
- Restructured Kelda Group’s portfolio of index-linked swaps to reduce our interest costs.

Credit ratings are an independent measure of a company’s financial resilience. Only Moody’s produce a corporate family rating for Kelda Group / Yorkshire Water, which was Baa2 at the time of publication. This is one notch higher than the minimum investment grade level requirement. We have ratings assigned by three ratings agencies with full details provided in our ARFS and in the ‘investor centre’ on the website of our parent company: www.keldagroup.com

FUTURE DIRECTION

We face growing cost pressures over the long term, for example with rising and volatile chemical and energy prices, and increasing need to invest in our assets to maintain services. We will build on our history as one of the most efficient water companies in the UK to keep costs low by embracing innovation and partnership approaches in the ways we describe throughout this publication.

There will be a cost to extend our services to the growing population in Yorkshire, but this will also mean more customers to share the costs of providing our services. We will seek ways to serve the growing population using existing capacity wherever feasible to help keep bills as low as possible.

For example, we can serve more people with current resources by championing water efficiency and the appropriate use of our drainage network.

The ability of customers to afford our services will remain a priority. Yorkshire is a diverse region with areas of relatively high deprivation. We will continue to support those customers that genuinely struggle to pay their water bill by embracing technology to better understand our customers and tailor interventions to meet individual needs.

LONG TERM VIABILITY PLANNING

We ensure that our business will continue to be in operation and meet its future liabilities.

We undertake extensive modelling and management controls to plan and externally confirm our financial resilience. This includes stress testing against very unlikely but plausible scenarios. We annually publish the results of our Long Term Viability (LTV) assessment in our annual accounts.

In this LTV assessment we consider our viability for up to nine years, through to the end of the current and subsequent planning period. In our latest assessment we have again matured our approach to add further rigour. Looking ahead, we will be undertaking our LTV assessment at least twice a year, or sooner if certain triggers occur.

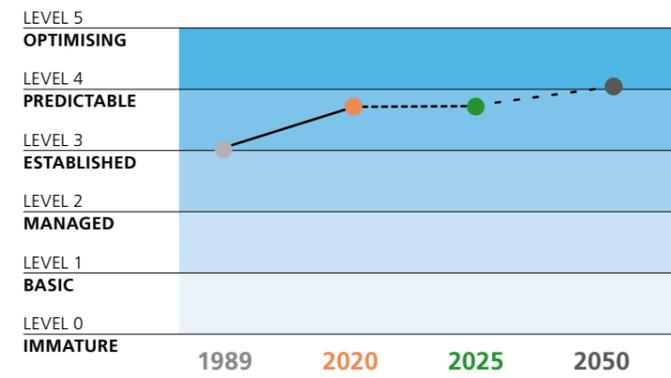


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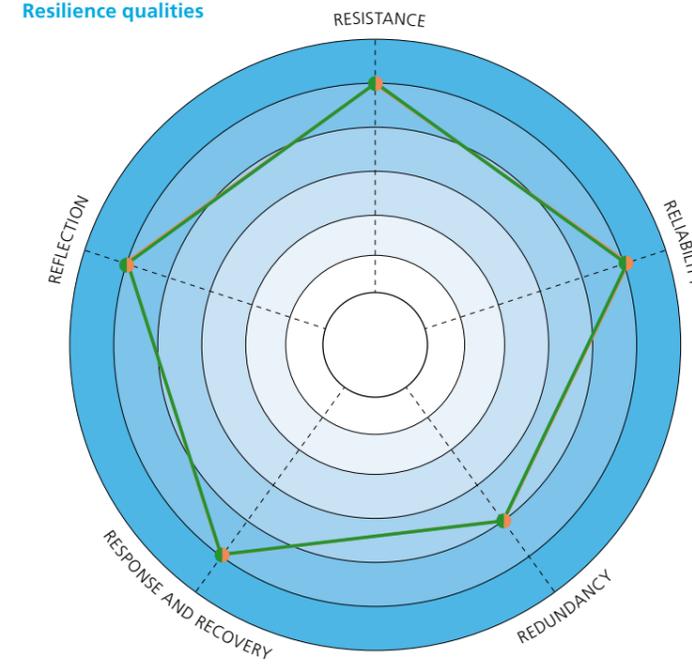
RESILIENCE MATURITY

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Resilience through time



Resilience qualities



PRIORITY SHOCKS AND STRESSES

Listed in alphabetical order

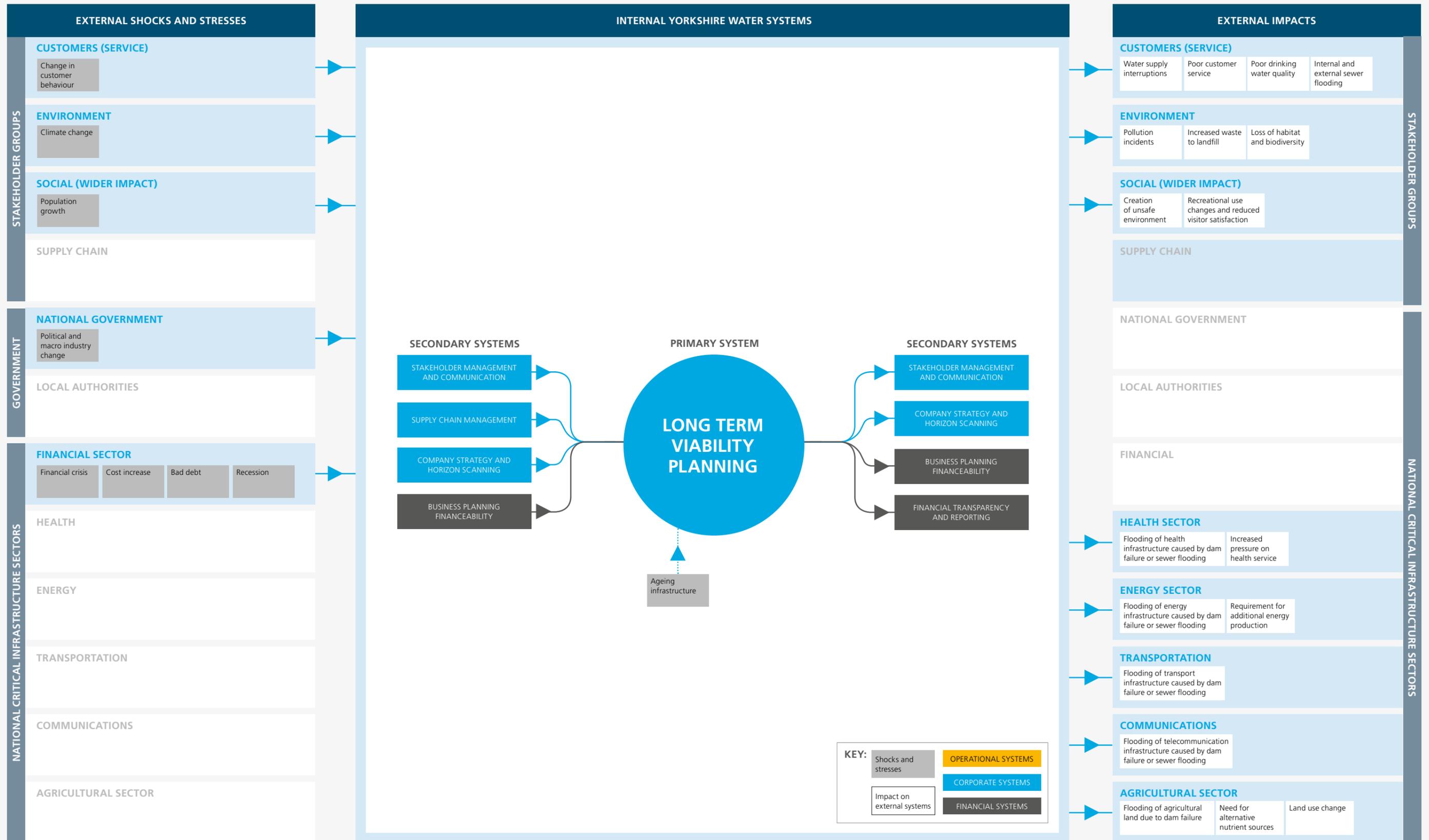
- Costs increase
- Climate change
- Financial crisis
- Political and Macro industry change
- Recession

SUPPORTED PERFORMANCE COMMITMENTS

This system includes critical activities which contribute to the achievement of all our performance commitments. The systems map over the page shows these interdependences.

MATURITY SCALE	YEAR
LEVEL 5: OPTIMISING	● 1989
LEVEL 4: PREDICTABLE	● 2020
LEVEL 3: ESTABLISHED	● 2025
LEVEL 2: MANAGED	● 2050
LEVEL 1: BASIC	
LEVEL 0: IMMATURE	

LONG TERM VIABILITY PLANNING INTERDEPENDENCE MAP



CURRENT POSITION AND OUR PLAN TO 2025

We regularly assess the Long Term Viability (LTV) of our business to support our financial and resilience planning. Our assessment uses the best available information and takes account of our current position, the potential impact of the principal risks facing us in severe, plausible and reasonable scenarios, and the effectiveness of any mitigating actions. Our assessment builds on the extensive planning we do to shape our price review business plan, including our mature financial models.

Based on our latest assessment, we have a reasonable expectation that the business will be able to continue in operation and meet its liabilities to at least March 2025. Sufficient information is available to reasonably consider a seven-year period because we are now at the end of the third year of the current five year regulatory cycle to 2020 (called Asset Management Plan 6, AMP6) and preparation is well underway for the next five year period to 2025 (AMP7). This timeframe falls within our current strategic planning horizon and our whole business resilience framework and associated assessments.

The table opposite summarises the severe but plausible scenarios we have considered in our latest assessment.

To determine the appropriate length of time over which to assess our LTV we consider the robustness of analysis and increasing uncertainty over time. We conclude that a five to nine-year range is appropriate for a regulated entity depending upon where Yorkshire Water is within the five year AMP cycle at the point of assessment, and the extent to which information is available on the direction of the subsequent five year cycle.

The future, including the AMP7 five year planning period to 31 March 2025, is subject to significantly greater uncertainty than the current five year period to 2020. Financial modelling for severe but plausible scenarios has been undertaken to understand future prospects and viability for that period.

The strategic plan and modelling of AMP7 scenarios reflect our best view of future prospects. The assumptions used in arriving at the AMP7 forecasts are based upon the best information currently available.

For our latest assessment we have further matured our approach. Ofwat have recently recommended that the variables which companies consider for stress testing, should reflect individual circumstances and may include but are not limited to the following. We have reflected these in our modelling.

- Inflation
- Revenue
- Totex
- Impact of ODIs
- Unfunded costs
- Debt service requirements
- Unfunded pension liabilities
- Exceptional items e.g. regulatory fines and legal claims.

The financial modelling demonstrates that under a severe scenario, Yorkshire Water does not reach default levels on financial covenants even if distributions are paid. However, due to the cumulative adverse cashflows modelled in this scenario, financial ratios would be at a level which would jeopardise maintenance of an investment grade credit rating which is required under our licence to operate, without further mitigating action being taken.

Should long term adverse conditions prevail, we have two significant practical mitigations. Firstly, we would act to find further mitigations that address risks as soon as these occurred, such as restricting dividend payments to shareholders. The second is the stable regulatory framework under which Yorkshire Water operates.

Further details on our LTV assessment are presented in our Annual Report and Financial Statements, available at: www.yorkshirewater.com/reports

LTV SEVERE BUT PLAUSIBLE SCENARIO SUMMARY TO END OF AMP7 (2025)

PRINCIPAL RISK	PLAUSIBLE SCENARIO
Financial sustainability	Failure to deliver financial targets / outperformance / economic volatility
New market implementation and competition	Impact of Brexit and low interest rate environment significantly impacts supply chain and programme delivery
Talent, culture and succession	Failure to effectively account for and/or complete the non regulatory sales programme for KWS leading to material financial liability or misstatement
Open and transparent governance	Failure to deliver positive PR19 outcome and upper quartile plan for AMP7
	Excessive chemical or energy cost inflation due to global supply chain disruptions or changes to market conditions
Enough safe, clean drinking water	Severe dry spring/summer leads to drought and supply restrictions
	Major WQ contamination failure
Leakage	Severe winter followed by thaw combines leading to an inability to meet stretching leakage targets
Climate change and resilience	Widespread flood inundation / coastal inundation / significant flood event
Protect our environment including flooding	Severe odour at key wastewater treatment works leading to significant reputational and SIM impacts
	Pollution incidents lead to loss of reputation with Ofwat and EA leading to ODI penalties
Public and colleague safety	Death or serious injury to colleague or member of the public
	Major fire or explosion due to process safety failure
Customer and stakeholder trust	Severe or continuous critical asset / service failure due to inability to effectively deliver business strategy and transformation
Organisational transformation	
Security and cyber resilience	Significant IT / cyber breach leading to major loss or breach of NIS and SEMD obligations
Data protection and privacy	Loss of Loop and Loop based services impacts YW service / billing provisions
Political, legal and regulatory change	Major breach of GDPR / DPA 2018 including investigation and fine by ICO
	Failure to comply with regulatory or statutory changes
	Water act / competition act - failure to comply

FUTURE DIRECTION

As we describe in the Business Planning Financeability section, we face growing pressures on our finances as we strive to keep bills low for customers while maintaining and enhancing our services. The LTV assessment is therefore an increasingly important part of our financial and resilience planning.

We will continue to mature our LTV assessment over time and further embed the activity as part of our standard risk, resilience and planning processes. While it is an annual regulatory requirement to complete our LTV, we will go further by undertaking our LTV assessment at least twice a year, or sooner if certain triggers occur.

FINANCIAL TRANSPARENCY AND REPORTING

We are open, accurate and honest so customers and stakeholders can trust that we are always acting in their best interests.

We have led the UK water industry in responding to concerns about the legitimacy of complex financial structures by committing to remove our financial structures in the Cayman Islands, a move which was then followed by others in the sector. We have improved the transparency of our financial reporting, recognised by Ofwat in its Company Monitoring Framework report in November 2017 and securing the Global Reporting Initiative (GRI) Core Standard in 2018.

We are working to make all our operational data open by default by 2020. We have already collaborated with the Leeds Open Data Institute to share 75 million lines of leakage data and holding 'hackathon' events to see what we can learn by inviting others to analyse it.

ENSURING COMPLIANCE WITH GOVERNANCE REQUIREMENTS

The Board of directors is committed to achieving the highest standards of corporate governance and follows Company Law, best practice and the following requirements:

The UK Corporate Governance Code (the Code)

This is published by the Financial Reporting Council and sets out standards of good practice for companies listed on the stock exchange. We are required by our licence to conduct and report on our business as if we were a publicly listed company (PLC). The Code covers board leadership and effectiveness, remuneration, accountability and relationships with shareholders.

The Ofwat 'Board leadership, transparency and governance principles' (the Ofwat Principles)

These were published in 2014 by Ofwat and set out the principles it expects regulated water companies to follow. The Board can confirm that by 31 March 2015, these principles had been fully implemented. A majority of independent non-executive directors sit on the Board, which is led by an independent non-executive Chairman.

'The Yorkshire Water Code'

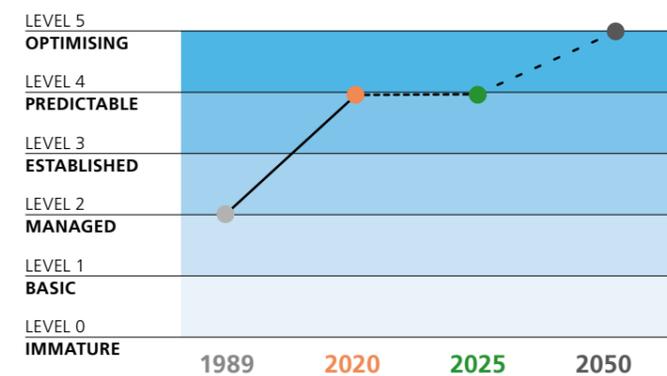
This sets out how the Company has complied with the Ofwat Principles.

DASHBOARD

RESILIENCE MATURITY

We have assessed our resilience maturity at four time periods and of five qualities of resilience. We have given each a grade from immature to optimising, following the the maturity scale in the British Standard for Organisational Resilience (BS 65000).

Resilience through time



PRIORITY SHOCKS AND STRESSES

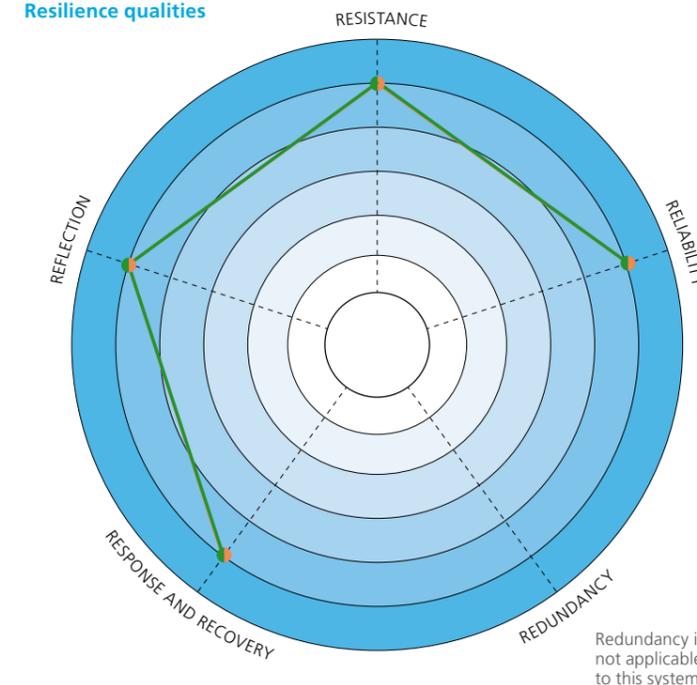
Listed in alphabetical order

- Bad debt
- Change in customer behaviour and expectations
- Financial crisis
- Political and Macro industry change
- Recession

SUPPORTED PERFORMANCE COMMITMENTS

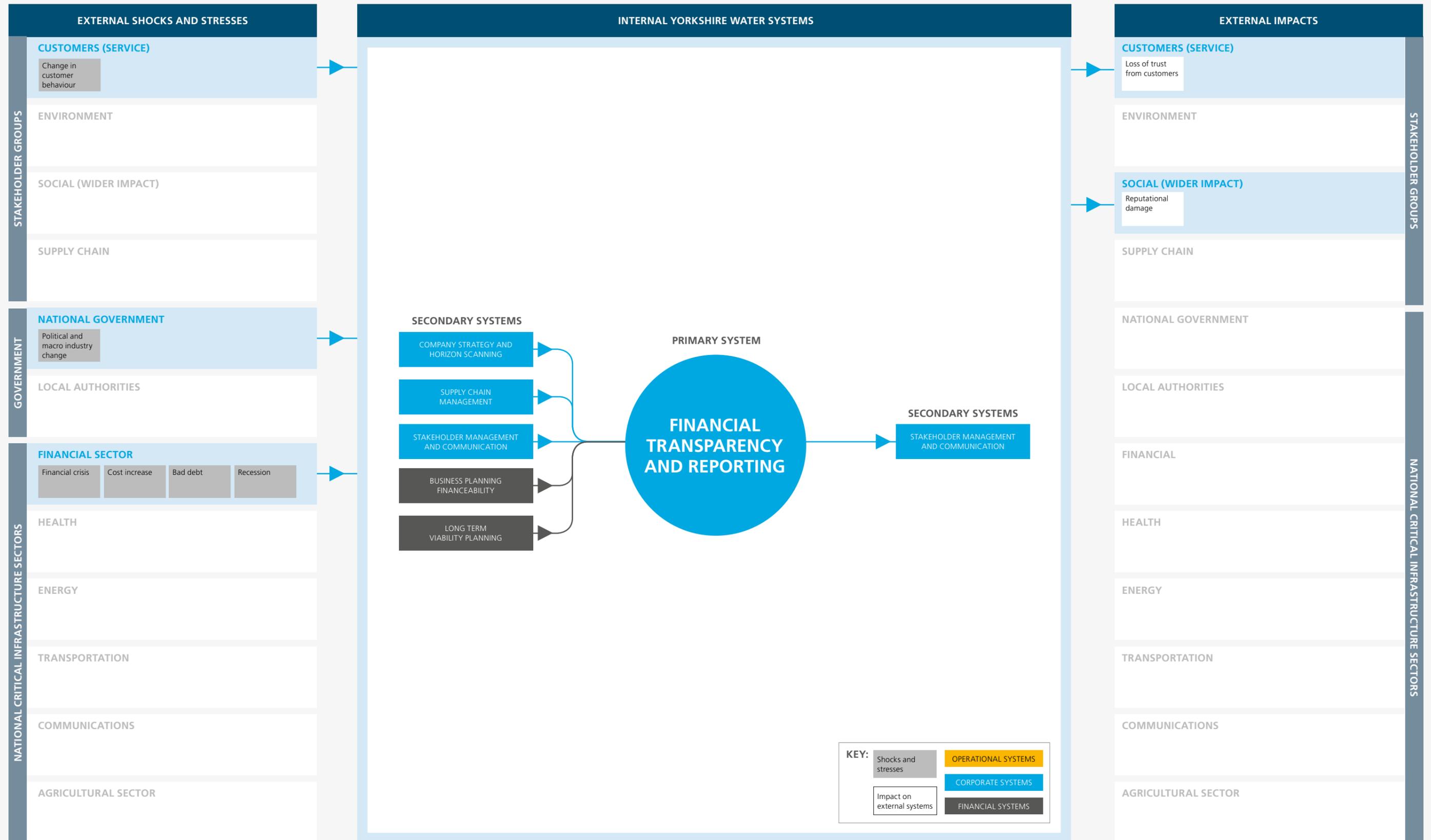
This system includes critical activities which contribute to the achievement of all our performance commitments. The systems map over the page shows these interdependences.

Resilience qualities



MATURITY SCALE	YEAR
LEVEL 5: OPTIMISING	● 1989
LEVEL 4: PREDICTABLE	● 2020
LEVEL 3: ESTABLISHED	● 2025
LEVEL 2: MANAGED	● 2050
LEVEL 1: BASIC	
LEVEL 0: IMMATURE	

FINANCIAL TRANSPARENCY AND REPORTING INTERDEPENDENCE MAP



CURRENT POSITION AND OUR PLAN TO 2025

Our financial structure and reporting is important to our resilience because we rely on our customers' and stakeholders' trust in us to deliver reliable services and act responsibly. The legitimacy of the UK water industry has been challenged in recent years with questions about financial structures, tax, executive remuneration and shareholder returns. We have responded by leading the water industry to simplify financial structures, to share information openly and to demonstrate how we always focus on the society we serve.

SIMPLIFYING OUR FINANCIAL STRUCTURE

In October 2017, we committed to removing our offshore financial structures in the Cayman Islands, a move which was then followed by others in the sector. These structures, although legitimate in purpose when set up and which delivered no taxation benefit, appeared opaque to customers and caused unnecessary suspicion. This process will be completed during 2018.

While it is wholly and exclusively resident for tax purposes in the UK, we are investigating our Jersey incorporated Holding company and exploring how we can further simplify our financial structure by closing some of the other companies in Kelda Group – the group of companies of which Yorkshire Water is part.

TRUSTING THE INFORMATION WE PUBLISH

Our aim is to provide customers and stakeholders with information they can trust. We spoke with our customers and stakeholders to understand the risks, strengths and weaknesses with our reporting, using the results to develop our assurance plan. The assurance plan helps provide confidence the information we publish is accurate, accessible and easy to understand. It can be found at: www.yorkshirewater.com/discoverwater

We assure the information we publish using a risk-based approach called 'three levels of assurance'. We assign a named data provider for the information we report. The data provider has specific roles and responsibilities and is supported by a named data manager. The data and analysis used to compile the performance information we report is subject to internal review by team managers and senior managers before being presented to the responsible Director. Statements are required from senior managers involved in regulatory reporting.

These statements are used to provide the Board, the Directors and the Chief Executive with evidence and confirmation that data is true and accurate and has been produced in a manner consistent with reporting requirements. This provides our first level of assurance.

A peer review of the information is undertaken by experts within the business. This provides our second level of assurance. This comes from oversight teams with specialist knowledge, such as our finance, regulation and legal teams. This assurance is separate from those who have responsibility for delivery.

Our information and the process to obtain this information is reviewed and challenged by independent technical auditors. We also work closely with the Yorkshire Forum for Water Customers to make sure that our reporting meets customer and stakeholder needs, and that we are held to account for delivering our commitments and meeting the promises we made to our customers. This provides our third level of assurance.

This process makes sure that our assurance activities are proportionate to the level of risk of error associated with the information or with the publication. This is best practice for assurance.

BECOMING OPEN BY DEFAULT

One of our new Big Goals is to be open and transparent. We have committed to a policy of open data, initially on leakage and then more widely across the organisation to become open by default by 2020. By inviting 'citizen regulators', this will help demonstrate our integrity and secure trust, as well as driving innovation and enabling society to hold us to account.

Earlier in 2018 we released 75 million lines of leakage data from our flow meters and held 'hackathon' events with the objective to encourage innovation by exposing the data to people and organisations with experience in different sectors and thereby generating new solutions.

We have recently consulted with the public to establish the levels of financial and operational transparency they would like to see from us. The results of this consultation were published in July 2018.

INDEPENDENT MEASURES OF OUR LEADERSHIP

To give further confidence in our approach, we ensure we comply with a range of best practice standards, for example:

- Our annual reporting processes are independently verified to the international quality standard ISO 9001:2015.
- We are committed to the concept of integrated reporting, continually enhancing our approach since 2014 when we published our first integrated annual report. This year, we have continued to advance our approach by ensuring we comply with the international best practice standard for integrated reporting known as the Global Reporting Initiative (GRI) Core Standard.
- We use the Business in the Community (BITC) Corporate Responsibility Index to benchmark our performance as a responsible business. For the second year running, we achieved top marks of five stars in 2017/18. In another indicator of our responsibility, we were pleased to be short-listed for the BITC "Responsible Business of the Year" 2018 award.
- Ofwat placed us in the 'targeted' assurance category (the second highest) in their last annual Company Monitoring Framework assessment, issued in November 2017. The report recognised the steps we have taken to improve the clarity of our reporting and upgraded its evaluation of the quality of our data. Ofwat also complimented our approach to communicating performance information to our customers. Our aim is to achieve the self-assured category in the 2018 assessment, the highest category available.

FUTURE DIRECTION

Trust in big business and executives is at an all-time low following numerous challenges in many sectors and organisations over recent years. As a regional monopoly of essential public services, we need to lead by example and we will continue to do so by building on the bold steps we have taken over the last year as we work towards our Big Goal to be open and transparent.

We will continue to engage and consult with our customers and stakeholders to check how we are doing and to inform our approach.

As we mature in our commitment to being open by default we hope to drive a culture of continual improvement that helps further our already high standards of reporting, and brings fresh insight on how we can further improve our resilience and efficiency.

We invite feedback to help us advance our approach to resilience in Yorkshire and we welcome opportunities to support the development of a national standard in the water sector.

Please get in touch with your feedback and questions.

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