



## Annex 4C

### Investment areas summaries

In this annex we provide supplementary information linking to our arguments in Chapter 4: Assessing Future Needs of our DD PR19 Representation. In particular, these illustrate the type of information we could provide to Ofwat in responding to our request for a full review of its approach to capital maintenance expenditure.

In chapter 4 we provide case studies of the likely impacts of reductions in capital maintenance expenditure for water treatment works and water recycling centre compliance.

The information in this annex provides a summary view and assessment of performance in each of seven investment areas.

The investment summaries should be viewed in the context of the reduction in capital maintenance over the past AMPs through efficiency, the implementation of predictive and prescriptive analytics, innovation, and our sector leading performance, as outlined in the main body of our September 2018 plan.

In our investment summaries we show the line of sight from our Strategic Direction Statement ambitions through to the service we provide to customers, delivered through efficient and effective asset management and our dedicated teams.

For each investment summary we define:

- The service each RAG provides, and
- the assets we manage to provide the services customers.

We demonstrate our intent through:

- The Strategic Drivers and the linkage to our Strategic Direction Statement, linking to the...
- proposed Investment on how we plan to meet our goals, and
- how Customers and the Environment will benefit from our actions.

We then show how the plan meets the above and the impact of reduction through:

- Historic and Future Investment requirements, and
- the impact of reductions on expenditure in risk at a RAG level, and we drill down into...
- asset Group examples of the reductions, describing the...
- risks position we be faced with and conclude by...
- explaining what is different in AMP7 and our future challenges.

# Raw Water Resources



## OUR SERVICE

We have a responsibility to keep our Water Treatment Works (WTWs) supplied with a reliable and consistent supply of raw water, ready for it to be treated and distributed to over 2.2 million households. On average we deliver 1,050 megalitres of water each day to our WTWs in order to meet the needs of our customers. Our abstraction service includes management of existing abstraction infrastructure, development of new sources, catchment and licence management. We provide access to our water parks to over 2 million visitors.

## OUR ASSETS

In order to provide this service, we look after a substantial asset base, including:

- 8 pumped reservoirs and 2 natural catchment reservoirs;
- 450 groundwater boreholes across c.200 sites;
- 17 pumping stations (7 direct river and 10 indirect supporting river abstractions);
- 3 raw water transfer stations;
- 20km of raw water mains and tunnels; and
- 7000 hectares of land, including 49 SSIs.

## Plan highlights

### THE STRATEGIC DRIVERS

Our customers have told us that they view the provision of safe, clean drinking water as the most vital service we offer.

We also know that our customers expect us to be prepared for future challenges and generally support going beyond minimum levels of investment to protect water supplies for the future. Our planned investment will allow us to proactively maintain our raw water assets without compromising intergenerational equity.

Our planned investment supports the vision and ambitions laid out in our Strategic Direction Statement. It's our goal to make the east of England resilient in the face of environmental pressures, growth and climate change. We promised investment over the next 10 years to mitigate risks to raw water quality, contamination and drought.

### SUMMARY OF PROPOSED INVESTMENT

Our investment spans a wide range of areas, from recreation and conservation to High Voltage equipment. Significant investment areas include:

**Boreholes** – the average life of one of our boreholes is 70 years. We will closely monitor performance, undertake planned maintenance, carry out required refurbishments and develop the new sources we need for the future.

**River intakes** – many of our surface water intake assets were introduced between 1955 and 1986. They are now becoming obsolete and difficult to maintain. Our investment will allow for cost-effective and proactive replacement and refurbishment of critical mechanical & electrical equipment.

**Reservoirs** – we have a statutory obligation to comply with the Reservoir Act 1975 and will undertake proactive inspection and maintenance of our dams and impounding reservoirs to protect public health and supply.

### HOW OUR CUSTOMERS & ENVIRONMENT WILL BENEFIT

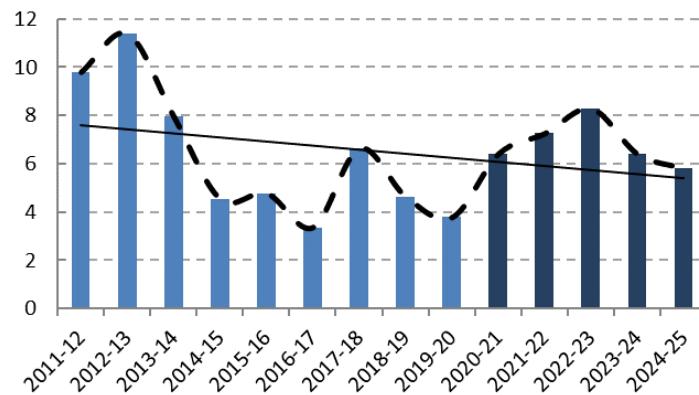
Our planned investment will help us to deliver on a number of the outcomes and associated performance commitments we have detailed in our business plan:

- **Delighted customers**
  - ✓ Water supply interruptions
- **Investing for tomorrow**
  - ✓ Unplanned outages
- **Resilient business**
  - ✓ Risk of severe restrictions in a drought

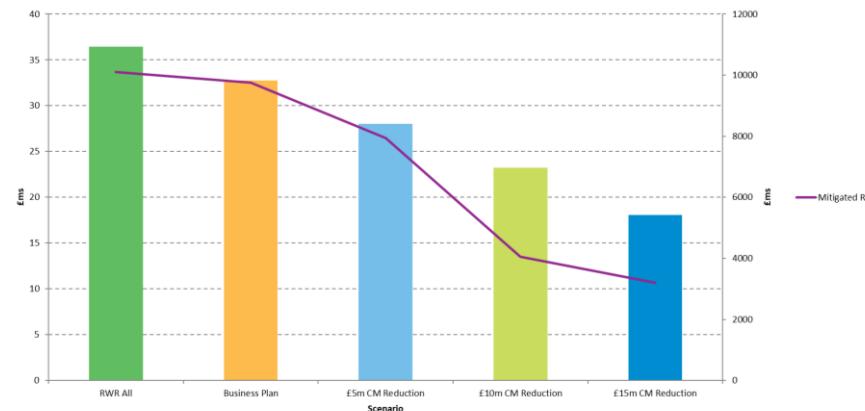
These performance commitments have a combination of reputational and financial penalties & rewards. Our targeted performance levels are challenging and predicated on our proposed level of investment.

## If we change our planned level of investment

### HISTORIC & PROPOSED EXPENDITURE

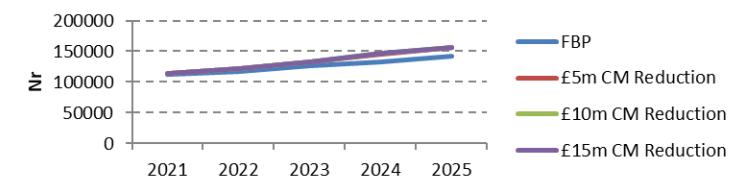


### IMPACT ON AMP7 PERFORMANCE

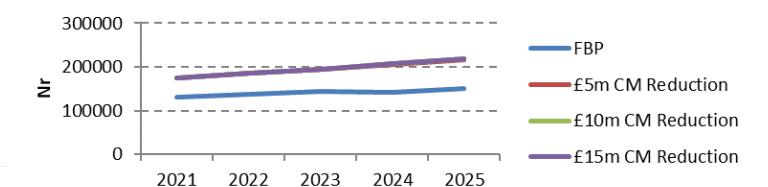


This shows the impact at a portfolio, below we detail the impacts at an asset group level

### Unplanned Interruptions - Property Incidents - 3-6 hrs(Residual)

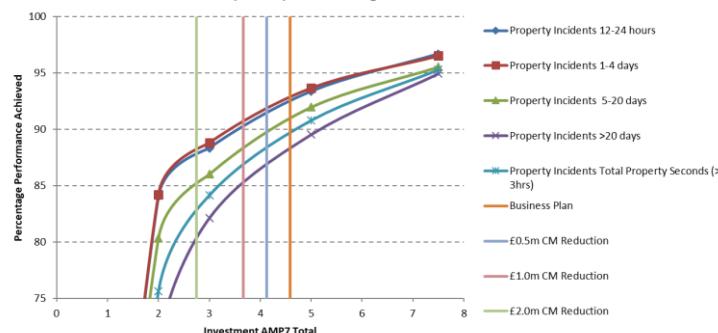


### Unplanned Interruptions - Property Incidents - 6-12 hrs(Residual)



### ASSET GROUP EXAMPLES

#### Boreholes (M&E) Percentage Performance Achieved



This is a subset of the portfolio

### UNDERSTANDING THE RISK POSITION

A reduction in our planned level of investment would have a material impact on our ability to provide the proposed levels of service we have agreed with our customers. The impacts would include:

- Increased risk of interruptions to supply (see above);
- Increased risk of deterioration in raw water quality – potentially affecting the efficacy of our WTW processes;
- Increased risk of regulatory non-compliance.

At an operational level, reduction in expenditure would result in a move to a 'run to fail' strategy on critical surface water assets. Limited resources to refurbish and replace meters would also affect our ability to accurately abstract from a number of our water resources. There are long lead times for replacement, which could result in the impact of long periods of reduced abstraction and reduced capacity in our reservoirs.

### CHANGES IN AMP7

Enhancement expenditure in AMP6 to respond to WINEP, Eels regulations etc. have left us with a larger and more complex asset base to maintain. Abstraction licenses have become tighter, requiring greater investment to ensure consistency of flow.

### CHALLENGES & RISKS FOR FUTURE AMPs

Increasing pressures of climate change, growth and environmental protection mean we need to be sure that our raw water abstraction system is sustainable in the future. Many of our assets used to abstract from rivers are either at or approaching the end of their asset lives. They have complex maintenance needs and to protect required levels of service we are increasingly forced to make replacements. Some assets in this group have long lead times to procure replacement parts, which would put our ability to supply our WTWs at risk in the event of a failure.

# Raw Water Distribution



## OUR SERVICE

On average we deliver 1,050 megalitres of water each day to our WTWs in order to meet the needs of over 2.2 million households. The transportation of raw water (or pre-treated water) from the boundaries of our abstraction sites and assets, through the raw water distribution network to our WTWs is a critical function in our supply system. We also provide untreated or non-potable water directly to commercial customers and third-party water companies.

## OUR ASSETS

In order to provide this service, we look after the following raw water distribution assets:

- 737km of raw water distribution mains;
- 9 re-lift pumping stations; and
- 3 raw water storage reservoirs.

## Plan highlights

### THE STRATEGIC DRIVERS

Our customers have told us that they view the provision of safe, clean drinking water as the most vital service we offer. We also know from speaking to our customers that focus on reducing water lost through leakage is really important.

In our Strategic Direction Statement we explained some of the challenges we face in the long-term, including the use of old cement pipes across our raw water distribution network. The age profile of these pipes means that the burst rate has increased over the past ten years and we want to address this.

Our raw water distribution assets are the critical linkage between abstraction and treatment. Many of these connections are single mains and we understand the need to increase the overall resilience of our raw water distribution system.

### SUMMARY OF PROPOSED INVESTMENT

Our most significant investment areas are as follows:

**Pipelines** – we will undertake proactive cleaning of mains to mitigate the risk of them becoming ‘fouled up’ through tuberculation. We will undertake a programme of mains refurbishment and replacement that is risk-based and informed by our routine inspections.

**Leakage** – we will enhance leakage detection to minimise losses of raw water before it reaches our WTWs. This will help to ensure that we maximise the efficiency of our raw water abstraction activity.

**Risk Assessment** – we will build greater system resilience by undertaking comprehensive criticality assessments on all our large water mains. This will help us to ensure repair and maintenance constraints are fully understood and ultimately help us to mitigate the likelihood and impact of a failure on our overall supply system.

### HOW OUR CUSTOMERS & ENVIRONMENT WILL BENEFIT

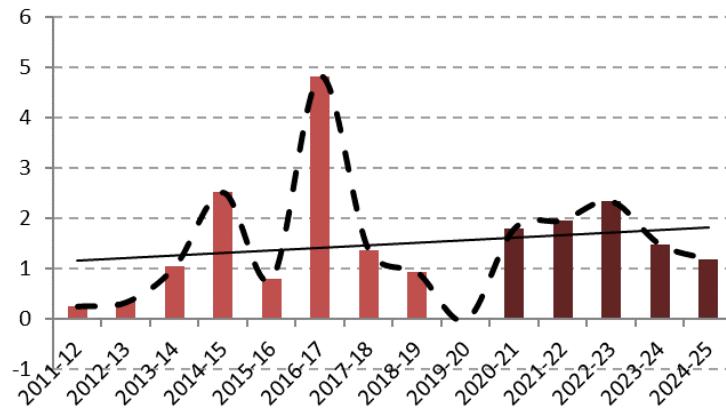
Our planned investment will help us to deliver on a number of the outcomes and associated performance commitments we have defined in our business plan:

- **Delighted customers** ✓ Water supply interruptions
- **Investing for tomorrow** ✓ Unplanned outages
- **Resilient business** ✓ Risk of severe restrictions in a drought

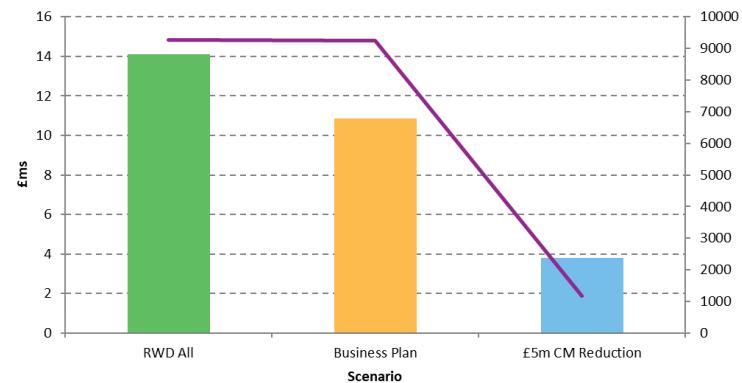
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## If we change our planned level of investment

### HISTORIC & PROPOSED EXPENDITURE

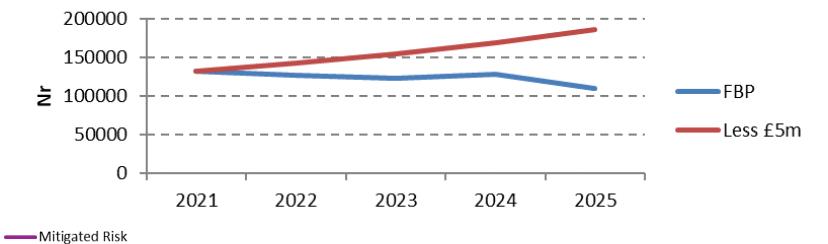


### IMPACT ON AMP7 PERFORMANCE

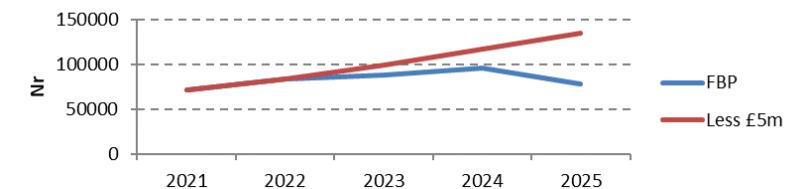


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### Unplanned Interruptions - Property Incidents - 6-12 hrs(Residual)

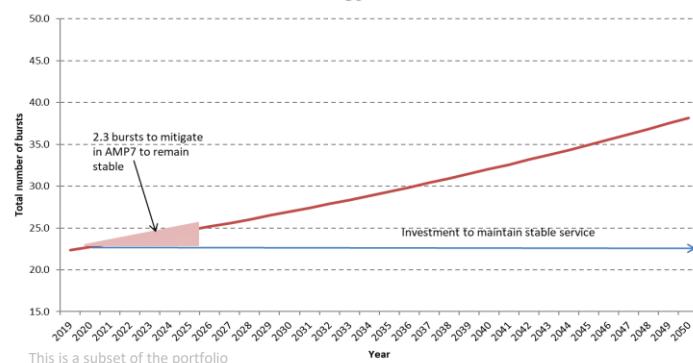


### Unplanned Interruptions - Property Incidents - 3-6 hrs(Residual)



### ASSET GROUP EXAMPLES

#### Total forecast raw water mains bursts per year - no CM investment 2020-50



### UNDERSTANDING THE RISK POSITION

A reduction in our planned level of investment would have a material impact on our ability to provide the proposed levels of service agreed with our customers. Impacts would include:

- Increased risk of interruptions to supply (see above) – particularly at our groundwater sites without raw water storage;
- Intermittent flows to our water treatment works impacting on treatment capability; and
- increased health and safety risk due to the need for higher volumes of reactive on-site works.

Reduction in expenditure will necessitate a more reactive maintenance approach. This could lead to an inefficient allocation of our human and financial resource, as well as being more disruptive to service.

### CHANGES IN AMP7

We are driving leakage reduction across our business, and this includes on our raw water mains. We understand the importance customers attach to reducing leakage, and in AMP7 we are actively targeting losses within our raw water distribution network.

### CHALLENGES & RISKS FOR FUTURE AMPs

The levels of projected growth in our region will be a significant challenge for how we manage our existing raw water distribution assets. It will lead to an increase in demand requirements on these already ageing assets, putting service at risk. The impacts could be particularly pronounced where we supply to large industrial users or WTWs that supply significant populations.

The result of reduced investment in AMP7 is greater exposure to asset and service failures, whilst pushing investment needs further into the future and AMP8, by which time the requirements will be more significant.

# Water Treatment Works



## OUR SERVICE

Treat all water arriving from our raw water assets to meet stringent water quality standards set by the Drinking Water Inspectorate (DWI) and European Legislation, or further customer quality requirements (e.g. fluoride dosing). These requirements need to be met for supply on a peak day basis.

## OUR ASSETS

- 15 Surface Water Treatment Sites (50% of water into supply)
- On site potable water storage tanks
- 115 Ground Water Treatment Plant (50% of water into supply)

## Plan highlights

### THE STRATEGIC DRIVERS

The strategic driver of water treatment works capital maintenance is the reduction of failure at treatment works to maintain a resilience system. A particular driver in WTWs for AMP7 is the replacement of treatment technology solutions that were installed in the 1980s to meet new Maximum Admissible Concentrations (MAC) drinking water standards. Our Investing in Tomorrow outcome was not ranked high by customer and we have therefore not introduced additional investment in AMP7 ahead of need. Of six areas in our Business Plan, WTWs was ranked at mid-importance by customers (3.54 from households out of 6).

### OUR PROPOSED INVESTMENT/ASSET STRATEGY

The investment consists of proactive maintenance of **mechanical and electrical equipment** ahead of failure based on asset monitoring; refurbishment/replacement/repair of **civil engineering structures and buildings**.

The proposed AMP7 expenditure allows for the reduction in requirements in AMP7 of expenditure caused by cyclical nature of replacement of short-lived assets.

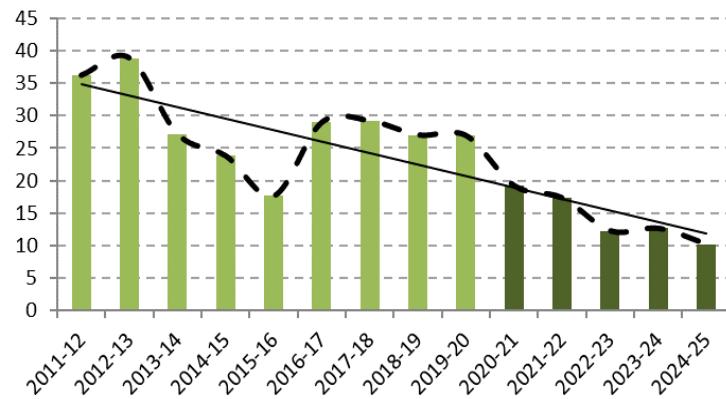
### HOW OUR CUSTOMERS & ENVIRONMENT WILL BENEFIT

We have statutory requirements. WTW management ensures we meet water quality compliance (set by DWI) and contributes to providing a continuous service to customers.

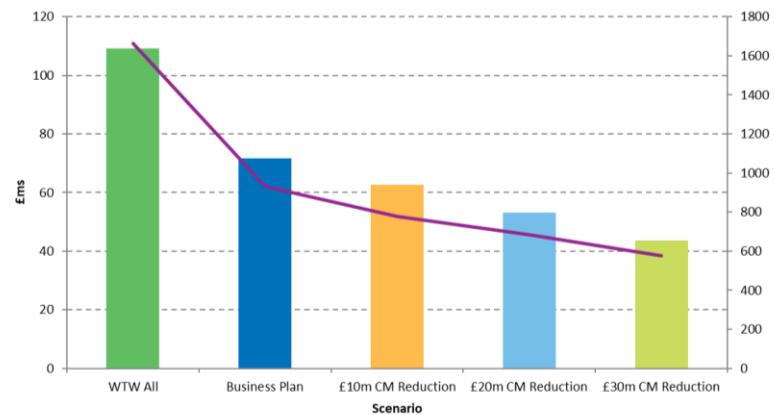
- **Safe, Clean Water**
  - ✓ Water quality compliance (CRI)
  - ✓ Water quality contacts
- **Delighted customers**
  - ✓ Water supply interruptions
- **Investing for tomorrow**
  - ✓ Unplanned outages
- **Resilient business**
  - ✓ % of population supplied by a single supply system

## If we change our planned level of investment

### HISTORIC & PROPOSED EXPENDITURE

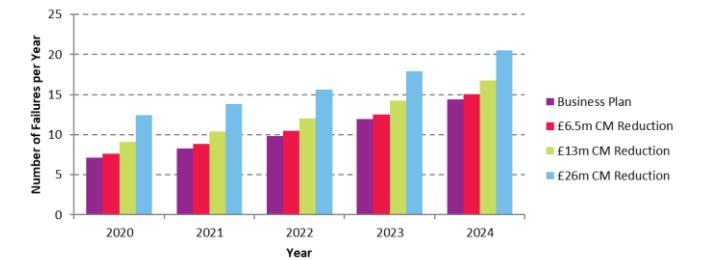


### IMPACT ON AMP7 PERFORMANCE

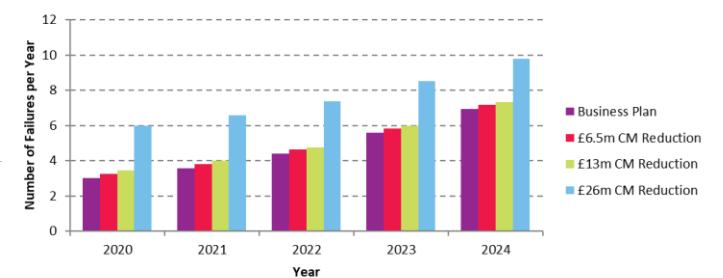


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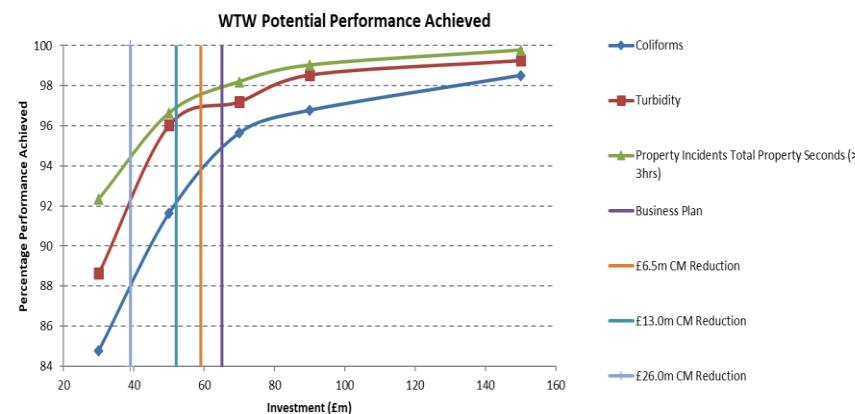
### All Water Treatment Works Coliform Failures



### All Water Treatment Works Turbidity Failures



### TREATMENT ASSETS EXAMPLES



This is a subset of the portfolio

### UNDERSTANDING THE RISK POSITION

We have built the plan based on an acceptable failure risk. If investment were reduced, the following risks would increase:

- Unplanned failures
- Loss of output and/or power efficiency
- Water quality failures
- WTW shutdown and consequent interruptions / stress on connected system, e.g. storage tanks
- Increase reactive replacement of assets (fix on fail) impacting the above

### CHANGES IN AMP7

Our asset health and condition analysis that we do not need to undertake full site refurbishments as in AMP6. We are also in a short-term reduction in capital maintenance for shorter-lived asset in AMP7, an increase will be required in AMP8.

### CHALLENGES AND RISKS FOR FUTURE AMPs

In AMP8 we predict an increase in capital maintenance as a result of shorter-lived assets reaching the end of their serviceable life. Reducing the AMP7 investment from the level currently planned would result in further increases in AMP8 above planned. Growth and climate change could trigger one-off issues if WTWs not maintained and reduce the capacity and realistic output of the plants.

# Treated Water Distribution



## OUR SERVICE

We operate the distribution network to ensure treated water arrives at the customer at same level of quality as when it left the WTWs, while minimising leakage. We ensure there is consistency of supply to customers, as interruptions can have an impact on public health.

## OUR ASSETS

- 38,000km of Potable Water Distribution Mains (25% of UK's pre-1900 mains)
- 464 Water Boosters
- 131 Water Towers (32% of UK stock)
- 250 Service Reservoirs
- 2.3m Water Meters

## Plan highlights

### THE STRATEGIC DRIVERS

Legacy issues and the fitness of the region we serve are the key exogenous drivers of our programme. A significant proportion of our distribution infrastructure, e.g. water mains and towers, were laid in the mid-20th century (New Towns) or even pre-20th century and are in deteriorating condition. We are extending the operational life of our assets through innovation, calming networks (managing pressure to reduce bursts), and targeting repairs and maintenance, where possible. Customers ranked water mains bursts of greatest importance (average 4.85 for households and 5.20 for non-households, out of 6). Leakage was ranked second.

### OUR PROPOSED INVESTMENT/ASSET STRATEGY

The proposed investment in treated water distribution will provide:

- Continued pressure management of pipes to reduce transience.
- Targeted 80% no dig techniques for the rehabilitation of pipes with a focus on early PVC (New Towns) which fail and cause interruptions.
- Replace or refurbish pipelines, towers and service reservoirs on a case-by-case basis following inspections.
- Proactive detection and repair of pipe using advanced technological solutions to manage leakage.
- Routine inspection of all tanks based on a risk based approach.
- Dispose and replace towers with pumped systems if economical.

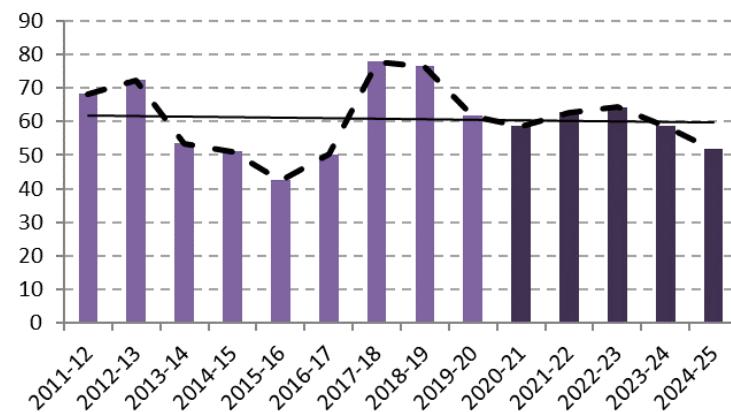
### HOW OUR CUSTOMERS & ENVIRONMENT WILL BENEFIT

This investment would help us deliver our performance commitments:

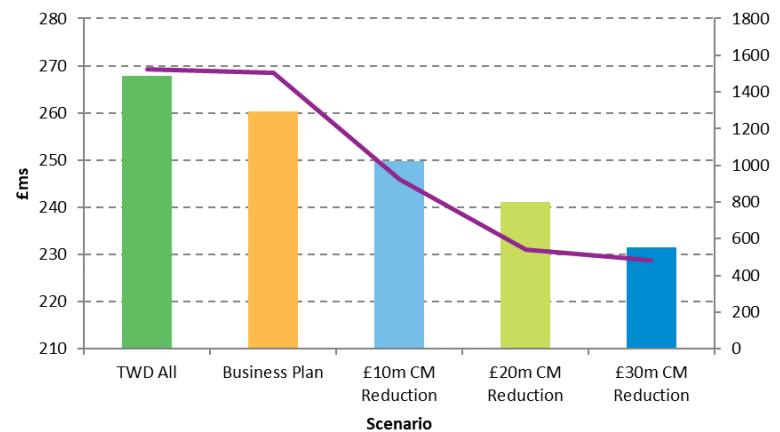
- **Safe, clean water**
  - ✓ Compliance Risk Index
- **Delighted customers**
  - ✓ Water supply interruptions
- **Investing for tomorrow**
  - ✓ Unplanned outages
  - ✓ Properties at risk of persistent low pressure
  - ✓ Reactive mains bursts
  - ✓ Total mains bursts
- **Supply meets demand**
  - ✓ Leakage

## If we change our planned level of investment

### HISTORIC AND PROPOSED EXPENDITURE

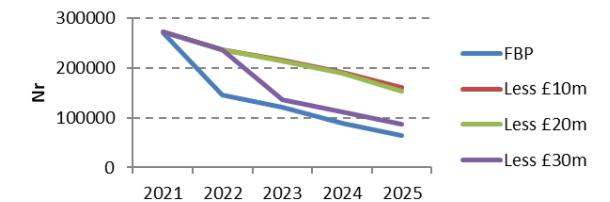


### IMPACT ON AMP7 PERFORMANCE

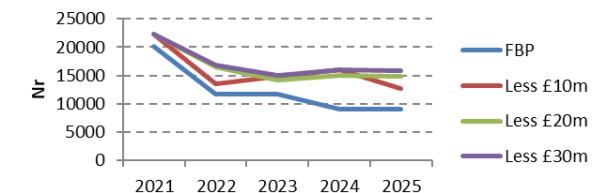


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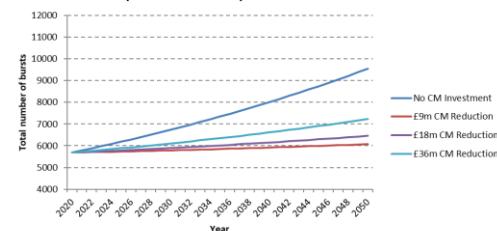


### Unplanned Interruptions - Property Incidents - 6-12 hrs(Residual)



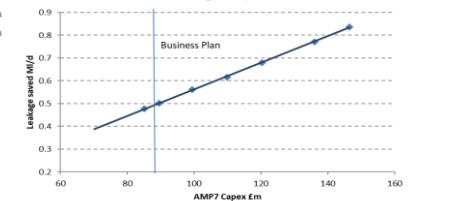
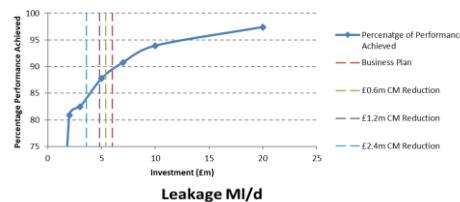
### MAINS ASSETS EXAMPLE

#### Impact on bursts if Capital Maintenance reduced



This is a subset of the portfolio

#### Water Boosters Performance Achieved



### UNDERSTANDING THE RISK POSITION

Underinvestment in this areas would result in reduced asset health and condition, which would then increase the risk of:

- Bursts and leakage
- Interruptions
- Water quality incidents
- Roadworks interruptions due to reactive works
- Health and safety incidents due to roadworks.

### CHANGES IN AMP7

Maintaining industry leading leakage at baseline levels achieved in AMP6 at outturn levels.

### CHALLENGES AND RISKS FOR FUTURE AMPs

Sustainable growth in the region will be putting pressure on our treated water mains and investment has to happen to continue to support developer growth. Our storage points will also see some pressure, particularly due to continuing development of our rural areas. Climate change and more prolonged hot weather and freeze/thaw events will put increased pressure on unmaintained treated water mains. As the network becomes increasingly interconnected (by 2035 we aim to have 100% of customers able to receive water from at least 2 supplies), it will require increased operational activities to maintain high quality drinking water.

# Sewerage Collection Services



## OUR SERVICE

To collect foul sewage from over 2.7 households to maintain public health. To transport collect sewage through a reticulation network for safe treatment and disposal at water recycling centres.

## OUR ASSETS

- 45,237km of Sewers
- 31,200km of Transferred Sewers
- 4800 Sewage Pumping Stations

- 1276 Transferred Sewage Pumping Stations
- 839 Emergency Overflows
- 1428 Combined sewer overflows
- 9 Balancing Lakes

## Plan highlights

### THE STRATEGIC DRIVERS

In our SDS, we identified the risk of our ageing asset base, in particular our underground assets. As an industry, replacement rates imply asset lives of hundreds of years – far longer than we know we can expect in reality.

Sewer collapses were ranked of high importance to customers, second only to mains bursts. While customers support investment in maintaining infrastructure, they generally support investment for improvements earlier rather than later.

### OUR PROPOSED INVESTMENT/ASSET STRATEGY

**Public sewers** – proactive approach - jetting to remove debris to prevent sewers blocking at known problem areas; CCTV to determine condition; replacement of known grade 4 / 5 sewers.

**Rising mains** – replace or refurbish frequently bursting rising mains. As rising mains are pressurised assets, they have a greater potential for environmental impact than gravity sewers. These are therefore an area of focus for us.

**Transferred sewers** – undertake further investigation of known hot spots, and refurbishment after investigation where it is economic to do so.

**Pumping Stations** – continue with planned maintenance regimes. Fix on failure pumps or continually failing pumps. Transferred pumping stations will require minimal refurbishments in AMP7, due to an AMP6 programme.

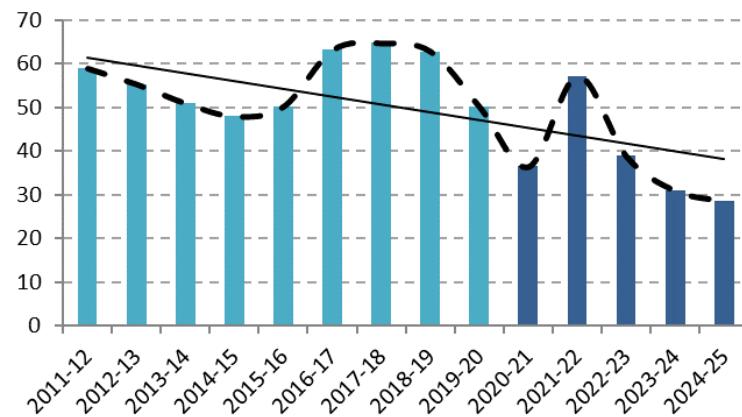
### HOW OUR CUSTOMERS & ENVIRONMENT WILL BENEFIT

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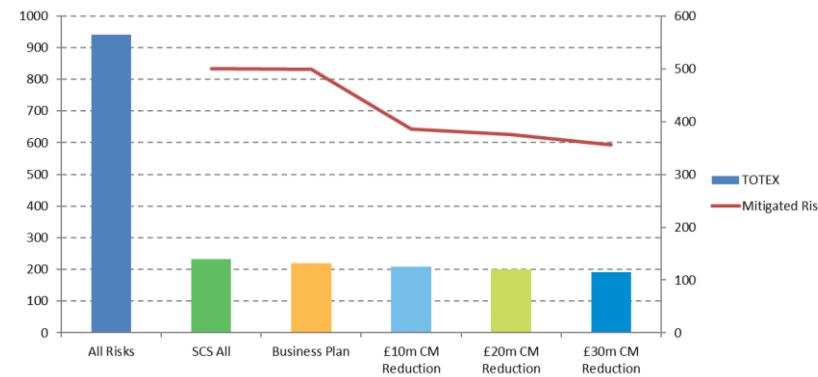
- **Delighted customers**
  - ✓ Properties flooded internally from sewers
- **Investing for tomorrow**
  - ✓ Sewer collapses
  - ✓ Properties flooded externally from sewers
- **A flourishing environment**
  - ✓ Pollution incidents
- **Resilient business**
  - ✓ Risk of sewer flooding in a storm

## If we change our planned level of investment

### HISTORIC AND PROPOSED EXPENDITURE

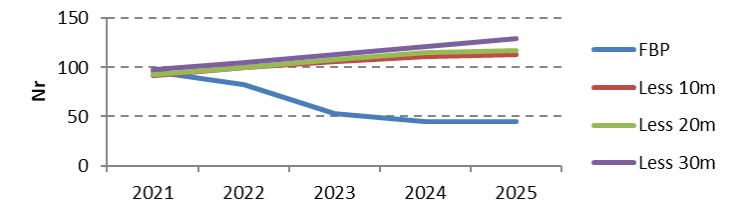


### IMPACT ON AMP7 PERFORMANCE

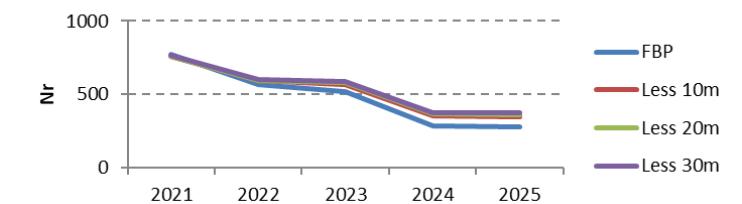


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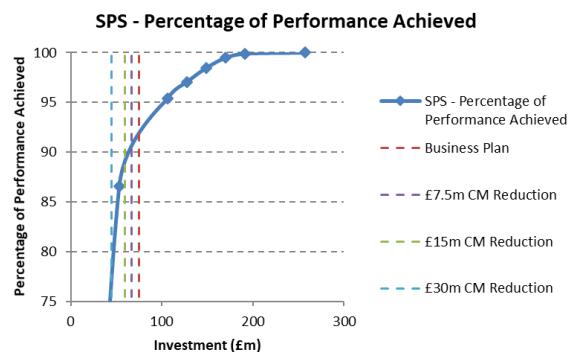
### Pollution - Number - Prosecutions(Residual)



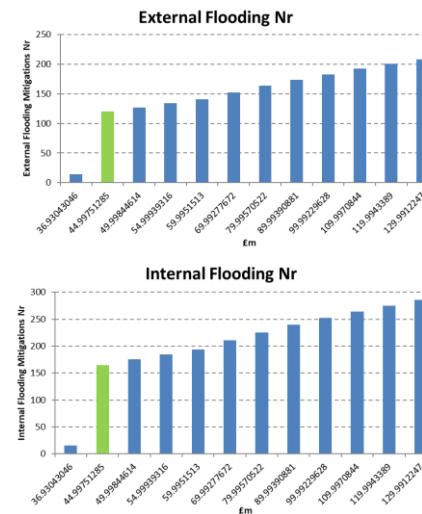
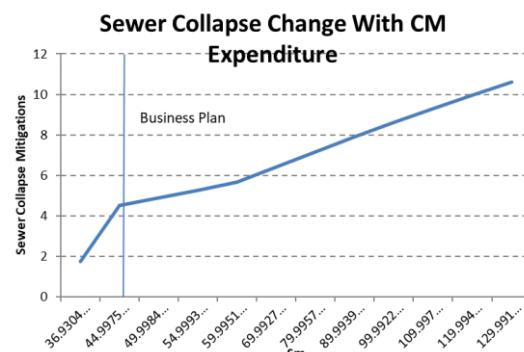
### Pollution - Incidents(Residual)



### ASSET GROUP EXAMPLES



This is a subset of the portfolio



### UNDERSTANDING THE RISK POSITION

Some sewers have a particularly high consequence if they were to fail due to their size, location and flow volume. Proactive capital maintenance on these assets is vital to protecting customer service and environmental impact. There are a number of examples across the industry (e.g. United Utilities *Mancunian Way*) where single sewer collapses have caused significant disruption to communities. Proactive CCTV has identified the need to maintain the main inlet sewer to Peterborough Flag Fen WRC, which is included as a named scheme within our sewer rehab programme.

### CHANGES IN AMP7

The expenditure for all transferred assets was previously accounted for as enhancement expenditure, and is now categorised as maintenance. We will continue to investigate and develop strategies to reduce the impacts of transferred assets on our long-term investment requirements.

### CHALLENGES AND RISKS FOR FUTURE AMPs

In the long term there will be a need to increase the replace and refurbishment rate of sewers. The current asset replacement rate assumes and asset life is circa 2000 years, this is obviously not sustainable. The data validates our current replacement rates, further sector wide research is required in this area.

# Water Recycling Centres



## OUR SERVICE

The treatment and safe disposal of the effluent from sewerage collection system, waster liquors from sludge and septic tanks to meet the discharge permits set by the Environment Agency (EA). This enables us to deliver the improvements in environmental quality for our customers.

## OUR ASSETS

- 1180 Wastewater Treatment Sites (including descriptive works)
- 372 Settled Storm Overflows

## Plan highlights

### THE STRATEGIC DRIVERS

Robust and well-maintained wastewater treatment works will help us to deliver on our SDS goal of improvements in environmental quality. Customer concern about the environment is growing, and customers support investment in maintaining infrastructure, they generally support investment for improvements earlier rather than later.

### OUR PROPOSED INVESTMENT/ASSET STRATEGY

- **Mechanical and electrical equipment** – continue with proactive maintenance and repair strategy. Replacement and refurbishment ahead of failure through asset observations and monitoring. Like for like replacement, except where technology has become obsolete or where there is benefit of replacing whole plant systems.
- **Civil engineering structures** – refurbishment or replacement of joints and structure where required.
- **Buildings** – maintain in a safe and serviceable condition to prevent water ingress impact on key equipment.

### HOW OUR CUSTOMERS & ENVIRONMENT WILL BENEFIT

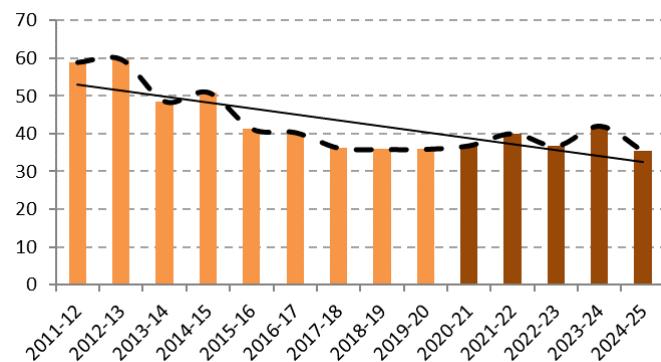
Our planned investment will help us to deliver on a number of the outcomes and associated performance commitments:

- **Investing for tomorrow**
  - ✓ Unplanned outage
  - ✓ Treatment works compliance
- **A flourishing environment**
  - ✓ Pollution incidents
  - ✓ Bathing water attaining excellent status

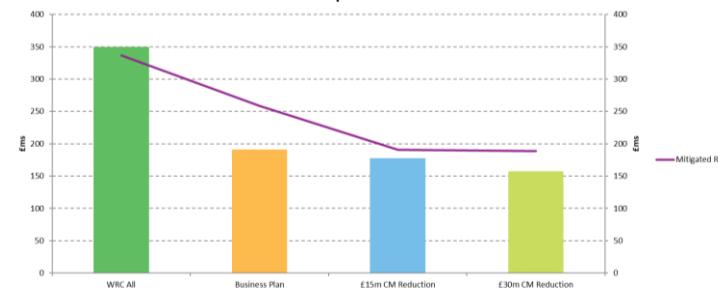
These performance commitments have a combination of reputational and financial penalties & rewards. Our targeted performance levels are challenging and predicated on our proposed level of investment.

## If we change our planned level of investment

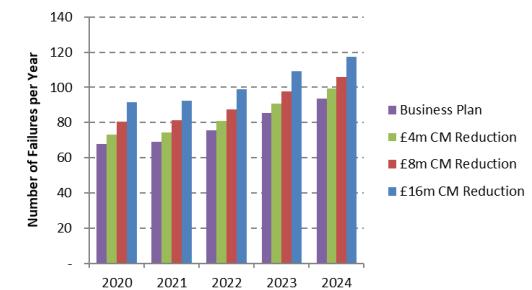
### HISTORIC AND PROPOSED EXPENDITURE



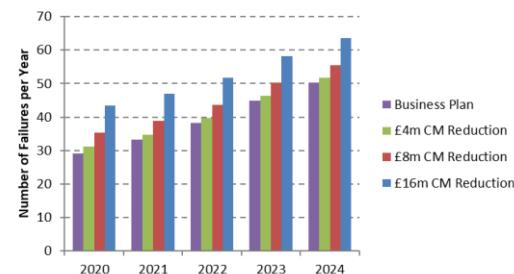
### IMPACT ON AMP7 PERFORMANCE



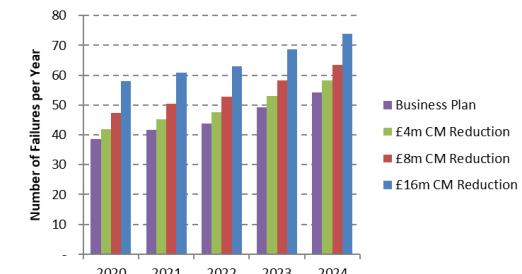
### WRC Band 6 BOD First 95%ile Failures



### WRC Band 6 Ammonia First 95%ile Failures

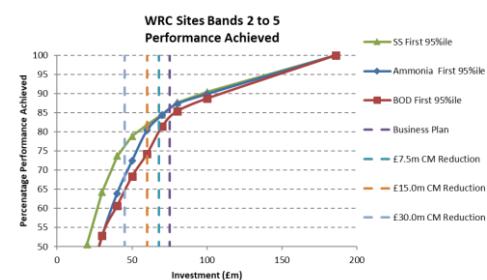


### WRC Band 6 SS First 95%ile Failures

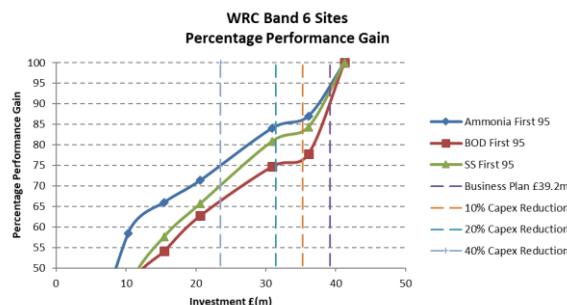


This shows the impact at a portfolio, below we detail the impacts at an asset group level

### ASSET GROUP EXAMPLES



This is a subset of the portfolio



### UNDERSTANDING THE RISK POSITION

**Service Impacts** – Asset failures and equipment offline will lead to increased risk of:

- compliance failures;
- increased number of pollution incidents;
- increased number of significant flooding events;
- and increase in odour complaints.

In addition, there are risks to increased costs from operating costs, hire costs and temporary plant, and H&S costs. These will be felt in response to asset failures and equipment being offline.

### CHANGES IN AMP7

For wastewater treatment works, we have installed advance technological solutions to meet more stringent environmental standards. These plants typically have shorter life assets e.g. Trickling Filters to Activated Sludge Plants or Grass Plots to Mechanical Sand Filters.

### CHALLENGES AND RISKS FOR FUTURE AMPs

Investment in AMP7 will support full use of assets built in AMP6 to meet required consent standards. Longer-term challenges including growth, climate change, supply chain risk, and changes in behaviour will continue to cause stress on our ability to deliver service.

Maximising our ability to meet environmental regulation and use technology now will provide us with a good basis to meet these future challenges.

# Bioresources



## OUR SERVICE

To treat waste sludge from our water recycling centres for safe disposal land. To generate electricity from methane gas to power treatment facilities

## OUR ASSETS

- 23 Strategic Dewatering sites
- 10 Regional advanced digestion sites
- Energy Generation Units
- Mobile plant
- 400 Farmer customers
- 227,300 Landbank available

## Plan highlights

### THE STRATEGIC DRIVERS

With virtually 100% of treated sludge disposed to land it is important that we produce high quality products and be capable of achieving enhanced treatment standards to maintain farmer and stakeholder confidence.

Electricity generation will help us to deliver on our SDS goals of reduced carbon emissions

Our customers expressed clear support for our strategy acknowledging advanced anaerobic digestion with recycling high quality products into agriculture and the production of renewable heat and electricity to run our plants.

### OUR PROPOSED INVESTMENT/ASSET STRATEGY

**Mechanical and electrical equipment** – continue with proactive maintenance and repair strategy. Replacement and refurbishment ahead of failure through asset observations and monitoring. Like for like replacement expect where technology has become obsolete or where there is benefit of replacing whole plant systems.

**Civil engineering structures** – refurbishment or replacement of joints and structure where required.

**Buildings** – maintain in a safe and serviceable condition to prevent water ingress impact.

### HOW OUR CUSTOMERS & ENVIRONMENT WILL BENEFIT

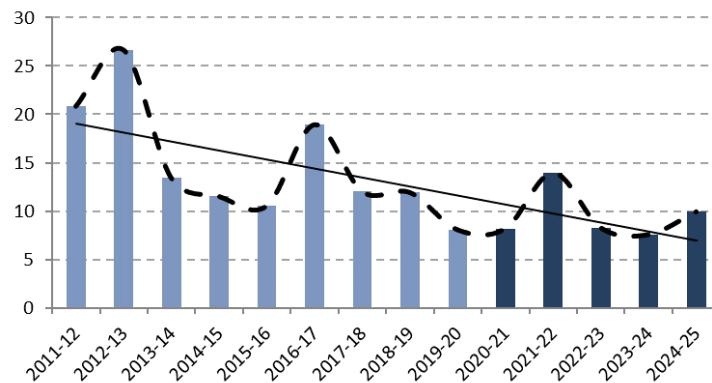
Our planned investment will help us to deliver on a number of the outcomes and associated performance commitments:

- **Investing for tomorrow**
  - ✓ Unplanned outage
- **A flourishing environment**
  - ✓ Pollution incidents
- **A smaller footprint**
  - ✓ Operational carbon

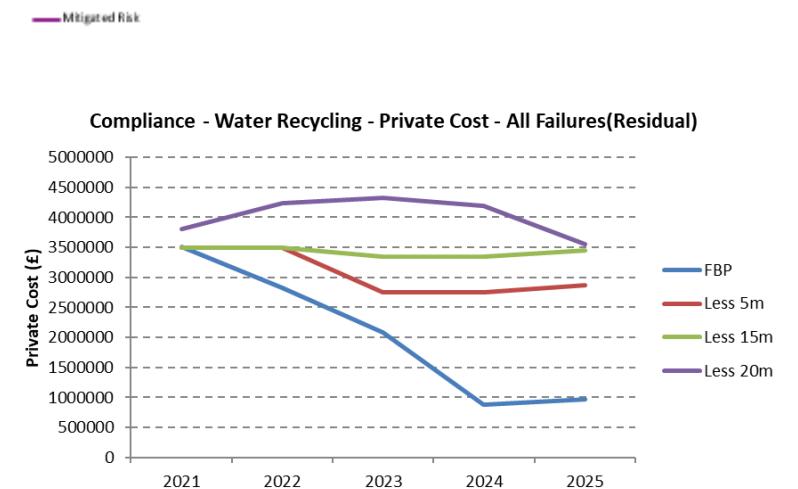
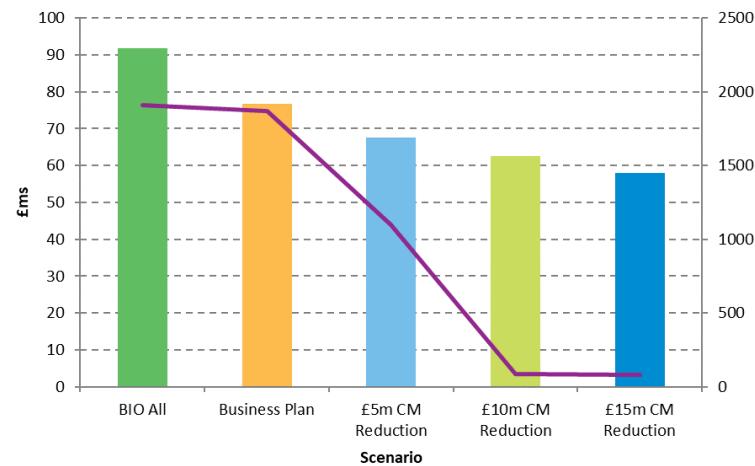
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## If we change our planned level of investment

### HISTORIC AND PROPOSED EXPENDITURE

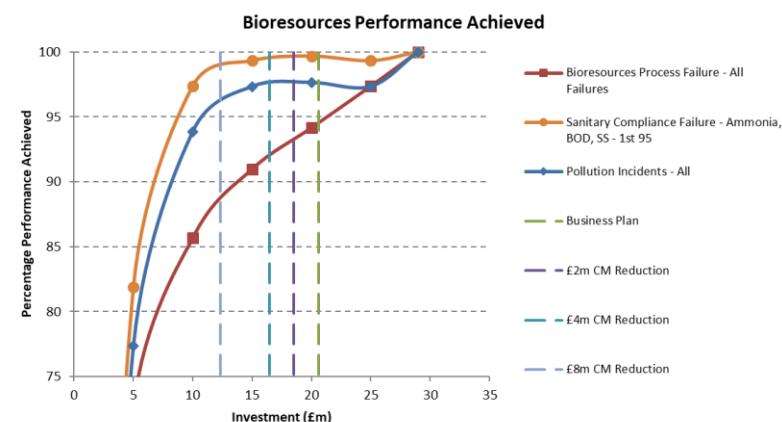


### IMPACT ON AMP7 PERFORMANCE



This shows the impact at a portfolio, below we detail the impacts at an asset group level

### ASSET GROUP EXAMPLE



This is a subset of the portfolio

### UNDERSTANDING THE RISK POSITION

A reduction in the availability of sludge treatment would lead to risks including:

- final effluent compliance;
- high sludge stocks within process tanks and elevated mixed liquor levels in activated sludge plants leading to an increasing risk of process over loading;
- additional stored sludge as raw cake increasing risk of odour complaints;
- increased 'end to end' unit costs of treatment due to double handling;
- diverting sludge away to other methods of treatment or third parties (which may not be available) reduces the generation of renewable power; and
- lower quality products through use of temporary treatment plants.

### CHANGES IN AMP7

We are targeting greater efficiency, with more than 90% utilisation of assets, this will require minimal down time and enhance monitoring and planning.

### CHALLENGES AND RISKS FOR FUTURE AMPs

Maintaining the confidence of farmers, wider agricultural stakeholders and customers is critical. This primary disposal route is sensitive to public perception. It is therefore we plan for the replacement and refurbishment of these technological advanced assets ahead of failure.