

## **1. PURPOSE OF THIS PAPER**

This paper seeks to provide Water Forum members with an overview of our approach to delivering resilience in the round that aligns and meets the expectations of our customers and stakeholders. The paper describes our developing resilience framework and summarises the detailed work being carried out across a number of business work streams in order to meet our resilience duties and underpin our price review submission.

## **2. OUR WATER AND WASTE WATER SERVICES**

Northumbrian Water Group (NWG) operates in the north east of England, where it trades as Northumbrian Water, and in the south east of England, where it trades as Essex & Suffolk Water (ESW). NWG supplies water and sewerage services to just under 4.4 million people. Water is supplied to 794,000 properties in Essex & Suffolk, with water and sewerage services provided to 1.3 million properties in the North. NWG operates:

- 55 water treatment works
- 303 water pumping stations
- 326 water service reservoirs
- 25,678.3 km water mains
- 413 sewage treatment works
- 29,923.1 km sewers (including 13,510 km of transferred network)

Every day we supply 1,104 megalitres (1.1 billion litres) of water. In the north east of England, where we also provide sewerage services, waste water is then collected from these properties via the sewerage network and treated at our works before it is returned to the environment as either clean water or sludge which can be recycled as fertiliser or used to generate energy.

## **3. PHASE 1 CUSTOMER RESEARCH - RESILIENCE**

In order to get a baseline of understanding of customers and stakeholders views on resilience NWG commissioned Explain to conduct qualitative exploratory research in July 2016. Customers who attended these events included:

- customers affected by flooding or other resilience scale events;
- customers at risk from flooding;
- young people (future customers);
- vulnerable customers and those on the NWG risk register; and
- customers with recent contact with NWG.



We shared the findings of this research with our Water Forums last year.

### Key Phase 1 research findings

This phase of research into resilience was aimed at providing an initial understanding of customer views and expectations in relation to resilience which would then influence NWG's future resilience strategy. A summary of the outputs of these workshops is provided below including those areas customers and stakeholders asked NWG to consider when developing our future resilience strategy.

### Understanding resilience

Customers struggled with the concept of resilience and what this meant to them and was not a word they would use freely.

#### ***'It's very hard to explain what resilience means': Brentwood customer***

They were able to better understand and convey what resilience meant to them when it was used in a context they could understand such as the characteristics of someone or something they do every day. Once a clearer understanding of resilience was understood customers described resilience as a strong, reliable service that can stand the test of time, cope with change and bounce back from difficult situations.

When thinking about what resilience meant in the water industry, the majority of respondents said this meant effective planning and the ability to deal with events which could impact on NWG's ability to offer their services. Respondents felt that resilience in the water industry included the following:

- ensuring that water services were always available;
- ensuring the water supply was clean and free from contamination;
- dealing effectively with events which could impact on NWG's ability to offer services;
- taking measures to prepare for the future, ie storing water and building more reservoirs;
- planning ahead and learning from past experiences;
- updating infrastructure, modernising and utilising necessary resources;
- correcting problems and offering a reliable service;
- preventing price increases; and
- dealing with competition.

When discussing the factors that could impact NWG from providing their service customers the most notable were:

- climate change impact;
- pollution of the water source;
- flooding;
- population growth;
- water usage; and
- natural disasters.

***“Reduced rainfall will obviously affect the available water for water supply and could also have implications for water quality as well.” (Environment, RSPB)***

***“They should have had more flood defence. Really they should have spent a lot more money... I think they're just waiting for something to happen before they do anything about it.” (Newcastle, Table two ABC1, 65+)***

Customers also emphasised the importance of NWG monitoring and maintaining their infrastructure to ensure that their water supply was consistent and that water was not wasted.

### **Expectations of NWG and preparation for future challenges**

The second part of the discussion focused on respondents' expected response from NWG if their services were to be unexpectedly put under threat. Respondents were presented with three scenarios, utilising engaging presentations and scenario based videos to keep respondents engaged and enable them to place themselves in that particular situation to understand how they would feel. The main outcomes from this discussion were that customers:

- expect NWG to be prepared for unexpected events and responsive when they occur;
- expect NWG to be planning for the future and implement preventative measures when needed;
- expect an adequate level of investment is made in infrastructure and use new technologies to try to stop issues arising in the first place;
- expect NWG to have alternative sources of water that can be easily utilised in the event of a problem at a treatment plant;
- expect us to help educating customers on water efficiency and saving water. Customers had little appreciation of how much water they used and what they are using it for day to day;
- expect NWG to be working in partnership with customers and stakeholders as a key part of developing their resilience strategy going forward; and
- expect NWG to publish their plans to provide re-assurance to members of the public that they are managing these risks to service adequately.

***“Under this scenario if one went down, then you would assume they would have a plan in place to use another treatment works as it is all under the same network of interconnecting pipes.” (Environment – River Waveney Trust)***

***“I would be annoyed if they didn't have any form of back up” (C2DE, 45-64)***

### **Trust in NWG**

We also wanted to understand the level of trust customers and stakeholders had in NWG to use their expertise to consider resilience within the business. Customers felt that trust was often earned over time and it was easier to trust individuals than organisations such as NWG. For the vast majority of respondents, trust was built through personal connections, positive experiences and receiving a good personal service that suited customers' needs.

***“I only trust companies I've had good experiences with.” (Great Yarmouth, Table one - Future customers)***

The research also aimed to understand both customers' and stakeholders' level of trust in NWG in relation to resilience. Firstly, respondents were engaged in discussion around the following question:

***Do you trust NWG to take the necessary steps to consider the needs of current and future?***

Stakeholders found it easier to comment on this question and in the main felt a greater level of trust in NWG to keep the services resilient based on the closer relationship that they had with members of the Company and open communication channels. Stakeholders representing the environment in particular had information around positive investments that NWG has been making to minimise leakage and plan for the future. Although customers also showed trust in NWG to keep the network resilient, this was something that was awarded based on the service that customers had received over the years, rather than an understanding of what NWG were doing to look to the future and protect their services.

Overall there was a strong level of trust in NWG from stakeholders and customers, especially around delivering resilient services. Highly satisfied customers who had not experienced a service failure were the most trusting of NWG.

***“Personally I’ve never had any problems with them so of course I’m going to trust them.”  
(Great Yarmouth)***

Those who had experienced service problems questioned NWG’s commitment to ensuring their services are resilient.

***“I am not sure at the moment because in the last ten years we have seen a lot of floods and the rest of it, and we don’t know a great deal about plans that have been put into place for the future.” (Newcastle, Table three - C2DE, 45-64)***

However the research did highlight that both future customers and bill payers were unaware of NWG’s policies in relation to resilience or any investments that they were making.

***“How can you trust them if you don’t know whether they can cope or not? If we are not being communicated with we don’t know what is going on in the background. How do we know they have actually planned? .. How can you trust them if you haven’t had any kind of feedback?” (Newcastle)***

These respondents felt that it was important for NWG to communicate with customers about these areas to re-assure them that plans were in place to protect services now and in the future, and a minority of stakeholders in the environmental category also suggested that increased communication about the issues the Company was facing would be beneficial.

### **Risk and priorities**

In order to understand what was most important for both customers and stakeholders in terms of water and sewerage supply resilience, a sorting activity was created which asked respondents to place potential failures on an acceptability scale. Service failures were split between five service areas, including the following:

1. customer service;
2. water quality;
3. water supply;
4. sewerage services (NW only); and
5. river and coastal water quality (NW only).

The top resilience priorities for NW and ESW customers and stakeholders are summarised in Table 1.

From this we concluded that customer and stakeholders resilience priorities are:

1. the provision of clean, clear drinking water that tastes good;
2. the provision of a reliable and sufficient supply of water; and
3. the provision of a sewerage service that deals effectively with sewage and heavy rainfall.

**Table 1: Top 3 ranked resilience priorities from customers and stakeholders**

<b>Overall (ESW only)</b>		<b>Ranking</b>	
<b>Service area</b>		<b>Customer</b>	<b>Stakeholder</b>
A 'do not use' water notice as there is a risk to your health if water is touched for 5 days	1	1	1
An unexpected interruption to the water supply to your home for more than 6 days	2	1	1
Bad tasting and smelling water for a day (that was safe to drink)	3	6	
<b>Overall (NW only)</b>		<b>Ranking</b>	
<b>Service area</b>		<b>Customer</b>	<b>Stakeholder</b>
A 'do not use' water notice as there is a risk to your health if water is touched for 5 days	2	3	
An unexpected interruption to the water supply to your home for more than 6 days	3	2	
Sewer flooding inside your home following a period of heavy rainfall	1	1	

Customers are expecting NWG to be undertaking appropriate preventative measures such as investing in infrastructure and new technologies to address these risks and overall risk appetite depended on the impact to the customer, duration and nature of the event, regardless if it was planned or unexpected. Significant events will impact the level of trust customers have in NWG and they expect us to manage these risks as best as we can.

Given the wide range of outcomes which were already felt related to resilience, the majority of customers didn't feel that a new specific resilience outcome was needed. However if one was created a strong view was that the word 'resilience' was not used as this did not resonate with customers and should instead outline what NWG were trying to achieve in simple language.

***“Resilience is not a word I would ever use.” (Brentwood, Table two - C2DE, 25-44)***  
***“I suppose it depends who the audience is for this. The language is really important since a lot of this goes over customers’ heads.” (Newcastle - Stakeholder)***

In regards to how NWG could measure resilience customers and stakeholders acknowledged this was not an easy task to determine if they were doing the right thing. Some suggestions were:

- measuring response when services are threatened to understand whether emergency planning is sufficient, ie did plans kick in at the right time and were they effective. This could also be compared to previous situations to evaluate response;
- milestone measurements - measuring the level of investment in infrastructure, efficiency of the water system, or levels of leakage from the network; and
- risk assessment highlighting the risks and impacts of different scenarios within the business plan and how risks could be alleviated then assessing progress from that list.

**Communication and engagement**

In the main, respondents considered resilience to be an important consideration for NWG and trusted that the Company had plans in place to manage the effects of certain scenarios, given that resilience was implicit within current company outcomes.

Respondents were confident that NWG had the funding to manage this going forward, but were unaware of specific initiatives relating to resilience.

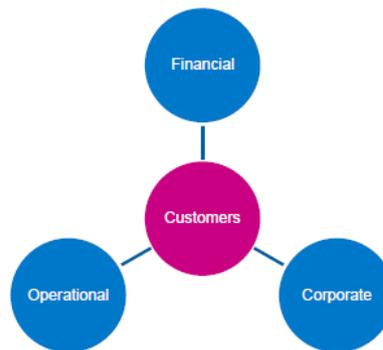
When planning for future campaigns respondents highlighted the importance of simple language which would resonate with customers. Rather than pitching communications about 'resilience', it may be more beneficial to outline what this means for customers in simple terms, ie 'response', 'future planning', 'preventative measures', 'unexpected circumstances'. Customers have also indicated that they want NWG to be better at communicating their plans in regards to resilience as this will assure them that they are managing risks and uncertainty as effectively as possible and with customer's interests being a key driver.

#### 4. RESILIENCE IN THE ROUND – OFWAT'S EXPECTATIONS

Long-term **resilience**, alongside customers, **affordable bills** and **innovation** is one of the four key themes at the centre of Ofwat's 2019 price review and strategy.

Ofwat uses the term 'resilience in the round' based around three business areas; financial, corporate and operational with customers at the heart of everything we do (Figure 1). Ofwat also recognises that delivering more resilient services requires a longer term planning and funding approach, especially when balanced against customer affordability and has added an option for companies to include 'enhanced' resilience schemes as part of their PR19 submission.

Figure 1 - Resilience in the round



With regard to each 'resilience in the round' theme, resilience activity or solutions should be based around the 4Rs; namely resistance, reliability, redundancy, and respond and recover. In addition NWG must clearly demonstrate in our plan that each of our proposals aligns to Ofwat's seven resilience principles:

- Principle 1: Considering resilience in the round for the long-term
- Principle 2: A naturally resilient water sector
- Principle 3: Customer engagement
- Principle 4: Broad consideration of intervention options
- Principle 5: Delivering best value solutions for customers
- Principle 6: Outcomes and customer-focused approach
- Principle 7: Board assurance and sign-off

Ofwat proposes to initially assess our plans using two specific resilience tests:

- how well has the Company used the best available evidence to objectively assess and prioritise the risks and consequences of disruptions to its systems and services and engaged effectively with customers on the risks and consequences; and
- how well has the Company objectively assessed the full range of mitigation options and chosen the interventions that represent the best value for money over the long term and support from customers?

### Enhanced resilience schemes

Ofwat accepts that water companies are already doing lots of ‘resilience’ work under business as usual (BAU). The real focus for PR19 is around the additional work we are proposing to undertake to deliver a more resilient service. Ofwat expects NWG to have:

- understood both the risks and the consequences to our ability to deliver our service to customers;
- undertaken optioneering of solutions and developed plans to manage these risks;
- explored how we can deliver more resilient services by greater use of partnership, technology and market opportunities;
- engaged and shared these plans and options with our customers;
- understood customers’ priorities and willingness to support and fund enhanced resilience activity; and
- built this into our PR19 submission to commence delivery in AMP7.

### Enhanced resilience methodology

Ofwat has issued guidance to aid companies in determining whether a proposed resilience scheme meets the criteria of delivering an ‘enhanced’ level of resilience. Enhanced schemes must deliver a ‘step change’ in the base level of service and it is accepted that this is not a replacement for capital maintenance funded within the current bill. We have incorporated this new guidance within our own methodology for enhanced resilience scheme verification.

## 5. NWG RESILIENCE FRAMEWORK

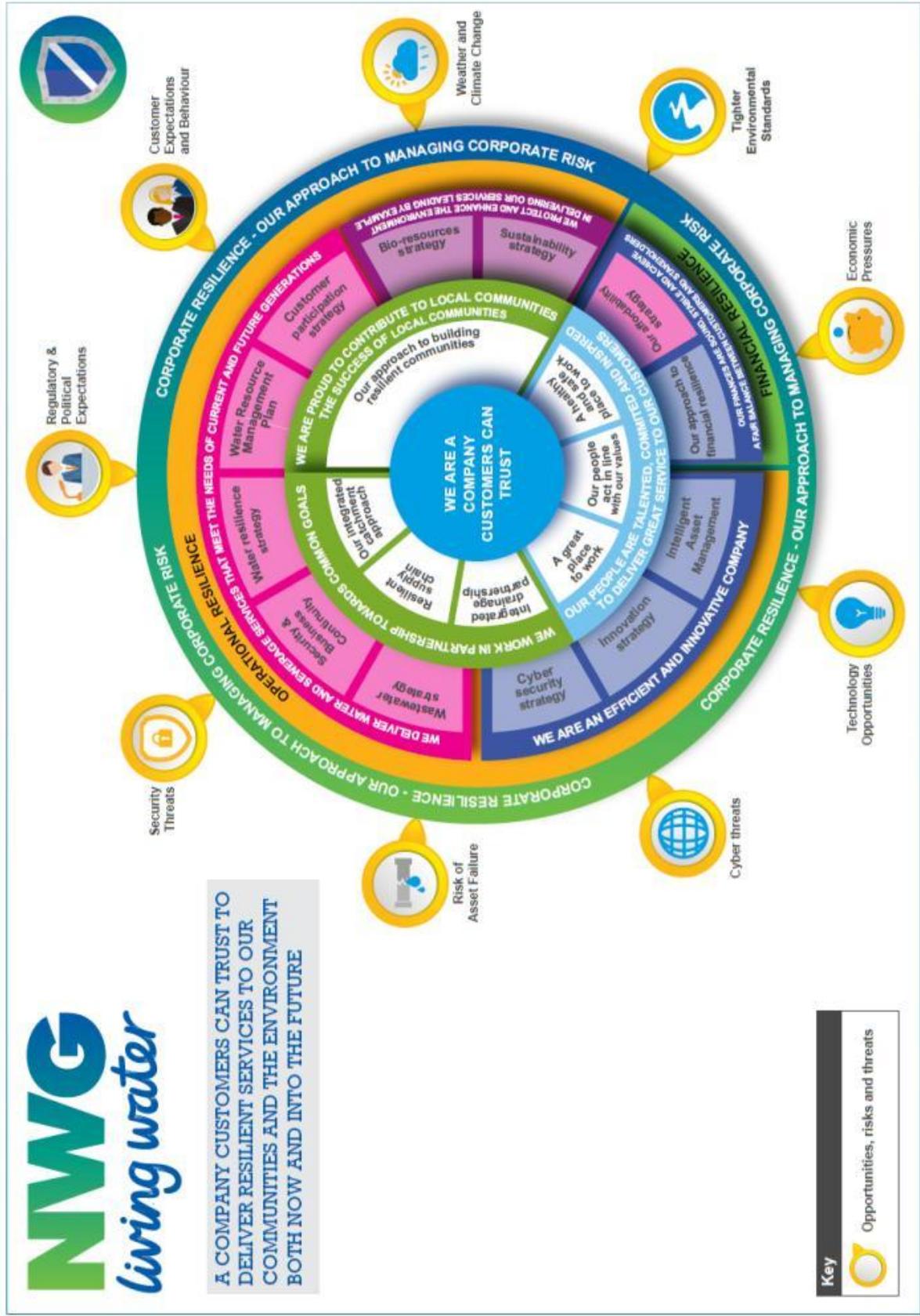
We have listened to both customers and Ofwat when exploring ways in which we can demonstrate how NWG are delivering ‘resilience in the round’ services for our customers as part of day to day activity and long-term planning. Customers told us they wanted simple, easy to understand language that they can easily relate to the service that NWG provides them. Customers related to our Outcomes during Phase 1 research and we believe that by using this approach customers will more easily relate to the work we do to deliver resilient water and waste water services.

For our submission we are developing our own **resilience framework**. The purpose of this is to demonstrate how the many different aspects of our business approach and future plans dovetail together to deliver resilience in the round. Our framework also aligns to our existing Delivery, Enabling and Reputational Outcomes which customers say they clearly understand and support.

This framework has been based on an initial model provided by PA consulting, which has been enhanced to make it more relevant to our approach at NWG. PA consulting has responded positively to our enhanced version, indicating that it is an improvement on the original. This framework has also been shared with Ofwat, who responded favourably.

The latest draft of our proposed framework is included on the following page.

Figure 2 – Our draft resilience framework



The concentric circles illustrate the lines of defence between the threats and risks we face, and our ability to maintain services for the benefit of customers and the environment, ultimately maintaining our reputation as a company that customers can trust.

The outer-ring represents our approach to managing corporate risk, which we view as the first line of defence in the framework. The inner-rings refer to the many aspects of business approach and future plans which will respond to these risks. Ultimately the framework will support an overall reduction in risk, via the corporate risk register, as we identify and address specific areas of risk within our corporate resilience plans - especially relating to operational resilience. As we deliver increased system and service resilience we can expect a corresponding reduction in our 'Managed Risk' score within our risk register. This provides assurance to shareholders, regulators and customers that we understand where our risks exist and are developing an appropriate resilience strategy to manage this effectively.

To support this concept there is a requirement to check alignment between the specific content developed by the strands of our PR19 programme for our resilience framework and our corporate risk model. A detailed update on the various strands of our programme has been provided in Appendices 1 to 6 attached. These cover both base resilience activity and options for delivering enhanced resilience schemes to meet both Ofwat expectations and customers' priorities.

## **6. PHASE 2 CUSTOMER RESEARCH – RESILIENCE, ASSET HEALTH AND LONG-TERM AFFORDABILITY**

At the end of October we commissioned the market research consultancy DJS to undertake qualitative research into resilience, asset health and long-term affordability on our behalf. The fieldwork for this research has been completed and we will share results with the Water Forum in the New Year.

We believe our draft plans will deliver the right solutions that meet our customer expectations and wanted this next phase of research to test our proposals further with customers. This is always a challenging conversation to have with our customers as it involved balancing the need for long-term asset investment against current day affordability. At the heart of this research was the theme of intergenerational fairness ie that it is not sustainable for us to maintain the condition of our assets into the future within current charges and as such we need our customers views on how we should fund asset health and when.

Water Forum members were invited to come along to any of the deliberative events or future customer focus groups to participate and observe. Water Forum members were represented at four of our sessions; Morpeth, Jesmond, Lowestoft and Brentwood.

Initial, anecdotal evidence from observing the fieldwork suggests that customers are supportive of increased investment in asset health and resilience. We will receive the final report from DJS in mid-January and will share the results with Water Forum members then.

## **7. NEXT STEPS**

We will continue to develop our PR19 resilience approach. This will focus on three main areas; customer engagement, content for the plan and costing.

Resilience, asset health and long-term affordability customer engagement workshops are completed. Final customer acceptability research is planned from March 2018.

We will continue to engage the Water Forum on resilience and have site visits to Horsley WTW and Abberton IR/Layer WTW planned for January 2018.

Many of the ideas that will form the basis for content in our submission are summarised in this paper and we will continue to work on this in order to tell a compelling resilience story in line with our “exceptional” ambition at the initial assessment of business plans.

In-line with Ofwat’s guidance we will cost all potential resilience schemes and include them as enhancements where they meet Ofwat’s criteria. We have tested a selection of these schemes with customers during Phase 2 research and our plans will be further tested with customers in our acceptability research.

Securing long-term resilience is one of Ofwat’s nine tests in the initial assessment of business plans and we will continue to assess our approach and report progress against this via our quality dashboard.

## **8. RECOMMENDATION**

The Water Forum is asked to note this resilience update. Resilience will continue to be a focus for our PR19 submission and the content described here will begin to be the basis for the submission.

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Assets and Assurance Director

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**8 January 2018**

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## **OPERATIONAL RESILIENCE, WATER**

### **Asset Resilience – short-term**

The water directorate has continued to deliver improving levels of service to customers during AMP6. We continue to be industry leader on interruptions to supply greater than three hours and have seen a significant improvement in discolouration contacts over the last two years. However, a number of areas still remain a challenge such as CRI, leakage and taste and odour.

The drive in AMP7 is to deliver upper quartile levels of performance against a number of common performance indicators such as CRI and interruptions to supply. Achievement of these stretch performance commitments during the next AMP will be challenging but will deliver improvements in overall operational resilience, including asset health as we improve levels of resistance, reliability and redundancy within our asset base. Customers have told us they expect us to invest in our infrastructure to ensure it continues to deliver great service now and into the future. The drive towards upper quartile performance will ensure we meet customers' expectations in this area by ensuring our asset base is being maintained at an appropriate level and we deliver sustainable and affordable improvements to their water service.

Over the next 12 months we will better understand the risks to our 63 critical water sites from natural and manmade hazards such as climate change and cyber threats. Whilst our ability to influence the source of such threats is low our ability to understand and reduce the impact from them is very much within our control. We will develop a prioritised investment plan to address specific risks at those initial 63 sites. We are proposing to expand this approach across all other water sites over the remainder of AMP7 as part of our long-term resilience planning. This work, alongside the proposed changes to how we maintain and operate our vast asset base, (see Appendix 3 attached – Operational Resilience, Asset Health and Asset Management) ensures we are looking to better understand and manage a number of risks to our ability to deliver services to customers.

### **Asset Resilience – long-term planning**

Longer term a number of stretching strategic goals are proposed that deliver a more reliable and sufficient supply of good quality water to customers. We believe these meet the expectations of our customers and stakeholders. Specifically for operational resilience these include:

- 100% water quality compliance;
- no customers experiencing an interruption to their water supply lasting more than three hours by 2035;
- reducing water demand to maintain our ability to supply customers and protect the environment both now and in the future;
- leakage reduced to 9% and 12% of distribution input in the south and north respectively by 2045 and all identified leaks repaired within 24 hours;
- maintain the level of drought risk at current levels for the foreseeable future. This is a new PC proposed by Ofwat to determine long-term resilience of water resources;
- reduce the number of burst mains to less than 1,000 per annum by 2035;
- maintain stable unplanned outages at our water treatment plants for the foreseeable future;
- develop long-term strategic network plans (25 years) for all three regions to align to our approach for managing water resources. In the north we envisage this planning approach is the enabler to; and
- the creation of a fully integrated potable water grid system by 2045.

### **Water resource resilience**

Long-term planning to secure sufficient water resources is a key area of interest for both Ofwat and our customers. The quantity of water we are authorised to abstract today is likely to be less in future years for the following reasons:

- climate change may result in drier summers with lower river flows;
- increasingly tighter environmental regulation may result in abstraction licence sustainability changes; and
- diffuse pollution from industry including agriculture, road and rail and leisure may continue to constrain abstraction.

Therefore, increasing the resilience of our raw water supplies is essential to ensure we can supply future growth in customer demand in a sustainable way. We have identified a number of areas where we will deliver activity aimed at delivering long-term security of resource. These include:

- agreeing our Water Industry National Environment Programme (WINEP) with the Environment Agency (EA);
- delivering drinking water catchment management solutions to reduce diffuse pollution, particularly pesticides and nitrates from agriculture and colour from poorly managed upland peat moorland;
- following confirmation of the sustainability of our groundwater abstraction from the fell sandstone in the Berwick water resource zone implement a number of solutions that will spread abstraction over a wider area, thus reducing the overall drawdown of aquifer levels;
- increasing the resilience of our raw water transfer capability between Abberton and Hanningfield and our ability to manage and treat changing raw water quality as a result of climate change;
- proposing to apply the Abstraction Incentive Mechanism to two abstraction sites in the south – Langham and Ormesby; and
- drinking water catchment management to manage the risks from pesticides, colour and cryptosporidium.

### **Enhanced options**

Customers have said we should be planning for the long-term. Ensuring increased resilience in the large and complex water networks we operate will require a long-term planning approach to ensure we manage risk alongside customers, stakeholders and shareholder affordability. The ability to improve the links between treatment sources, and then have the flexibility to move water around our strategic networks during stress events, will require significant and cross AMP financial investment. We are therefore proposing to frame our approach to operational resilience in the water sector around the development of long-term resilience plans based around our geographical areas of supply. We have a number of analysis tools and feasibility reports that allow us to evaluate service and system risk and develop options that would address these. This approach enables us to identify what assets we will need in the long-term (25 years ahead) and which ones we may no longer need. It will allow us to manage for future risks and uncertainty aligned to a long-term infrastructure investment plan aimed at delivering improvement of both service outcomes and overall service resilience.

We believe this approach delivers the best long-term solution to customers in regards to managing future bills against our ability in managing an aging asset base and the need for potentially significant future investment. The schemes we are now sharing and testing with our customers align to our new long-term planning approach and delivering the improvements in both system performance and overall risk reduction expected by our customers and Regulator.

Schemes identified so far include:

#### **Essex system resilience**

Increase the resilience of our raw water transfer capability and address emerging water quality risks at Abberton Reservoir impacting Layer WTW's ability to treat this water. Additional analysis is still underway, but the final solution will likely need to be a new front end DAF treatment process at Layer WTW and/or a new raw water transfer pipeline between Abberton and Hanningfield Reservoirs.

#### **North Suffolk system resilience**

Improve overall network interconnectivity in the North Suffolk zone by constructing a new 20MI service reservoir at Barsham WTW. This will complete Phase 3 of the North Suffolk zonal study recommendations (Phase 1; Yare Tunnel completed and phase 2 Lound to Gorleston to be completed in AMP6) and reduce the risk to a large area of Great Yarmouth and Lowestoft currently supplied from single treatment sources.

#### **Central system resilience**

Improve overall system resilience by improving network interconnectivity and strategic storage capacity to the Central area by delivering two specific resilience schemes. The main risk is from a water quality issue or asset failure at our large treatment works at Mosswood (c.231,000 customers) or a trunk mains failure on

either of the two trunk mains that leave this works. We currently have no alternative way of supplying these customers from alternative supply sources. Schemes include the construction of a new 62MI service reservoir at Springwell, Gateshead, installing new trunk mains and addressing water quality risks arising from an increased use of Kielder raw water at Mosswood WTW. These investments will:

- address a current shortfall in strategic storage capacity in the wider Wearside community;
- allow us to implement additional network reinforcement from this new reservoir to reduce risk of a large loss of supply event to c.120,000 customers in Washington and Sunderland caused by an issue at Mosswood WTW or the single strategic trunk main (Derwent North);
- improve resilience against loss or failure of a number of 'too critical to fail' and strategic assets within the Central network;
- improve overall network performance whilst managing long-term system operation costs;
- provide flexibility of operation to manage future uncertainty and risk, including climate change impacts on our catchments; and
- commence the creation of an integrated northern water transfer grid.

Lay a new transfer trunk main between Whorley SR (Tees) and Shildon SR (Central) and construct a new strategic 55MI water pumping station at Shildon SR. This solution will:

- reduces the risk of a large loss of supply event to c.111,000 customers around Durham caused by an issue at Mosswood WTW or the single strategic trunk main (Derwent South) between Mosswood WTW to Shildon SR with no alternative supply source; and
- commence the creation of an integrated northern water transfer grid.

### **Teesside system resilience**

Commence the implementation of recommendations from the 25 year Tees Strategic Network study, our first completed long-term network plan. We are planning to apply the same approach across all our other supply areas. This study proposes we:

- replace two existing trunk mains between Lartington WTW and Longnewton service reservoirs that at the end of their asset life and restricting our Tees operational resilience with a single, larger replacement main;
- ensure majority of Tees customers are supplied from at least two supply points;
- increase system reliability for c.250,000 customers;
- increase operational efficiency;
- improved network water quality performance;
- provide flexibility of operation to manage future uncertainty and risk; and
- link to Central system resilience project and commence the creation of an integrated northern water transfer grid.

### **Too critical to fail**

Undertake site risk assessments at 63 water sites deemed 'too critical to fail' by March 2018. These assessments will:

- considers natural and man-made hazards, ie those that we have limited influence over from occurring such as climate impact, power supplies etc;
- develop a base level resilience metric for these sites; and
- develop and deliver a programme of risk mitigation measures to deliver an improvement in overall site resilience at these locations for the most likely hazards.



## **OPERATIONAL RESILIENCE, WASTE WATER**

### **Asset resilience – short term**

Following a comprehensive programme of customer and stakeholder engagement, including a series of innovative workshops bringing together a diverse range of partners - the PR19 waste water sprint, the NWG Innovation Festival and our regional 'Thinking Ahead' workshop the Waste Water directorate has identified proposals that respond to our customers' priorities and concerns. These include a number of ground breaking objectives and frontier shifting goals.

We have developed an integrated approach over the last 18 months. This requires the business to adopt a joined up way of thinking about issues, and consider integrated solutions to manage issues, minimise environmental impact, and deliver multiple benefits. This will underpin the approach to meeting the waste water challenges during PR19 and beyond.

Sewer flooding was one of customers' priorities during Phase 1 research and continues to be considered by customers as the worst service failure they can experience with a corresponding impact on the local environment. Customers expect us to be working in partnership to protect properties from flooding and protect and enhance their local environment. Our plan addresses both these priorities.

On the River Don partnership, we have established a joint approach by combining our flooding partnership and catchment based approaches in an integrated manner to address the issues within the catchment. We will continue to seek opportunities to implement similar partnership approaches in the future.

We are also expanding the number of strategic studies completed as part of our Northumbria integrated Drainage Partnership. These should present us with a number of opportunities to expand the success of our partnership approach and identify a number of small to medium integrated solutions to address flood risk as well as enhance communities and the environment. One such scheme we have identified is Middlesbrough East and Eston South Bank. This will be a substantial and complex scheme and will require intensive partnership collaboration to deliver multiple benefits to the communities. We have already started Stage 1 for Middlesbrough East and we will be starting Eston South Bank in January 2018. Stage 2 progression is expected by 2019/2020.

We also recognise that there are a number of 'new development' led opportunities through schemes such as the Garden Village and Cramlington. These should allow us to be innovative at approaching developers to support and identify surface water separation opportunities alongside our rainwise studies and schemes across the region.

### **Asset Resilience – long-term planning**

A number of key themes have been identified which we will build around our long-term waste water resilience strategy. These are:

#### **Customer participation**

- ensure effective engagement with our customers following the 'FACE' framework for customer participation created by Ofwat (futures, action, community, experience);
- creation of a 'Green Fund' that will support the wider environment and enable our customers to participate in the sector's future by giving those customers who may wish to contribute further to the wider environment through their water bills the ability to do so;
- increasing customer action to improve the resilience of our waste water assets through a programme of behavioural change proposals, including education and incentives. We will target a number of critical areas such as misconnections, sewer misuse and property-level surface water management. We have tested this and the Green Fund concept with customers during Behavioural Change and Funds customer research conducted in November 2017;
- build upon our industry-leading sustainable drainage partnership project, Rainwise, and implement measures to create resilient communities that are empowered to respond effectively to flood events; and

- reduce our response time to internal sewer flooding incidents from four hours to two hours and external sewer flooding incidents from a same-day response to four hours.

### **Working in partnership**

- expand our Northumbria Integrated Drainage Partnership approach towards the delivery of a fully integrated drainage plan for the region;
- develop a multi-agency response to incidents to ensure the most appropriate partners and resources are in attendance;
- deliver improvements on the ground to Water Framework Directive water bodies;
- deliver all Environmental Performance Assessment and Water Industry National Environment Programme commitments; and
- Expand our existing partnership work with our developer customers to incentivise sustainable surface water management and proactively identify growth-ready development sites that we will promote in terms of waste water capacity.

### **Fit and healthy asset base**

- Further increase our treatment capacity in the Howdon sewage treatment works catchment by upgrading existing facilities and/or considering alternative facilities as part of our resilience strategy.

### **21C Drainage and Drainage and Wastewater Management Plans (DWMPs)**

Whilst the industry and partnership approach is still developing nationally NW can still undertake a number of actions and activities to prepare for this step change in long-term drainage and waste water management across the north east of England. NW will:

- update our DAS (Drainage Area Study) by upgrading our model library and making provisions for model integration in the future;
- ensure we meet Defra expectations that we are planning for the long-term and have transparency of our tools and ambitions;
- ensure our approach will align to that of Water Resource Management Plans ie over a 25 year planning horizon;
- ensure we continue to influence the debate and aim to be fully compliant and in a position to commence delivery of DWMP's by 2020; and
- ensure we continue to influence the debate on the proposed resilience flooding PC with the final methodology from Ofwat due in December 2017. This will influence how much work we may need to undertake in characterising vulnerability and the extent of additional modelling required.

### **Enhanced options**

We have challenged ourselves to look for opportunities to offer customers enhanced resilience schemes that support both their waste water service and the environment. We are proposing to offer customers the following options to deliver additional resilience to our waste water service as part of our PR19 submission:

#### Intelligent Tyneside network

- provide real-time proactive intelligence and control in one of our most complex drainage areas;
- expand on our existing work in this area, including installing additional monitors at key network locations such as combined sewer overflows. This new enhanced data leads to more effective decision making in the future ie within future drainage area studies and via the SNIPER tool;
- provide flexibility of operation to manage future uncertainty and risk including growth, climate change and sewer misuse; and
- support the short-term extension of Howdon WwTW until the long-term requirements of Howdon are determined.

### **Howdon Treatment Works for the future**

We need to start to consider the long-term future of Howdon WwTW as we continue to manage increases in population growth within its catchment. Any solution will likely require significant and costly infrastructure investment in the near future. We expect the intelligent network system proposed above will support extending the current capacity at Howdon for a number of years until the final solution to this issue is implemented.

The longer term outlook to cope with climate change and population growth will eventually necessitate upgrading the facilities at Howdon and/or considering alternative treatment facilities. We are currently undertaking investigatory studies and analysis to understand what the most cost beneficial solution to this issue will be. Options we are exploring include an extension of the existing Howdon facility and/or an extension of an existing treatment works within the catchment. Optioneering and costing are expected to be completed in early 2018 and the proposed recommended solution included in our PR19 plan under Enhancement – Growth.

### **Hazards to critical sites**

Similar to the work being completed on our critical water sites we will undertake work on waste water sites in order to:

- identify all operational waste water sites susceptible to specific hazards identified by operators in our November 2017 Resilience Workshop;
- develop a base level resilience metric for these sites; and
- develop and deliver a fully costed programme of risk mitigation measures to deliver improved resilience at these locations.

### **Rainwise – community pods**

We will continue to build on our innovative approach to proactive flood risk reduction. So far taking a 'Rainwise' approach has:

- reduced flood risk to over 4,000 of our customers;
- raised the awareness of what customers can do to reduce flood risk in their own communities; and
- allows us, in collaboration with EA resilience officers, to support local communities at risk of flooding by providing community pods. We will:
  - deliver these pods in collaboration with the EA's resilience officers as they have the skills required to build local community groups but lack the funding and practical skills these types of initiatives require – community pods, rain gardens, Suds for schools etc;
  - ensure the pods contain equipment specific to an areas needs which can be quickly deployed by communities themselves; and
  - the pods will be community resilience focused and will have multiple uses as well as flood risk reduction.



## **OPERATIONAL RESILIENCE, ASSET HEALTH AND ASSET MANAGEMENT**

### **Short-term**

We need to maintain our asset base so that it delivers the levels of performance expected from our regulators (efficiency) and customers (service levels). We have become experts in managing assets reactively and with limited or poor data – we do a great job with what we have available to us.

Proposals relating to our asset base can be categorised into the physical health of assets and the data we have to ensure their efficient operation and management. Our investment strategy for water and waste water provides for the maintenance of physical asset health into the future through investment in areas such as mains renewal, sewer cleansing, pumping station refurbishments etc which will assist in achieving our UQ targets.

Furthermore, our investment in physical asset health will be supported by a move towards the creation of intelligent water and waste water networks utilising improvements in cost and reliability of emerging sensor technologies.

### **Long-term**

For the remainder of AMP6 our programme Intelligent Asset Management (iAM) will start to transform how we manage and invest in our assets and is the enabler to deliver the transformation needed in our asset health management approach by the start of AMP7. Our PR19 story will be based on having better information on asset condition, performance and its operational environment allows us to make intelligent decisions and deliver an unrivalled customer experience every time.

Our move towards intelligent data driven water and waste water networks is complimentary to this proposed approach. Ultimately we are aiming to transform from a company brilliant at fixing problems to one that is expert at mitigating and avoiding issues in the first place.

### **Annual Report and Financial Statements.**

Ofwat also considers financial resilience as part of its Financial Monitoring Framework, and it published its second Annual Monitoring Report in November 2017.

It is our responsibility to operate, invest and finance our business as efficiently as we can on behalf of all our customers and stakeholders. This helps us to keep customer bills down and also provide a dividend return to our shareholders, who have provided the financial capital required to run the business, though this dividend is not guaranteed from one year to the next. We make sure the dividends we pay to our shareholders are set at a level which is sustainable, remains consistent with our strong investment credit rating and allows us to maintain our significant investment programmes.



## **FINANCIAL RESILIENCE**

Within the Ofwat methodology issued in July 2017 the Regulator sets out seven specific areas in regards to financial resilience. These were a company's ability to:

1. demonstrate compliance with all current operating licence conditions;
2. set an investment grade credit rating target and the reasons why a company considers that level to be appropriate;
3. demonstrate compliance against Ofwat's financial monitoring framework;
4. demonstrate, via a Long-Term Financial Viability Statement our long-term financial viability including revisions;
5. demonstrate financial resilience by compliance against the PR19 proposals as set out in C11 of Delivering Water 2020 methodology document;
6. provide Board assurance that the plan is financeable; and
7. demonstrate long-term planning beyond the next five year period.

We invest over a million pounds every day, both to run our day to day operations and to maintain and improve our asset base, to provide the best service we can to our customers. This is funded by a combination of revenue from customer bills and borrowing from banks and debt markets. The mix of funding allows us to balance our costs between today's and future customers, who will also benefit from this investment, meaning that bills are fair, stable and sustainable for our customers.

We demonstrate that our finances remain sound through our commitment to maintaining strong investment grade credit ratings, as assessed by independent credit rating agencies Moody and Standard and Poor.

We monitor our financial obligations over the long-term but maintain a detailed plan over a five year planning horizon, which is updated and approved annually by the Board. The Board assesses the resilience of this five year plan by testing it against the principal risks and uncertainties facing the business. The outcome of this is summarised in a LTVS which we publish each year in our Annual Report and Financial Statements.

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## **CORPORATE RESILIENCE, CYBER SECURITY**

Cyber security and resilience is the overarching term to describe the 'Confidentiality, Integrity and Availability' of our computer systems and information from both malicious and accidental compromise. Good cyber security and resilience reduces the risk of an incident and also helps us recover following incidents on our systems or information. Current threats include but are not limited to:

- foreign states;
- cyber terrorism;
- criminal gangs/fraudsters;
- hacktivists; and
- technical failures and outages.

There is no such thing as 'perfect security' or 'perfect resilience' and we cannot eradicate breaches or incidents, but we can reduce our risk from them and ensuring the security of our systems and information is paramount in the effective running of NWL. There are three main areas of focus:

- protecting our Operational Technology (OT) assets that treat and distribute clean water and waste water;
- protecting our Information Technology (IT) assets that help us function as a business and support our customers; and
- protecting our Customer and Employee data.

Within the current AMP we are investing in new technology and ensuring any new systems we build has security in mind. We have also increased our security resource levels to help manage the threat as effectively as possible. This also enabled us to deliver an award winning employee campaign to raise awareness of the threats our business is facing each day. However, the threats we will face in the next few years remain extremely difficult to predict and are complex.

We will continue to work with the intelligence services and our partners to ensure we are able to adapt and quickly mitigate threats. We will continue to:

- invest in high quality security and resilience solutions;
- add additional layers of security and resilience to our current infrastructure by leveraging communications service providers;
- continue to migrate to resilient cloud services where appropriate;
- undertake regular maintenance and resilience testing; and
- install early warning systems and have robust contingency plans in place.

We recognise that we need to maintain system and data integrity at the highest level to deal with current and emerging threats. Our plan is to deliver more enhanced and resilient system and data security for the business during AMP7 by ensuring we can proactively manage the risks from malicious third parties who wish to disrupt both our business and the service we deliver to our customers each day. Our cyber security plan will include:

### **Proactive Security**

We will continue to protect our business, our customers and our employees, and stay alert to any emerging trends and new threats through our external relationships and a shift towards proactive controls, continuous monitoring and real-time assessments. Technology can no longer be 'sweated' just because it works at a functional level. It must also be able to maintain an appropriate level of security.

### **Focus on data and people**

We will focus on the data and not just the data container. This focus will include people, process and technology and ensure cyber security becomes a proactive activity across the entire business, not just the IS

department. Good cyber security practices will be embedded throughout the information and systems lifecycle and engrained into our culture.

**Prepare for 'when', not 'if':**

There is no such thing as 'perfect security and resilience' and we cannot eradicate breaches, but we can reduce our risk by implementing robust and considered security practices and aligning our security strategy with the business goals. In-line with Government recommendations we will prepare for 'when' a cyber security event occurs, not 'if'.

Our objectives will align with best practice and those set out in the Networking and Information Security (NIS) Directive and will focus on Identify, Protect, Detect, Respond, Recover.

## **OTHER RESILIENCE AREAS**

### **Governance and Assurance**

Ofwat has asked seven questions of companies to demonstrate their overall corporate resilience. These are:

1. Demonstrate that we are compliant against the Board leadership, transparency and governance principles.
2. Demonstrate we have adequate management resources and systems of planning and internal control.
3. Demonstrate that we operate the business independent of CKI influence.
4. Demonstrate that we have the specific legally binding undertakings from the bodies that control us.
5. Demonstrate that we are resilient against the shocks from the corporate environment.
6. Do we provide a Risk and Compliance statement in annual reporting.
7. Demonstrate we have appropriate systems and processes in place to allow us to identify, manage, mitigate and review its risks as part of the Risk and Compliance report?

We believe we are fully compliant with all current requirements from Ofwat with regard to demonstrating a strong governance and assurance culture in NWG. We believe we can demonstrate that:

- We have robust processes and controls in place already.
- We are compliant with Ofwat principles for Board leadership transparency and governance. We recognise we may have one area where we may need to make change in the future. This relates to Executive Directors sitting on internal governance boards where best practice would lend itself to having only Non-Executive Directors. We will await the Ofwat review on these principles late this year before considering whether we want to change our current arrangements.
- We are operating at levels of operational resilience 'above average' when benchmarked against other utilities (Operational resilience benchmark report, PWC, January 2015). The report did highlight several areas of improvement and these are currently addressed/being addressed.
- Our recent achievement in attaining 'Self Assured' status from Ofwat is reflective of the level of trust our Regulator has with the way we manage and report data and the robustness and resilience of our corporate governance approach. This is a very positive outcome for both NWG and its customers.

### **Innovation**

Innovation is an area where NWG believe we are a leading company within the industry. Our Innovation Festival broke new ground for our industry and our regions. We have many other examples of great innovation approaches; Invest Quest, partnerships with academic and other institutions, embedded technologies. Our Innovation Strategy, which will set out our current and planned activity, is currently under review and further development and will be a key part of our overall PR19 business plan.

### **Security and Business Continuity**

In support to our IT/OT resilience strategy we will also continue to deliver on all our commitments and regulatory requirements in regards to security of our sites and buildings by the end of 2020. Key milestones and current status are:

- all enhanced (major) service reservoirs and water towers are now secured to the agreed national security standards;
- we have completed the protection of those aquifers from which we extract water from a potential contamination and are on target to securely protect our most critical sites from a potential contamination of the water supply;
- we have doubled the number of rapid deployment water storage tanks that we can deploy, increased and improved our water tankering capabilities across all water supply areas. This supports customers priorities that we should have effective response and recovery plans and capability in place;

- we are on target to complete the installation of physical and electronic security at all of our above ground water assets to the agreed national security standards; and
- we are moving our CCTV capability from an old analogue to digital platform, ensuring that they are future-proof.

For AMP7 we intend to:

- start to install security measures to the nationally agreed standard on our waste water assets to prevent harmful discharges to the environment;
- make further improvements to our response capabilities to the loss of piped water supplies to customers, including additional rapid deployment water storage tanks;
- deliver further improvements to our water tanker fleet to aid the deployment of alternative water;
- install additional equipment to assist with the prevention of flooding of our assets;
- deliver further security improvements at our Enhanced (major) service reservoirs and water towers; and
- investment in improved technology systems to aid the 24/7 security monitoring of our assets.

### **Customer Affordability**

Plans are currently being developed with respect to affordability and helping customers in vulnerable circumstances and are likely to be key areas underpinning our plan.

### **Customer Participation**

Our approach: *From customer consultation to a culture of customer participation* was issued in October 2017. This is a comprehensive approach which describes our ambitions in this area.

### **Sustainability**

Our PR19 Sustainability strategy is under development and will be published in due course.

### **Climate Change**

- we are now self-generating 20% of our own energy;
- recommendations from the Royal Haskoning DHV Climate Change Asset Impact 2012 update report using UKCP09 climate change model data have either been completed or will be completed by the end of 2020;
- the UK climate change projections model is being refreshed and re-issued in 2018;
- once the revised model has been issued we will commission a new review of NWGs climate change risk profile before the end of 2020 using the new modelling data; and
- we will develop appropriate mitigation options based on this new report and implement cost beneficial solutions as required.

### **Supply Chain**

- we have recently established our co-location supply chain delivery team at Seaham, County Durham;
- we will continue to implement the “living wage” with eligible suppliers;
- we have just introduced vehicle telematics into our fleet, with a focus on getting everyone home safely;
- we have recently launched our ‘*Responsible Procurement Plan*’ which outlines our approach to supply chain engagement;
- we always look to reduce our reliance on single suppliers wherever possible and effectively manage this risk where it exists;
- we undertake regular supplier and market monitoring reviews to ensure we are aware of any new or emerging risks to our business as early as possible.

### **Workforce Resilience**

Key areas of focus to ensure we have a resilient and healthy workforce are:

- continue to develop and deliver our people programme;
- creating the workforce of the future by strategic workforce planning, predicting what will be required and putting in place strategies to ensure we have what we need whilst managing future uncertainty and risk;
- ensuring our workforce are skilled and competent by:
  - developing our skills strategy and maximising opportunities such as the apprentice levy to our full advantage;
  - Competent Operator; and
  - Trailblazer apprentices.
- ensuring the talent pipeline exists and that the water industry is seen as a great place to work. We will do this by effectively engaging with school, colleges, universities and skills partnerships.

### **Bio-resources**

We are proposing to maximise the efficiency of our waste water services and enhance the value for money provided for customers by transitioning into a leading bio-resources market business whilst improving and enhancing the environment. This will require further investment at both of our regional treatment centres to increase our digestion capacity.