Appendix:
Internal Sewer Flooding

YKY-PR24-DDR-43-OC-ISF-appendix

YorkshireWater

Contents

1. Summary

This response is concerned with the performance commitment (PC) for internal sewer flooding (ISF). Whilst we are supportive of protecting our customers through a common performance commitment, we have identified multiple issues with the application of the common target of industry median in the PR24 draft determination. Yorkshire Water has not been sufficiently funded at PR19 or in the draft determination to reach a median industry position because of significant exogenous regional factors, namely the number of cellared properties, percentage of combined sewers and rainfall, which when combined affect us more than other companies.

The high instances of ISF in the Yorkshire region are not due to a lack of investment or operational interventions. We consistently have invested more than the industry average for below ground WWN+ assets, and have invested more than our allowance in base, which is where all our ISF investment is funded from. So far in AMP7 we are £180m higher than our allowance for WWN+ base from a totex perspective (based on APR24 submission table 4C). Furthermore, when you consider the performance improvement delivered, our investment can also be seen as comparatively efficient to the rest of the industry.

Benchmarking carried out demonstrates that Yorkshire Water historically has carried out the same type of or an even broader range of activities as other water companies. This is also clear from our collaborative cross company discussions. We carry out a highly targeted programme of proactive operational activities to minimise the likelihood of incidents whilst also continuing to resolve defects on the local combined sewer small diameter assets in and around cellared properties in particular. And we have instigated the largest property level sensor deployment across companies (40,000 installed in high-risk areas) to react to alerts and prevent internal sewer flooding. In line with the rest of the industry, we are transitioning to operating our network with greater visibility and insight through utilising sensors to target and direct timely interventions as a key part of our AMP8 plans.

Best practice targeted application has led to significant improvements since the end of AMP6. However, despite this investment we have not reduced incidents to the performance commitment level (PCL) set in AMP7. Our evidence indicates that within the Yorkshire region, ISF is significantly impacted by other external factors which affect other water companies to varying extents (which include the percentage of combined sewers, the number of cellars/basements and rainfall). Yorkshire Water has not been sufficiently funded at PR19 or in the draft determination to reach a median industry position because of these factors.

Critically, it is how these factors combine as indicated in our econometric modelling that influences our performance. Econometric modelling carried out by Economic Insight identified that number of cellared properties is statistically the most material driver of internal sewer flooding. Independent analysis undertaken by Edge Analytics indicated a disproportionate percentage of properties that have cellars are in our region compared to other water companies. If Yorkshire Water had an average number of cellars, modelling indicates our performance would be in the region of 1.46 to 1.52 per 10,000 connected properties for 2022/23. This is significantly lower than our performance of 2.67 (per 10,000 connected properties for 2022/23). In general, we are underperforming against our industry peers because of these significant, exogenous regional factors.

We therefore seek to agree an appropriate stretch PCL for key service measures in internal sewer flooding that is not common across the industry. Common targets fail to adequately account for our exogenous regional factors that are beyond Yorkshire Water's management control. The strong engineering rationale and econometric modelling outlined in subsequent sections of this document recommends the Yorkshire Water baseline for these PCLs are revised to 2.21 ISF incidents (per 10,000 sewer connections) at the start of AMP8 compared with a common PCL for AMP8 of 1.31.

This regional approach is also supported by our recent customer research, with 67% of customers agreeing Ofwat should adjust the targets for regional circumstances and 62% feeling it is fair to do so.

We believe this document evidences why a common PCL based on the proposal in the draft determination is not appropriate to Yorkshire Water. Our case is set out over the following chapters:

- Section 2: PC change required.
- Section 3: Historical performance and investment.
- Section 4: Our best practice operational interventions.
- Section 5: Our business plan econometric modelling.
- Section 6: Factors affecting ISF – our unique position.
- Section 7: Customer support for our proposal.

Ofwat did not engage with our evidence for setting a company specific ISF target in our October submission, however Ofwat has commented on related parts of the DD and hence we have provided commentary to counter statements made in these, such as:

- Our cost adjustment claim for combined sewers in how they relate to ISF in section 6.3; and,
- The ISF methodology regarding the PR19 baseline and climate resilience funding in section 3.4.

2. PC change required

We are re-stating the position set out in our October submission with further evidence. Ofwat did not engage with our evidence for setting a company specific ISF target in our October submission, however Ofwat has commented on related parts of the DD and hence we have provided commentary to counter statements made in these, such as:

- Our cost adjustment claim for combined sewers in how they relate to ISF in section 6.3; and,
- The ISF methodology regarding the PR19 baseline and climate resilience funding in section 3.4.

Our evidence indicates that within the Yorkshire region, ISF is significantly impacted by external factors which affect other water companies to varying extents. Instead of a single common target for all companies, our research shows that the regulator should consider a bespoke target which appropriately reflects these factors.

The strong engineering rationale and econometric modelling outlined further below recommends the Yorkshire Water baseline for these PCLs are revised to 2.21 ISF incidents per 10,000 sewer connections at the start of AMP8 compared with a common PCL for AMP8 of 1.31.

Table 1: AMP8 Business Plan Targets and OFWAT DD Target

Summary of changes to the ISF performance commitment levels					
Unit of measurement:	Number of internal sewer flooding incidents per 10,000 sewer connections				
	2025-26	**2026-27**	**2027-28**	**2028-29**	**2029-30**
October 2023 business plan submission	2.204	2.134	2.075	1.911	1.757
January 2024 usiness plan resubmission	2.204	2.134	2.075	1.911	1.757
Ofwat's draft determination	1.31	1.29	1.24	1.20	1.16
YKY draft determination representation *	2.21	2.14	2.08	1.91	1.76

**Please note the difference between Oct BP submission and YKY Draft Determination Representation is a forecast change in the normalisation factor (Number of sewer connections). The proposed incident numbers remain the same.*

Exogenous variables have been used in econometric modelling to determine an expected performance range (outlined in section 5). Due to the importance of internal sewer flooding to our customers, we have then stretched our target further, beyond the modelled econometric performance range. We therefore propose a 20% improvement in ISF across AMP8 which goes beyond Ofwat's proposed 10% incident reduction from 2024-25 to 2029-30.

2.1 Application of cap & collar

This PCL can be significantly affected by extreme rainfall which can fall at any location across the region and exceed the capacity of the drainage system. The latest evidence points to greater extremes in rainfall which creates a greater risk of flooding with the associated impacts on risk of achieving the targets proposed. We propose the introduction of a cap and collar at the standard level of 0.5% of wastewater regulated equity, or the reintroduction of an allowance for extreme weather events that recognises the limitations to which most sewer systems have been designed to.

There is currently no collar on this PCL (or for external sewer flooding), nor does the definition for ISF include any limitation for extreme rainfall (which was in place previously but removed). Whilst we accept Ofwat's statement that this is a well-established performance commitment, extreme rainfall, such as seen in 2007, could flood 100s or 1000s of properties in a single event and is out of our control. Using an ODI performance penalty rate, internal sewer flooding to 1000

properties from an extreme event (on top of our normal performance) would result in a penalty of over £60m. Such an event would be outside our control and drainage systems have never been designed to cope with such an event. We therefore propose to set a collar at the standard level of 0.5% of wastewater regulated equity.

If there is a concern that no further investment would take place if a collar was reached (due to extreme rainfall), a shadow reporting with the extreme event removed could be used to demonstrate continued performance, investment and provide assurance. Alternatively, the definition for extreme rainfall could be reinstated that recognises the limitations to which most sewer systems have been designed.

3. Historical performance and investment

3.1 Comparison of our historical performance

Over the last eight years, our internal sewer flooding incidents have been on a sustained downwards trend. Since the end of AMP6, despite challenges that are outside of our control, we have significantly closed the gap in ISF performance in comparison with other water companies.

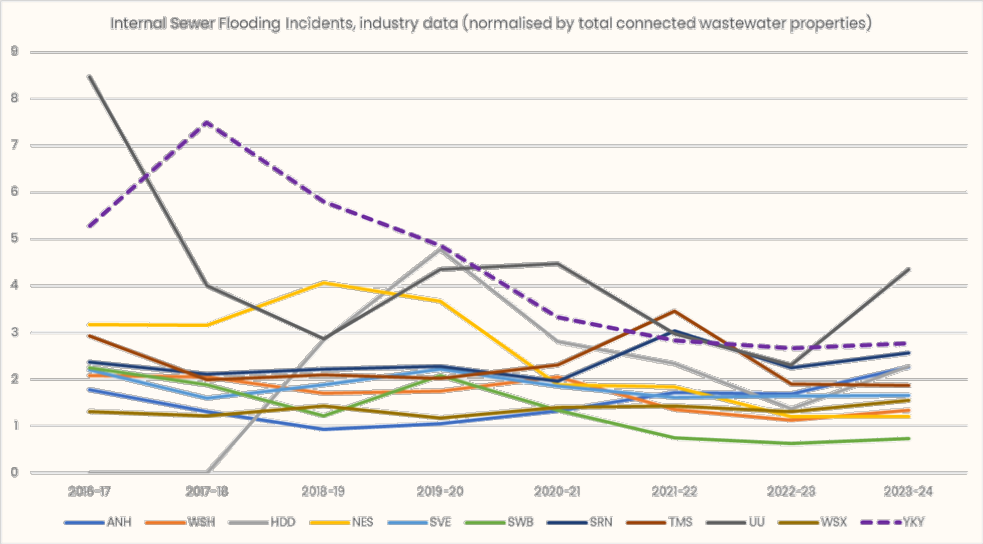


Figure 1: Our comparable performance over the last 8 years (ISF)

3.2 Comparison of our historical investment

Our vast improvement in operational performance is a result of Yorkshire Water consistently investing more than the industry average for below ground WWN+ assets and more than our allowance. So far in AMP7 we have invested around £180m more in our base allowance for WWN+ from a totex perspective (based on APR24 submission table 4C).

We recognise that investment to address other causes is held within wider data captured in the APR data. Figure 2 below shows normalised WWN+ totex below-ground investment for the last 4 years alongside the normalised ISF performance. Yorkshire Water consistently invests more than the industry average into its Network; only Southern Water and Thames Water invested more.

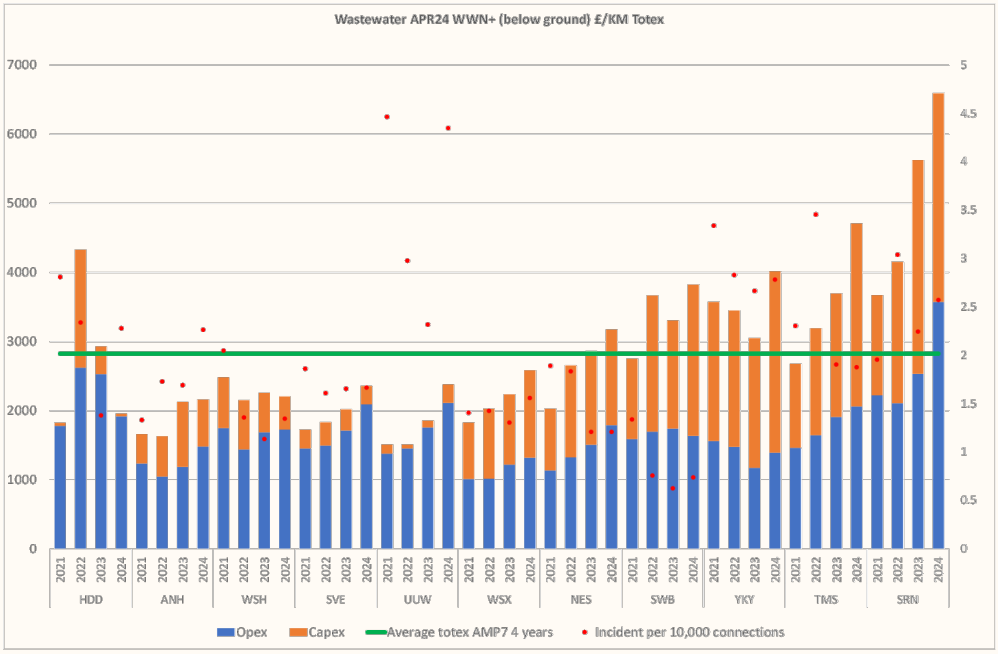


Figure 2: Comparative normalised investment in AMP7 and the number of internal sewer flooding incidents

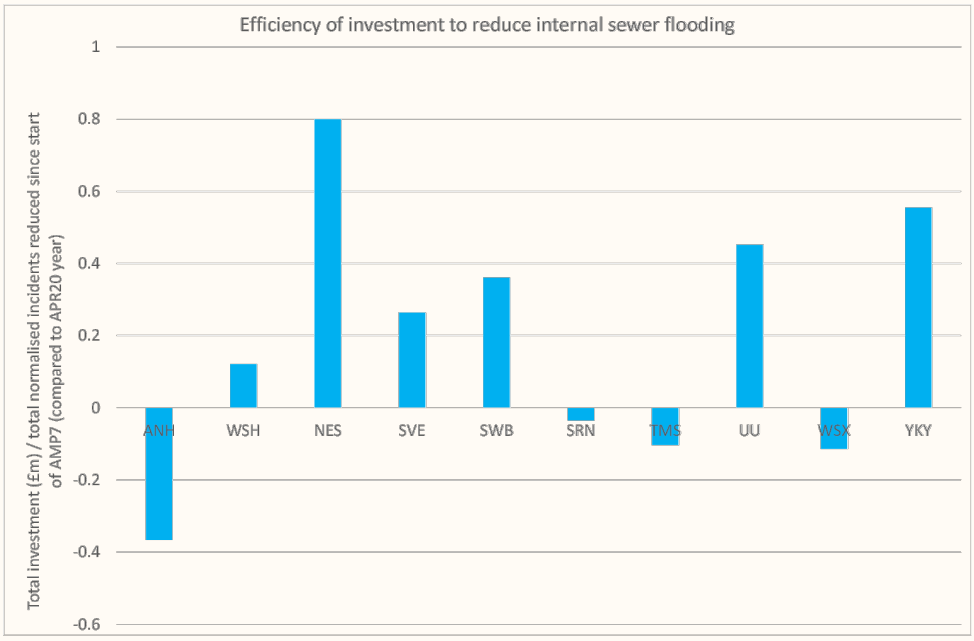
The graph indicates that typically there are broadly similar levels of operational investment. Despite investing heavily and beyond the allowed revenue in this area, we still experience high levels of internal sewer flooding compared to others, as shown by the red dots. South West Water invested comparable levels to us, but their internal sewer flooding incidents were low (and historically have been low). Anglian Water invested significantly less, yet their performance on average sits within the 1.5 to 2 band (per 10,000 connected properties). Neither company experience the high level of exogenous factors in combination (high percentage of combined sewers, cellars or urban rainfall) compared with Yorkshire Water. The graph potentially indicates that investment per se does not influence the performance and rather the wider exogenous factors play a crucial role.

3.3 Comparison of our historical performance and efficiency with other water companies

When considering the overall improvement since the start of AMP7 vs investment in the wastewater network, our investment can also be seen as efficient. Figure 3 shows that for the level of investment, only Northumbrian Water have delivered a greater level of improvement, with some companies' performance worsening.

This is calculated as total improvement (sum of improvement in years 1 to 4) compared with the outturn in Year 5 of AMP6 divided by the investment over that period of time. The results highlight our efficiency in driving improvement and supports that we are deploying the right kind of interventions to drive our improvement.

Figure 3: Comparative efficiency in driving a reduction in internal sewer flooding incidents based on improvements since the start of AMP7 and investment



3.4 Investment required to achieve industry median position

3.4.1 Funding shortfall to achieve the 2024-25 baseline position

Yorkshire Water has not been sufficiently funded at PR19 or in the draft determination to reach a median industry position because of significant exogenous regional factors, namely the number of cellared properties, which affect us more than other companies.

Ofwat state: "We set the 2024-25 baseline position aligned to the PR19 2024-25 PCL (1.34) for all companies ... We consider this is achievable yet stretching because six of 11 companies forecast to deliver or outperform this level.. Historical outturn performance demonstrates that companies can deliver performance improvements to internal sewer flooding in line with the PCL stretch. This is shown by a 28% reduction in internal sewer flooding incidents between 2017-18 and 2022-23, which is greater than the 10% incident reduction companies are challenged to deliver from 2024-25 to 2029-30."

We agree companies should be able to deliver a 10% incident reduction from 2024-25 to 2029-30; indeed we have delivered a more than 40% improvement between 2019/20 and 2023/24 and propose a 20% reduction in our AMP8 Business Plan. We have significantly invested since the start of AMP7 to drive a major improvement in performance, investing beyond most of the rest of the industry and beyond our allowance as discussed above. We outline the breadth and depth of those operational activities below in section 4. However historical allowances have not been sufficient to allow us to achieve the 2024-25 baseline position given the exogenous factors we face regionally (explained further in section 5 and 6).

The changes in base allowances for AMP8, as determined by Ofwat's econometric modelling provided a circa £40m increase, with the inclusion of urban rainfall as a driver. Our evidence from the econometric modelling demonstrates that urban rainfall alone does not consider the factors we face, in particular for combined sewers and high cellar proportions in those areas. This circa £40m will only partially contribute to meeting Ofwat's proposed PCL. In Year 4 of AMP7, we saw over 90% of flooding occur in new locations. To go further and meet the targets set by Ofwat in the draft determination, we would need significant further investment.

To place Yorkshire Water in a more comparative position with other companies we would need to vastly reduce the number of cellars or at least remove the risk that a cellar could flood. To do this we would need to prevent the mechanism of flooding; either exfiltration from the combined sewer seeping through the cellar walls or a direct connection surcharging back, both typically linked to a blockage occurring in the small diameter combined sewers.

Our own surveys indicate we have circa 260,000 cellars. A high-level costing exercise shows that to tank a cellar internally and prevent seepage being able to enter the cellar at half of these would cost circa £1bn. Halving the number of cellars would bring us roughly in line with the industry average and would also very approximately halve the number of ISF events occurring in cellars. This combined with our already planned AMP8 investment (monitors, proactive rehabilitation and others – see section 4.3) would place Yorkshire Water performance in the region of the draft determination target. We do not however propose to develop this approach further as we do not believe this is good value for customers.

3.4.2 Climate change funding

Ofwat state: "We have also provided all companies with a climate change resilience uplift to address their priority issues relating to flooding and power resilience. We provide such funding in line with our policy approach that companies should manage all external risks, as they are better placed to do so than customers. We expect this investment to support the delivery of our proposed PCLs for internal sewer flooding levels. Companies should not expect to receive relief from the impacts of underperformance where exogenous events occur."

We recognise that £15m has been offered to provide further climate change resilience and that this should be used to support internal sewer flooding. When reviewing the root-cause of ISF incidents, less than 1% are linked to assets where we could target intervention (e.g. Sewer Pumping Stations - SPS), with the rest spread across our network. We propose to use a proportion of this funding to improve power and fluvial flood resilience at pumping stations, which would start to address some of this risk, and to develop real-time network interventions to increase capacity and resilience in our network assets (gravity and pumped). These interventions are about improving our resilience to climate change. Whilst we do envisage a benefit to ISF and other PC measures, we have not included the benefit in our PC forecast, as we see this funding providing limited protection against extreme events, which are not included in our projected performance levels. For further information on our plans in this area, please see our wastewater resilience enhancement case.

To summarise this section, Yorkshire Water have made a considerable investment in the network, over the industry average and beyond our allowances, and seen a notable improvement. However despite this, and the cost-effective practices outlined in the following section, we are still not near the industry median position. Section 5 explains how this has been demonstrated to be a result of exogenous factors. Without reflecting the impact of exogenous factors on Yorkshire Water's PCL, Ofwat are setting a target that is entirely unachievable.

4. Our best practice operational interventions

4.1 Our activities to address endogenous and exogenous factors over the last four years

The above-average level of investment highlighted in the previous section corresponds with the volume and vast breadth of activities we carry out to reduce internal sewer flooding.

We have continued to significantly invest in reducing sewer flooding and blockages per se since Year 4 of AMP6, and have subsequently seen improvements in reduced incidents, particularly from other causes. Our activities are similar to those completed by other companies, and in some circumstances, we are taking a leading approach in driving targeted innovation relevant to the combination of factors that create our unique regional circumstances. We compare the types of activities being undertaken by a number of leading water companies to ourselves to address internal sewer flooding and blockages in section 4.2.

We summarise in Table 2 our activities which for internal sewer flooding particularly targeted high combined sewer areas with high proportions of cellars, with higher-than-average regional rainfall and Food Service Establishments (FSEs). FSEs are associated with increased risk of blockage due to fats, oils and grease (FOG) disposal. These activities target eliminating the problem at source, an enhanced response, elimination of repeat incidents and our broader management and governance. This table demonstrates the significant level of effort and expenditure undertaken on targeted activities and how our broad sewer programme has evolved.

We have visited hundreds of thousands of high-risk properties each year to inspect, flush and identify where repairs are required, even to minor defects. To date in AMP7 we have undertaken 12,447 repairs across years 1-4. These repairs do not count towards our renewal rate but are cost beneficial and targeted to reduce the likelihood of internal sewer flooding. Our work includes the use of customer sewer alarms (close to the properties where they can be installed) in combined sewered and cellared areas. With 40,000 installed by the end of Year 4, we cleared 2,500 blockages in Year 4 and anticipate a higher clearance rate in Year 5 (as we gain the full benefit from the sensers installed in Year 4). Our work to target repeat incidents has also been successful and remains a key focus with a significant reduction since Year 1 of AMP7.

Table 2: Overview of the activities undertaken and developed in AMP7 to reduce internal sewer flooding (✓ indicates activity started / continued in relevant year).

Activities	Year 1	Year 2	Year 3	Year 4
Eliminate at source				
Investment in proactive schemes to prevent initial flooding incidents occurring	*£20.4m*	*£17.8m*	*£10m*	*£18.5m*
Further investment in network reactive maintenance	*£23.2m*	*£23.2m*	*£20.2m*	*N/A*
Carried out sewer investigations at properties with a higher risk of internal sewer flooding	150,000	261,116	99,275	131,042
Total sewer investigations at properties	178,000	289,707	99,275	131,042
Repairs carried out following investigations	2,415	3,599	1,947	4,486
Improved targeted approach for proactive surveys was used from Year 3, to identify defects	N/A	N/A	116% more	36% more
Improved targeted approach for proactive surveys was used from Year 3, to identify blockages	N/A	N/A	80% more	40% more
Proactive sewer cleansing and desilting	170km	160km	97km	450km
Customer sewer alarms installed (previously gully monitors)	Pilot	4,000	16,000	40,000

Activities	Year 1	Year 2	Year 3	Year 4
Blockages cleared due to customer sewer alarms	n/a	n/a	600	2,520
Behavioural change - e.g. Campaigns, letters (l), home visits, communications (comms £m)		32,064 (l) £0.3m comm	18,621 (l)letters	11,943 (l) £0.9m comm
Sweep Jetting / flushing close to properties		58,383 props	N/A	40,125 props
Defects Identified following survey	Not available	Not available	2,714	5,319
Blockages cleared due to proactive surveying (includes Sewer Maintenance Programme & Sewer Cleansing)	Not recorded	Not recorded	3,241	4,247
Enhanced Initial Response				
Creation of the Operational Performance Team	✓	✓	✓	✓
Developed and enhanced a competency framework for operational roles	✓	✓	✓	✓
Creation of a mobile application to capture evidence of investigations	✓	✓	✓	✓
Optimal flooding process updated and used to track performance at each stage, weekly.	✓	✓	✓	✓
ISF response to customers has improved	N/A	14.4 hours	5.9 hours	< 4 hours
Elimination of Repeats				
Early warning approach for incoming ISF incidents	✓	✓	✓	✓
Implemented a “pump out management” process	✓	✓	✓	✓
The Fast Track Civils project supported by our Service Partner Amey to respond to ISF incidents	✓	✓	✓	✓
Improved mitigation options programme	✓	✓	✓	✓
Our Escape Hubs have been enhanced		✓	✓	✓
Introduced a ‘Risk Reduction Hub’		✓	✓	✓
Enhanced escape report assurance process		✓	✓	✓
Repeat incident standdowns.			✓	✓
Regional performance trackers for technicians.			✓	✓
Prioritised approach for Competency Assessments and Escape Training.			✓	✓
Weekly root cause analysis review			✓	✓
Repeat incident health & Escape Report (ER) Assurance KPI Review			✓	✓
12 month rolling repeat rate for ISF	18.0%	7.7%	5.7%	7.7%
"Tactical Team" created to tackle complex repeat incidents			✓	✓
Management information & governance				
Created a regular reporting process from the Sewer Flooding Team and Data Science	✓	✓	✓	✓
Enhanced governance approach through hubs to understand Root Cause Analysis of failure	✓	✓	✓	✓
Provide regular, bespoke communication material to relevant teams and colleagues	✓	✓	✓	✓
Training for new Network Escape Technicians on Ofwat guidance	✓	✓	✓	✓
Increased the Sewer Flooding Team size by 30%	✓	stable	✓	stable
Infrastructure Delivery Assurance Group	✓	✓	✓	✓

Activities	Year 1	Year 2	Year 3	Year 4
APR24 - established a review panel within the Sewer Flooding Strategy Management team				✓
Increased collaboration across water companies			✓	✓

4.2 Comparison of our activities to other water companies

Our work aligns closely with activities carried out by other companies and, in several areas, surpasses. We regularly hold best practice discussions with our colleagues in other water companies to understand their activities and share ours, recognising what they are targeting and why.

To demonstrate the innovative nature of our approach we have documented a comparison between ourselves and a number of the top performing companies for internal sewer flooding or blockages as shown in Table 3 below. This analysis utilised the water company PR24 submissions to capture activities being currently undertaken to reduce the likelihood of internal sewer flooding resulting from other causes (focusing on published information). Whilst not all activities will be noted in a water company submission, the relative breadth of these activities that we undertake demonstrates we are deploying the right tactics to address internal sewer flooding whilst tackling the exogenous factors.

Table 3: Comparison of our activities against leading companies in aspects linked to managing internal sewer flooding. *Note comparison developed from other water company submissions and expect not all activities to have been included.*

Activities Overview	NES	NWT	SVE	SWB	WSX	YKY
Customer education	✓	✓	✓		✓	✓
Business visits and education	✓					✓
Sensors on properties						✓
Sensors on manholes	✓	✓	✓	(✓)	✓	✓
Sensors where repeat blockages			✓		✓	✓
Prioritise hotspots for ISF & blockages	✓	✓		✓	✓	✓
Repeat blockage focus	✓		✓			✓
Targeted CCTV	✓				✓	✓
Auto-coding CCTV					✓	(✓)
Proactive inspection for service, condition incl. collapses	✓	✓				✓
Proactive jetting and cleansing	✓	✓	✓	✓	✓	✓
Tree root cutting					✓	✓
Patch repairs and relining of assets	✓				✓	✓
Enhanced staff training					✓	✓
Increased resources	✓					✓

Key: ✓ indicates activities undertaken, (✓) activities recently commenced

4.3 Overview of our proposed plans to reduce internal sewer flooding in AMP8

We are targeting the continued improvement in our internal sewer flooding performance via three key thematic areas through activities that are endogenous to Yorkshire Water and within our management control.

We are taking a blended approach of operational and capital interventions, reliant on building and creating ever better data to support decision making. We will deliver these through organisational improvements, data confidence, innovation and on the ground interventions. Our approach for AMP8 is summarised in Table 4:

Table 4: Overview of the main activities we will focus on in AMP8, building on our ongoing AMP7programme

Thematic Area	Summary of Activity
Understand the Problem – Data Confidence & Visibility Innovations	Our strategy for AMP8 is to build on the use and installation of sensors developed through AMP7, to deliver a lasting improvement to our network and service levels. Whilst we can't stop the impact of an inherited legacy of combined sewers and cellars without significant investment, we hope to improve our ability to respond to such events through effective data and analysis from planned sensor installations. Our sensors will monitor main sewers and properties, targeting locations based on flood risk. We will build on the 40,000 Customer Sewer Alarms (CSA)s currently installed in addition to deploying main sewer sensors. Analysis of these sites will determine when site visits are needed, such as for blockage removal, silt removal, optimising cleansing programmes for maximum value. We are developing platforms and protocols to provide / improve predictive analytics, validate data and enhance decision-making. By using machine learning and artificial intelligence, we will analyse sensor data, cross-referencing with nearby sensors and other data (e.g., weather) to enhance accuracy and understanding. Automated analysis is being developed that will enable us to move to automated scheduling. We have methods to identify forming blockages, currently being tested in a SMART pilot in Leeds with partners Stantec and StormHarvester. This trial focuses on internal sewer flooding hotspots and can be applied to external sewer flooding. We are piloting ESRI field maps to automatically update our systems, enhancing knowledge of local sewer networks around properties (which are often unmapped), which is crucial for operational teams and scheduling. We will auto-code CCTV data to expedite the coding process and accurately target defects, supporting long-term investment needs and providing geolocated pipe history. Additionally, we are trialling hybrid mapping of sewers to improve insights into drainage system locations, aiding planners and operatives and asset information.
Operational Delivery & Intervention Response	In early 2023, we launched Wastewater Networks 2.0, a transformation initiative aimed at significantly improving the quality and productivity of our end-to-end customer journey for wastewater services. The core elements of the transformation are below, which we will continue to evolve: 1. **Planning and Scheduling Improvements**: Enhancing work basket planning and scheduling through validation and prioritisation using evolving triage processes. 2. **Unified Operations Centre**: Developing a pilot platform that integrates various systems (e.g., telemetry, asset data, weather) into a single user interface to provide comprehensive critical information. 3. **Proactive Service Response**: Improving our planning and response to increasing numbers of Customer Sewer Alarms and main sewer sensors to shift from reactive to pre-emptive interventions.

	4. **Customer Contact Centre Enhancement**: Implementing a targeted up-skilling program for contact centre staff to enhance their knowledge and support capabilities, supported by experienced team members and greater reliance on digital customer interactions. 5. **Resource Optimisation**: Focusing on reducing private jobs to better address direct customer needs, supported by innovations in identifying private vs public sewers and hybrid mapping of unknown assets. Overall, this initiative aims to enhance our service delivery and operational efficiency through better planning, advanced technology and improved customer interactions so as to create the right operational response. For instance, critical to a successful resolution is a timely operational response to issues such as soft blockages and siltation which can reduce capacity. Our work to improve how we schedule and manage operational teams and the work basket will enable us to be agile in our future ways of working and respond to sensor alerts in an optimal manner - whether there are potentially several days to respond or a “blue-light” intervention is required within 2 hours. Reducing the inappropriate discharge of solids and material is also critical. We will enhance our dedicated customer campaigns and focus on education via the network protection team, including for example visiting all Food Service Establishments (FSEs) in Yorkshire’s high-risk areas.
Appropriate Capital Response that targets the root cause of the problem and seek innovative techniques to rehabilitate the network	Where we respond and find more serious defects that require a swift intervention, we are putting in place the mechanisms to enable a first fix fast track civils repair intervention to further avoid repeat incidents. We are undertaking rehabilitation trials that will improve the speed, quality and cost of lining small diameter sewers. Our spray lining trials have the potential to swiftly improve asset health where structural lining is not required. We are also supporting the work undertaken on major research programmes such as Pipebots[1]. This research provides the potential for small robots to move autonomously through a network identifying issues to inform where an intervention may be required. Whilst we are targeting other causes, we continue to target hydraulic improvements. We are testing smart water butts to optimise storage, ensuring they empty at the right times and are available for customer use when safe. This technology is valuable for residential and especially non-residential premises with larger roofs. We are also piloting methods to maximise storage use in the drainage network to reduce hydraulic flooding and overflows. An active system control pilot with Stantec and Siemens is developing protocols to utilise existing and new assets efficiently. Successful desktop tests will lead to full-scale trials.

[1] https://pipebots.ac.uk/

5. Our Business Plan Econometric Modelling

5.1 Methodology Overview

Ofwat identifies practicality, affordability or customer support as valid reasons that a common level of performance is not justified. Activity to make our exogenous factors align with the industry average would not be practical or affordable.

We recognise the benefits to Ofwat and customers in being able to directly compare company performance, and support this where a fair comparison between companies can be made. However, we remain concerned that setting some PCLs at a common level does not allow this fair comparison. Ofwat recognises differences in companies through exogenous variables in its econometric cost modelling, but these models only reflect historic cost differences. Without adjusting PCLs to reflect exogenous drivers the historic and forward-looking performance differences are not reflected. This leads to some companies benefitting from a favourable set of factors and others being overly stretched.

Ofwat's cost models are built on historical expenditure data which is independent of relative company performance and therefore solely reflect the cost differences between companies at current (and historical) performance levels. Companies with high percentages of combined sewers see higher costs (accounted for in the cost models) as well as poorer performance (not reflected in the cost models). As we set out below, the investment required to change the key exogenous drivers impacting ISF would either be unachievable or unaffordable.

We worked with Economic Insight to test the impact of four key exogenous drivers of ISF on the Yorkshire region; combined sewers, cellared properties, Food Service Establishments (FSEs) and urban rainfall. The resulting set of econometric models incorporated these factors. The econometric modelling approach was designed to align to the four criteria briefly summarised in Table 5 and Figure 4. More detailed information on this approach is held in our evidence for setting a company specific ISF target in our October submission[2].

We have tested the robustness of our models to different specifications and find that they pass relevant statistical tests using Ordinary Least Squares (OLS) and Random Effects (RE). We have updated these models since draft determination with the new results included here.

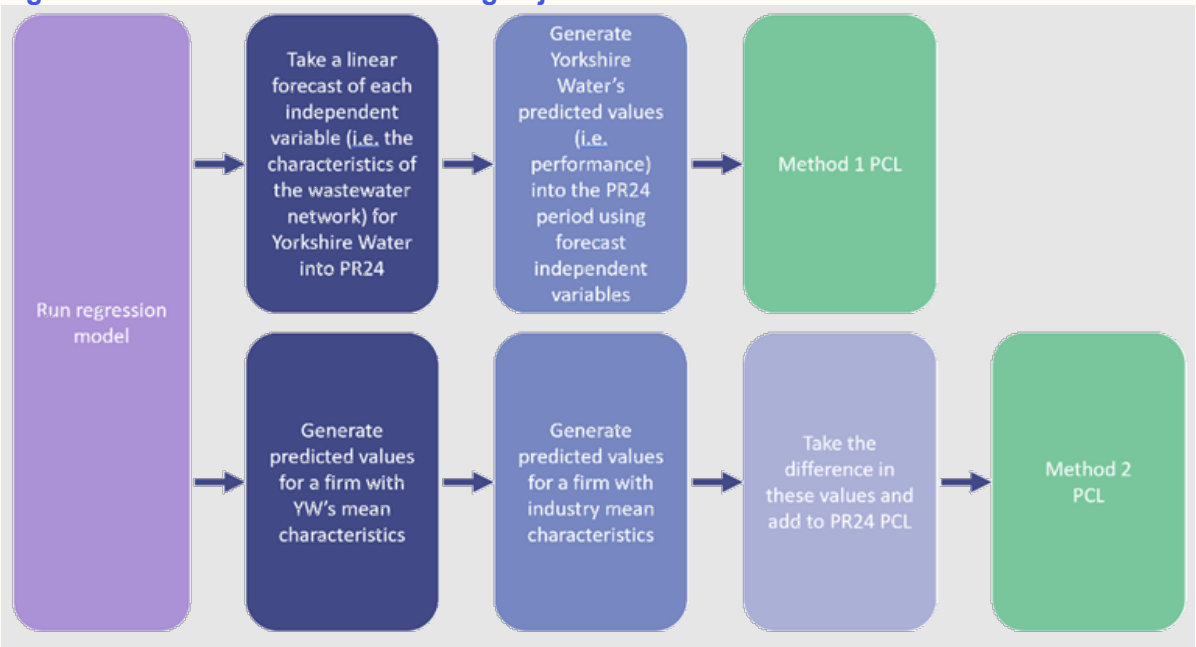
Table 5: Key elements of the econometric model and the foundational criteria

Criteria	Summary of our econometric modelling approach
The model is founded on engineering and economic rationale	The econometric model used the key exogenous drivers of ISF: i. Combined sewers, ii. Cellared properties, iii. Food Service Establishments; and, iv. Annual rainfall; The model includes a linear slight downwards trend in ISF incidents across companies over time. We do not consider that this downwards trend is driven by the three exogenous factors, because these variables do not follow a trend over time.
The input data accurately describes the determinants of performance	The input data employed in our modelling accurately describes the drivers in question. The data sources are assessed, understood and reviewed to confirm appropriate to use. This allows us to robustly estimate their impact on ISF performance.
The model is robustly estimated	Seven models were tested. The preferred model specification indicates that the proportion of cellared properties is the most material driver of ISF performance and that combined sewers, FSE and annual rainfall are also important drivers of performance. FSE is excluded in the final model however due to collinearity with other factors.

[2] *yky20_details-of-performance-commitments-revised-31-10-23* - Section 24 and appendices

The results are appropriately applied to obtain an adjusted PCL	We employed two methods to estimate an adjusted PCL to reflect our unique regional circumstances as shown in Figure 4 below. Method 1 estimates a unique PCL for Yorkshire Water directly from the econometric model. Method 2 estimates an uplift directly from Ofwat's common PCL for Yorkshire water.

Figure 4: Two methods for estimating adjusted PCLs for Yorkshire Water



5.2 Results

We ultimately found that FSEs as a variable was highly colinear with both combined sewers and rainfall and hence was likely capturing many of the same performance variations. Our final model excluded FSEs and was based on explaining ISF performance using cellared properties, combined sewers, urban rainfall and a time trend to forecast an adjusted UQ performance level for the industry that accounted for these factors.

We note that cellared properties is the most material driver of internal flooding. Independent analysis undertaken by Edge Analytics[3], used in the analysis to adjust our proposed ISF PCL, indicated a disproportionate percentage of properties that have cellars are in our region compared other water companies.

Cellars enable internal sewer flooding to occur more easily as the escape point is below ground level. If Yorkshire Water had an average number of cellars, modelling indicates our performance would be in the region of 1.46 to 1.52 per 10,000 connected properties for 2022/23. This is significantly better than our performance of 2.67 per 10,000 connected properties for 2022/23. In general, we are underperforming against our industry peers because of these significant, exogenous regional factors we have seen. For more information on these factors please see section 6, or section 6.2.2 for cellars specifically.

Since the results shared with Ofwat in our October business plan submission, the model has been updated to account for (i) the latest APR data; (ii) PR24 business plans; and (iii) PCLs set in Ofwat's PR24 draft determinations, with these updated results provided below. The updated results continue to suggest that an ISF target, which reflects the unique regional challenges that our network faces, remains above Ofwat's proposed PCL.

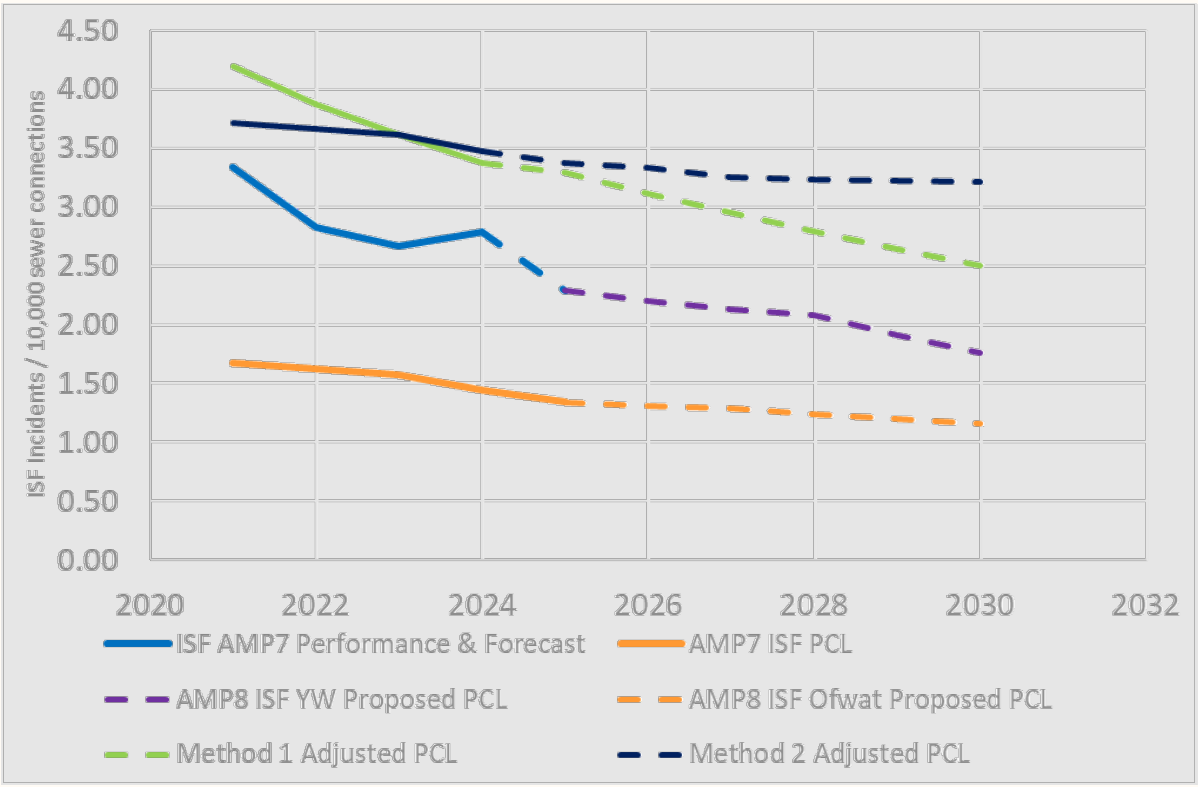
As shown in Figure 5, the updated results of our econometric modelling indicate **an AMP8 year 5 PCL of between 2.5 and 3.22 or 2.43 and 3.43** (green and black lines) ISF incidents per 10,000 connections (using Random Effects or Ordinary Least Squares respectively) would be representative of the industry average given our unique regional circumstances. This is considerably higher than the industry average of 1.27, or the industry upper quartile value of 0.98 ISF incidents per 10,000 connections. The variance in attainable targets supports Yorkshire

[3] Edge Analytics – Cellar Analysis Yorkshire Water – July 2023

Water's assertion that we would not achieve Ofwat's proposed AMP8 PCL (orange line) without significant further investment (e.g. removing cellars or preventing any water entering a cellar from a combined sewer).

Prior to the inclusion of APR2023-24 data, this range was between 1.96 and 3.44 (as communicated in our October business plan). The estimated PCL positions are slightly different as they are influenced by the generic trend across the industry where each companies normalised incidents in the main increased in 2023/24, and as such influenced the overall predictions by the two methods used.

Figure 5: Econometric modelling estimated adjusted PCLs for Yorkshire Water



Due to the importance of internal sewer flooding to our customers, we have stretched our target further, beyond the modelled level of median performance. We are setting ourselves a more challenging AMP8 target, culminating in 1.76 ISF incidents per 10,000 properties per year by Year 5 as shown in Figure 5 (purple line).

6. Factors Affecting Internal Sewer Flooding – Our Unique Position

Ofwat's six principles for the Base Cost Assessment for PR24 form the basis for our original business plan and this representation. We believe we have developed robust econometric models (principle 4) as demonstrated in section 5 and our previous submission using publicly available data. We have focused on principle 3, exogenous cost drivers that influence our performance (as included in the econometric modelling and summarised below in section 6.1).

In line with principle 5 of Ofwat's guidance, setting a stretching but achievable cost efficiency challenge relies heavily on our unique regional exogenous factors and is consistent with engineering, operational and economic rationale (principle 1) for our region as demonstrated through our econometric modelling. This is also further supported by our customer research. The following subsection details the key factors that we believe affect ISF and whether some of these factors are exogenous and drive company performance related to ISF.

6.1 Factors affecting ISF

Our analysis shows that the cost of operating a sewer network within a fixed performance envelope is directly impacted by a variety of exogenous factors that have historically not been captured in Ofwat's econometric modelling. To mitigate these factors, we have over the last 6 years undertaken significant investment and activities to reduce internal sewer flooding, targeting properties most likely to flood, in particular those with cellars in areas with a high proportion of combined sewers. Our work to reduce flooding to date is summarised in section 4.1 with an overview of additional work planned for AMP8 in section 4.3.

Key factors that increase the likelihood of internal sewer flooding include, but may not be limited to:

- The prevalence of **combined sewers,** linked with their age and general **condition.**
- The prevalence of **cellared properties** impacting the likelihood of internal sewer flooding.
- The propensity of the area to experience blockages (e.g. **food service establishments** discharges, **customer behaviour**).
- **Rainfall** in urban areas that leads to backing up, in particular when a blockage occurs and heavy or extreme rainfall can lead to significant number of properties flooding.

These factors, amongst others, are considered in Table 6 below and compared with factors experienced by other companies in section 6.2. The factors do not sit in isolation, but combined they result in a unique set of circumstances that affects our performance as indicated in our econometric modelling (section 5).

Table 6: summarising factors we believe are fully or partially exogenous

Factor	Summary of engineering explanation	Exogenous Factor not in control of Yorkshire Water
Combined sewer legacy including sewer age and asset health related to age.	Combined sewers were historically built prior to World War II and form 52.4% of our legacy sewers. These sewers also serve many of our older properties in the west of the region. We have one of the highest combined sewer to foul sewer ratios. Whilst many sewers remain in a serviceable condition, the combined sewers due to their age in particular around these older, cellared properties, may have minor defects that lead to more ragging / blockage developing and a greater maintenance requirement (but would not be considered poor condition (e.g. grade 4-5). Many of these older sewers in and around properties also have poor access to the pipes making them more difficult to gain access to or maintain.	Yes – combined sewer legacy is a historical planning decision that was not in the control of Yorkshire Water. While companies are able to build separate systems this goal is expensive and remains a long-term ambition.

Factor	Summary of engineering explanation	Exogenous Factor not in control of Yorkshire Water
	Newer drainage systems should be designed to convey foul or surface water separately, therefore issues related to surface water surcharging behind blockages should have a lower likelihood.	
Number of / proportion of cellars	Where there are cellars, e.g. 1-2m below ground level, they are more likely to flood internally compared to properties at ground level where a threshold is far higher. Access to the sewer can be problematic and new access often has to be created, leading to higher costs. Cellars were typically constructed before WWII (over 85% based on Edge analysis) and are found in combined sewer areas (and hence will also suffer from the challenges highlighted for combined sewers). Newer cellars are required to meet building regulations and therefore should not flood.	Yes – unique regional factor. Historical planning to build and retain since being built.
Rainfall	Rainfall can lead to flooding in two ways: 1. When the rainfall is heavy or extreme and the volume entering the drainage network exceeds the capacity, flooding can occur. Storm overflows provide a 'safety valve' at points but do not protect the whole system. 2. Rainfall can surcharge the network when blockages occur either due to deposition building up, soft blockages forming on minor defects or collapses. Here a small amount of rainfall can lead to flooding. It may be the case that on occasion rainfall will help to 'self-clear', e.g. if the 'head' of water behind a blockage means it will push the solids forward and not flood into a property. At cellared properties, this depth to push solids through is not the case therefore more frequent rain, and more rainfall creates the potential for flooding to occur, particularly in the cellared properties.	Yes – not in control of when it rains and if this in particular coincides with a blockage occurring that then does not self-clear.
Food Service Establishments	Establishments include restaurants, cafes, pubs, and takeaways. These establishments are concentrated in urban areas and vary significantly across different regions based on local demand, population density, and economic conditions. Food service establishments contribute fats, oils and greases to the sewer network which contribute to the formation of blockages and possible flooding.	Yes – although we can engage to try to influence behaviour.
Customer Behaviour	Accumulation of debris, fats, oils, greases, and other materials can block sewer pipes, causing wastewater to back up into homes. What customers dispose of can have significant consequences locally to their properties and further afield. When this occurs in the small diameter pipes, the likelihood of a blockage will increase. Please note that data on customer behaviour is not readily available, although the issue of the discharge of wipes has been well documented. Due to a lack of high confidence data linked to demographics, Customer behaviour was excluded from the econometric modelling.	Yes – although we can engage to try to influence behaviour.

6.1.1 Combinatory effects and discounting factors

We believe the econometric evidence and the engineering rationale demonstrates that these exogenous factors influence the amount of internal sewer flooding we and our customers experience. These factors materially impact company cost and performance in sewage networks, and in our case are working in tandem, as indicated in Figure 6. Figure 7 highlights why a blockage on a combined system, with a cellar and rainfall that can build up behind it, is

more likely to lead to internal sewer flooding compared with properties that have no below ground room.

Figure 6: An example of how exogenous factors combine to lead to internal sewer flooding, the majority in cellars.

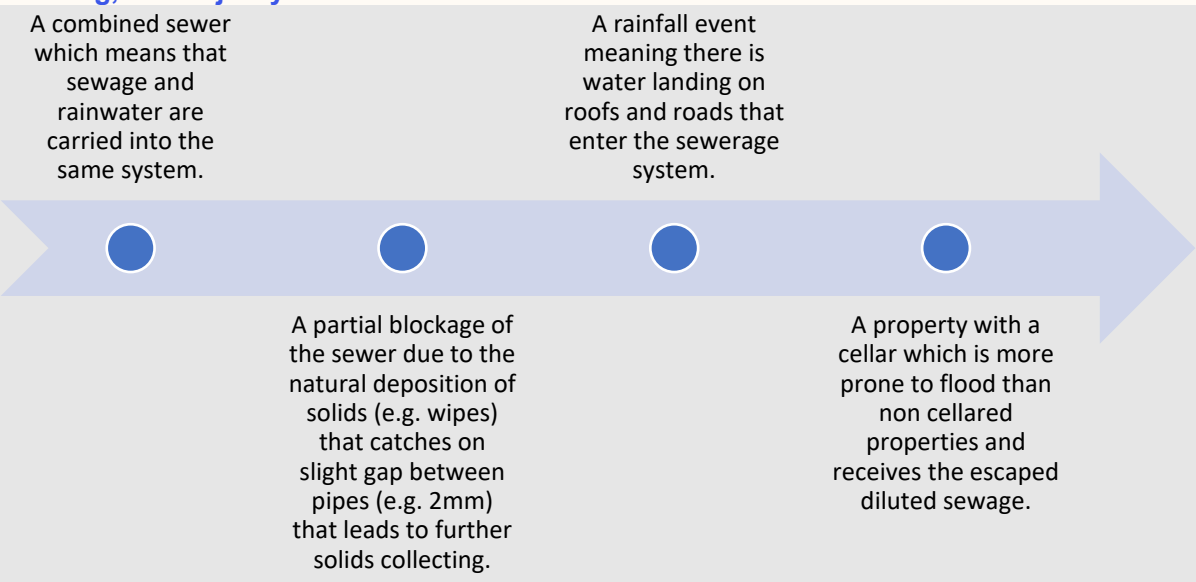
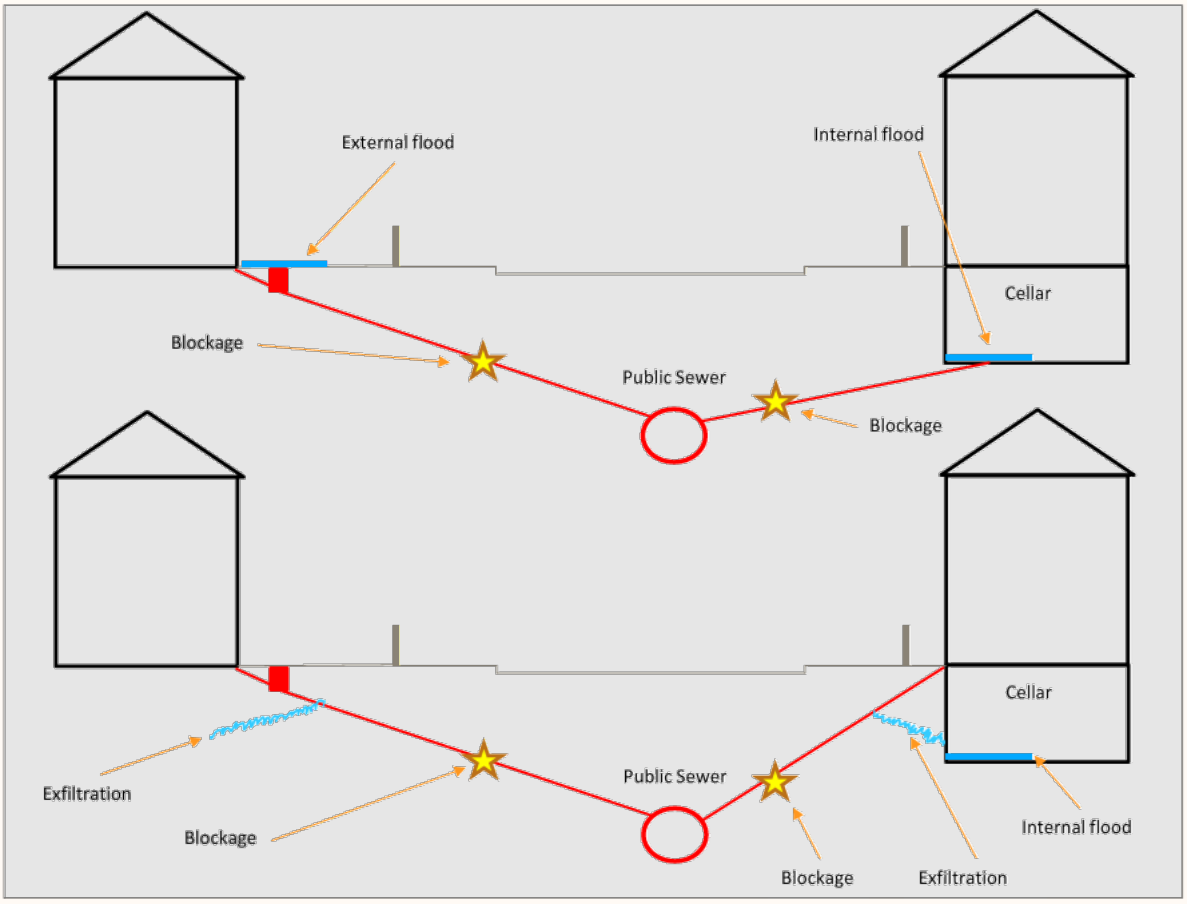


Figure 7: An example of when a blockage occurs on a combined sewer close to a property (within the responsibility of the water company)

The likelihood of a cellar flooding is far greater because of two mechanisms (direct flooding via a connection or exfiltration and seepage into the cellar).



6.2 Exogenous Factors – comparison to other water companies

Within this section we compare Yorkshire Water's exogenous factors related to the environment it operates in, that lead to higher costs and lower overall relative performance in sewer flooding, to other water companies. They are:

- Combined sewer legacy.
- High number of cellars.
- High propensity of food service establishments.
- Higher urban rainfall in combined sewers areas.
- Customer behaviour.

Table 7 illustrates the relative extent to which we are impacted by four of these five key areas in comparison to other water companies, with further evidence and narrative provided in the following subsections. Each exogenous factor is ranked according to the resulting level of internal sewer flooding that could be seen in each company's area, having a score of 1 (company most impacted) to 10 (least impacted).

As can be seen from the table, we are likely to suffer the greatest from these exogenous factors (with three reds and one orange and highest scores), followed by United Utilities (NWT). This indicates our unique circumstances and why from an engineering perspective we are more likely to be impacted than other companies, when these factors become combined (as indicated in the econometric modelling).

Table 7: summary of the exogenous factors and relative scale of impact for each water company

Exogenous factor	ANH	NES	NWT	TMS	SRN	SVH	SWB	WSH	WSX	YKY
Combined sewer legacy	6	4	1	10	9	7	3	5	8	2
Cellars	9	10	5	2	3	8	4	6	7	1
Food service establishments	8	3	2	5	7	6	9	4	10	1
Rainfall	10	8	3	9	6	7	2	1	4	5

Key: Red (1-3) greatest impact, Orange (4-6) medium impact, Green (7-10) least impact.

6.2.1 Combined sewer legacy

Combined sewers are a function of historical development. Separate systems were constructed more recently, therefore their age will be less, and condition theoretically should be better. Five of the water companies have a high proportion of separate or partially separate systems. This means the foul network should carry minimal surface water, although at times may for example take roof drainage.

We proportionally see around double the amount of flooding from combined sewer assets as foul sewer assets once you normalise for sewer length (ratio of flooding in combined vs foul is 6:1 with a sewer asset ratio of 3:1). The majority of flooding (over 85%) occurs in the small diameter combined sewers in and close to properties. These pipes are, in the majority of cases, taking rainwater that may back up behind blockages or collapses leading to flooding. The impact of this is demonstrated in our combined sewers cost adjustment claim[4], which clearly demonstrates as the percentage of combined sewers increases, so does the number of internal sewer flooding. Visually this comparison is shown in Figure 8.

At 16,266km, we have the second longest length of combined sewers out of all the water companies, and second highest proportion (Figure 9). Hence, the length of combined sewers is a contributory factor that impacts performance, and likelihood of flooding occurring. This is as a result of a blockage occurring and flows that back up due to rainfall at times in small diameter sewers.

[4] *YK46 cost adjustment claim - Figure 3.5*

Figure 8: – Location of the internal sewer flooding (on the left align) typically with the higher percentage of combined sewers (on the right)

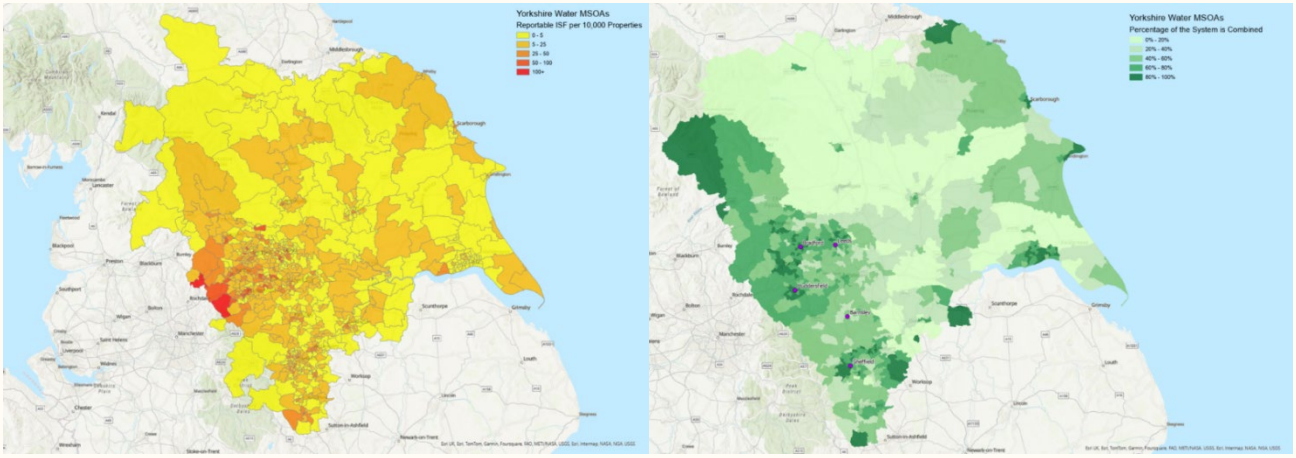
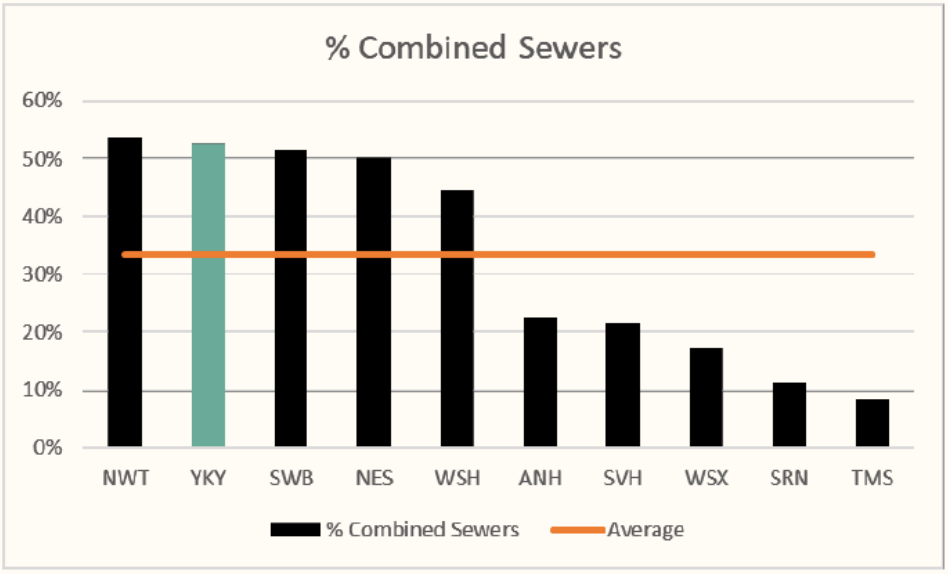


Figure 9: Comparison of water company's proportion of sewers that are combined



To conclude, a high percentage of combined sewers means there is the mechanism and situation for flooding to occur as a result of blockage and rainfall (with both rainfall and solids in the same pipe) which will be less present in separate networks.

6.2.2 High Number of cellars

Within our combined sewer areas, we have a high proportion of properties draining to the combined sewer that are cellared (as evidenced below). Along with our own detailed records of cellars in our region, we have used two further sources to indicate the proportion of cellars nationally. Our records show we have circa 260,000 cellared properties which we have identified previously by surveys in the field.

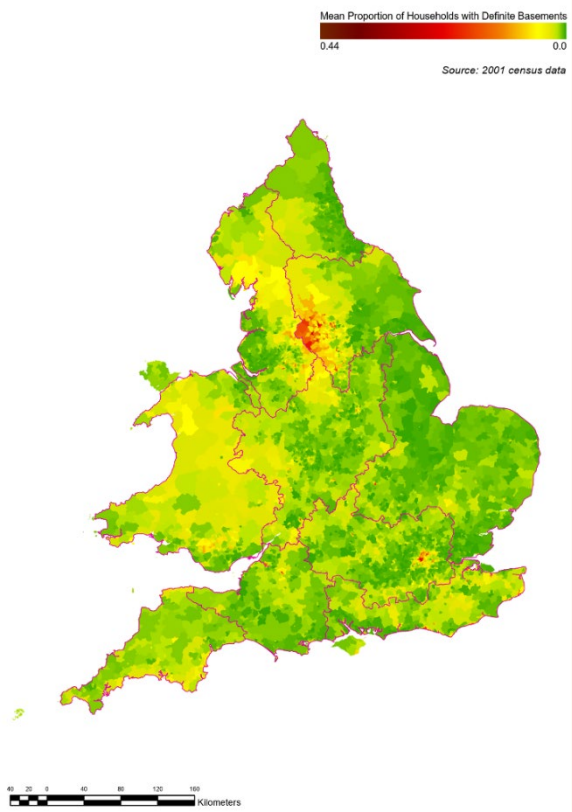
The 2001 Census survey demonstrates that compared with the rest of the country, the Yorkshire region and Manchester have a high density of cellars (shown in red in Figure 10). This is based on collected data that captured if a cellar or basement was present in a property.

Any properties with cellars / basements built after this date should be protected and comply with building regulations requirements. Building regulations recognises this risk for basements noting, "For low-lying sites (where the ground level oversight of the level of a basement is below the ground level at the point where the drainage connects to the public sewer) care should be taken to ensure that the property is not at increased risk of flooding"[5]. Building Regulations further highlight that basements should be protected from flooding directly so the sewer cannot

[5] Building Regulations Approved Document H Drainage and Waste Disposal (2015)

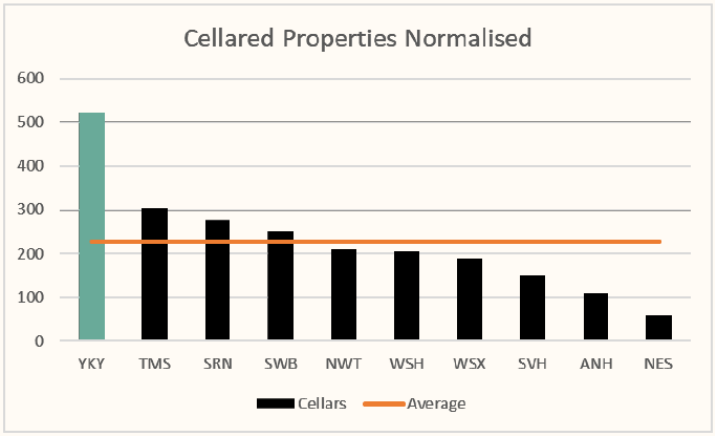
surcharge back, and any gully is positioned to prevent flooding of the property. With existing properties built prior to World War II, this is clearly not the case.

Figure 10: Distribution of cellars as recorded in the 2001 census showing an intensity in West and South Yorkshire



Independent analysis undertaken by Edge Analytics[6], included in our evidence for setting a company specific ISF target in our October submission[7], *also* indicated a disproportionate percentage of properties that have cellars are in our region compared other water companies (Figure 11). The desk-based analysis indicated we had circa 200,000 cellars. Our own surveys indicate we actually have circa 260,000 cellars. A difference between physical surveys and the data approach would be anticipated, however both indicate significant numbers of cellars and should be considered representative.

Figure 11: Distribution of cellars normalised by water company based on Edge Analytics analysis



In summary, cellars enable internal sewer flooding to occur more easily as the escape point is below ground level. If we had the industry average number of cellars (as per the aforementioned Edge Analytics assessment) then we would anticipate Yorkshire Water ISF performance to be in the region of 1.46 to 1.52 per 10,000 connected properties (for 2022/23). Our own evidence from surveys indicates the number of cellars to be greater than that estimated by Edge analytics. Adjusting for our estimate, normalisation would suggest an adjusted performance for Yorkshire Water of 1.31 to 1.36 per 10,000 connected properties, which in 2022/23 was close to upper quartile performance.

6.2.3 Higher urban rainfall in combined sewers

Higher annual rainfall occurs in the west of the region where combined sewers and cellared properties are predominant. Rainfall may sometimes help to clear blockages that start to form, therefore its influence may not be as significant as other factors, as we noted in our econometric modelling work. However, the majority of the time, water forming behind a blockage has a greater potential to lead to flooding.

Rainfall distribution ranges significantly across the Yorkshire region as indicated in Table 8[8], along with the number of days it rains and distance from the urban area. This is highlighted pictorially in Figure 12, where we can see the higher rainfall typically occurs in areas where ISF is also higher to the west of the region, in particular in the Bradford, Huddersfield, Sheffield and Leeds areas. The table also highlights the variability that occurs across the region to the east and west of Leeds, with significantly higher rainfall recorded at the west rain gauge which is

[6] Edge Analytics – Cellar Analysis Yorkshire Water – July 2023
[7] *yky20_details-of-performance-commitments-revised-31-10-23 - Figure 76 and Table 105*
[8] Uses data from the MET Office https://www.metoffice.gov.uk/research/climate/maps-and-data/uk-climate-averages/

topographically higher (262m vs 8m). Leeds residential areas are typically higher, ranging from circa 70m to 150m.

Major urban location	Bradford	Huddersfield	Leeds (west of)	Leeds (East of)	Sheffield	York	Hull	Doncaster
Raingauge distance from urban location (miles)	4	2	13	14	0	9	0	6
Rainfall Av (1991-2020) mm	1057	1041	1057	620	832	634	693	582
Rainfall > 1mm days (1991-2020)	156	Not available	156	116	133	120	125	114

Table 8: Variation of average rainfall depth (1991-2020) and "wet days" greater than 1mm rain across the Yorkshire Region

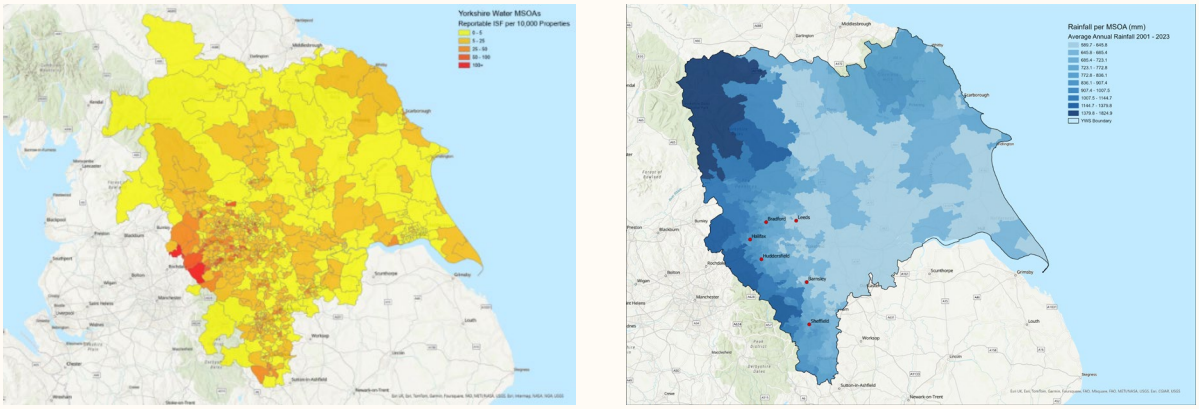
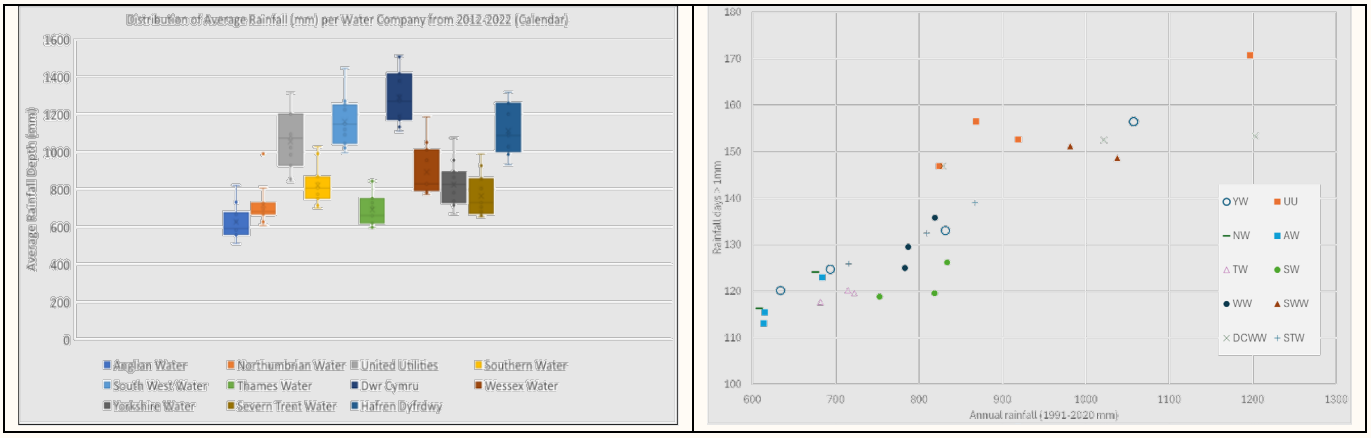


Figure 12: – Location of the internal sewer flooding on the left align typically with the higher annual rainfall on the right (noting that an MSOA typically has similar population).

In a broader comparison across England and Wales, Yorkshire's average rainfall is influenced by the drier areas (which have a lower population density as well) in the mid and eastern parts. Figure 13 shows analysis of the rainfall from 2012 to 2022 which indicates Yorkshire as a whole receives typically average rainfall compared with other water companies. The graph in Figure 13 on the right shows however at a more granular level that rainfall, particularly in the Leeds, Bradford and Huddersfield area which suffers significant internal sewer flooding, does have higher rainfall and more wet days (>1mm) than most parts of the country.

Figure 13: Average rainfall across the water companies (left) and an indication of how our rainfall when understanding the distribution is far greater in the major urban areas which also suffer the higher internal sewer flooding.



High rainfall and rainy days experienced in the west of the region, where there is a high proportion of combined sewers and cellars, leads to an increase likelihood of flooding linked to blockages occurring.

6.2.4 High propensity of food service establishments

High propensity of fast-food service establishments contributing fats, oils and greases (FOG) to the network increase the likelihood of blockages or creates the potential for backing up and slowing the flow (and movement of solids).

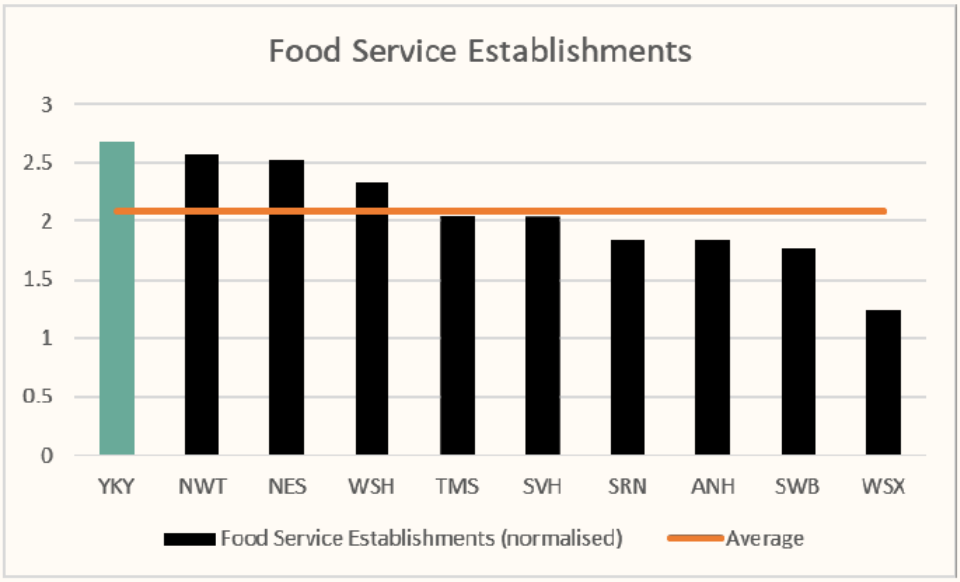


Figure 14: Distribution of FSEs across each water company.

Figure 14 clearly highlights that our region has the highest number (normalised) of FSEs based on data from Public Health England.

These establishments can be influenced to reduce what is discharged to the sewer and encourage good practice but are outside of our control in the release of FOG.

As identified under section 5.2 however, we ultimately found that FSEs as a variable was highly colinear with both combined sewers and rainfall and hence was excluded from our final model.

6.2.5 Customer behaviour

Customer behaviour in terms of disposing of items that lead to blockages can be influenced but not controlled by a Water Company. The recent UKWIR publication[9] highlighted that campaigns appear to have some impact in some cases but need to be continuous and do not eradicate the number of blockages (that may or may not lead to flooding).

Disposing of inappropriate items such as wipes, creates the potential for deposition in the sewer and blockages. This can occur in a system that is clean and in perfect condition as well as those with minor imperfections in condition which typically would not be considered for rehabilitation, for instance a stepped or slightly separated joint by 1-2mm.

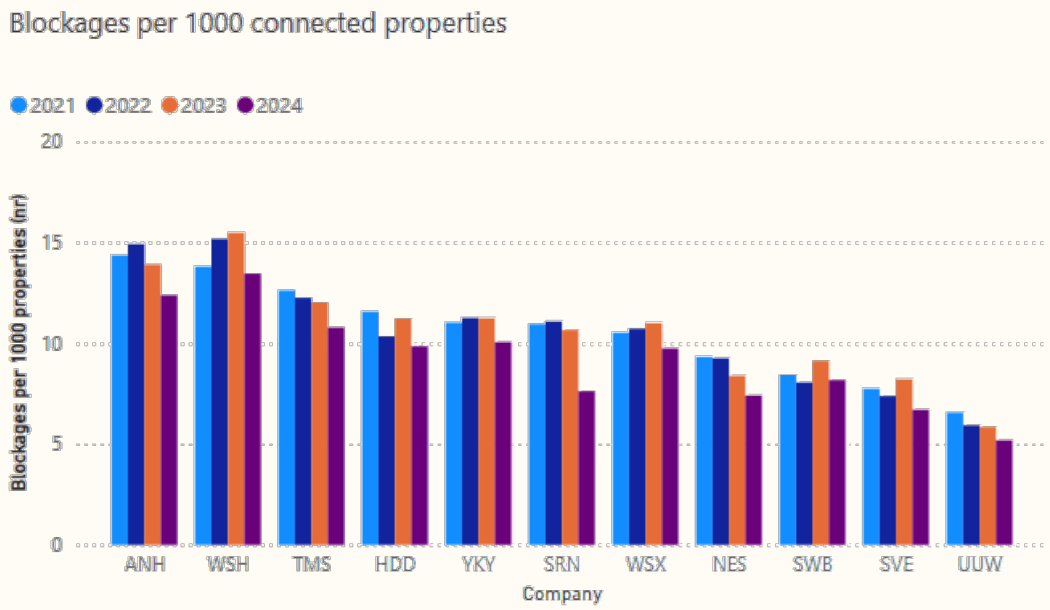


Figure 15: Normalised number of blockages by water company over a four year period.

The blockage data by company for the last four years in Figure 15 shows that we sit in the centre of the pack. Our performance has held steady over the last four years, despite significant investment in sewer flooding. This pattern is similar for majority of the companies, with all of them showing an improvement in 2023/2024.

Please note that data on customer behaviour is not readily available, although the issue of the discharge of wipes has been well documented. Due to a lack of high confidence data linked to demographics, customer behaviour was excluded from the econometric modelling.

6.3 Considering counter arguments for these exogenous factors

Based on the combination and no one single effect, it is appropriate to adjust PC targets to reflect exogenous factors where it is in customers' interest to do so. The factors (excluding customer behaviour) formed part of our econometric modelling summarised in section 5. There are potential counter arguments to the use of these factors which we commented on when submitting our *YK46 Cost Adjustment Claims.* Further to our previous points raised we summarise in Table 9 our responses to other reasons raised to discount the exogenous factors we believe should be included.

[9] UKWIR Report (2024) Learning and recommendations from customer behaviour campaigns on blockage reduction Project report reference 23/SW/01/28.

Table 9 – Overview of reasoning to not discount exogenous factors

Possible reason to discount	Response addressing reason
Annual Rainfall and Combined Sewers: A potential argument that more rainfall will flush out blockages therefore reduce flood risk from blockages.	Rainfall is likely to have a complex relationship with deposition and solid re-entrainment, and links with other factors such as combined systems conveying rainfall and foul material, that can hence block and surcharge. As blockages do frequently occur, it's more likely there is a higher chance of a blockage not being flushed, especially if the available head to force the blockage forward is minimal and an escape route to a property is readily available (as in a cellar). Dwr Cymru may be an example of this, with low internal sewer flooding but the second highest normalised blockage rate in the industry. If rainfall was expected to flush, logically the blockages would also be low.
Combined sewers: Concerns on the quality of the asset function of sewers (e.g. foul or combined) and how these are reported.	Asset function is an important record held by water companies to determine activities. Legacy sewers should typically be understood as these would form part of hydraulic sewer models which most companies have invested heavily in. Legacy data should be considered robust. Transferred sewers by function are less understood and this should mature over time as more data is collected. However, reasonable assumptions based on the legacy sewer asset function should provide a good indication to type. Sewer lengths per se are used in econometric models already.
Combined sewers: Would incentivise the construction of more combined sewers.	It would be cost prohibitive for any company to start to invest in constructing new combined sewers. The whole direction, ambition and commitment by water companies is to reduce surface water entering the drainage system, hence creating separate networks including through sustainable drainage. This is substantiated in our commitment to deliver 20% of the storm overflow programme through blue-green interventions and increasing this AMP on AMP. Where there is a concern that companies would target building combined sewers, current water company positions could be capped to provide a protection and if it was the case, disincentivise their construction.
Cellar data: Quality of the cellar data and confidence it provides a representative picture.	Our work has drawn on publicly available evidence to provide a national comparison of the number of cellars through the 2001 Census and independently by Edge Analytics. We believe both data sets are robust to indicate the proportion of cellars within each company boundary. In reference to 2001 data, properties built after this time would typically be protected from flooding where there are below ground rooms.

7. Customer support for our proposal

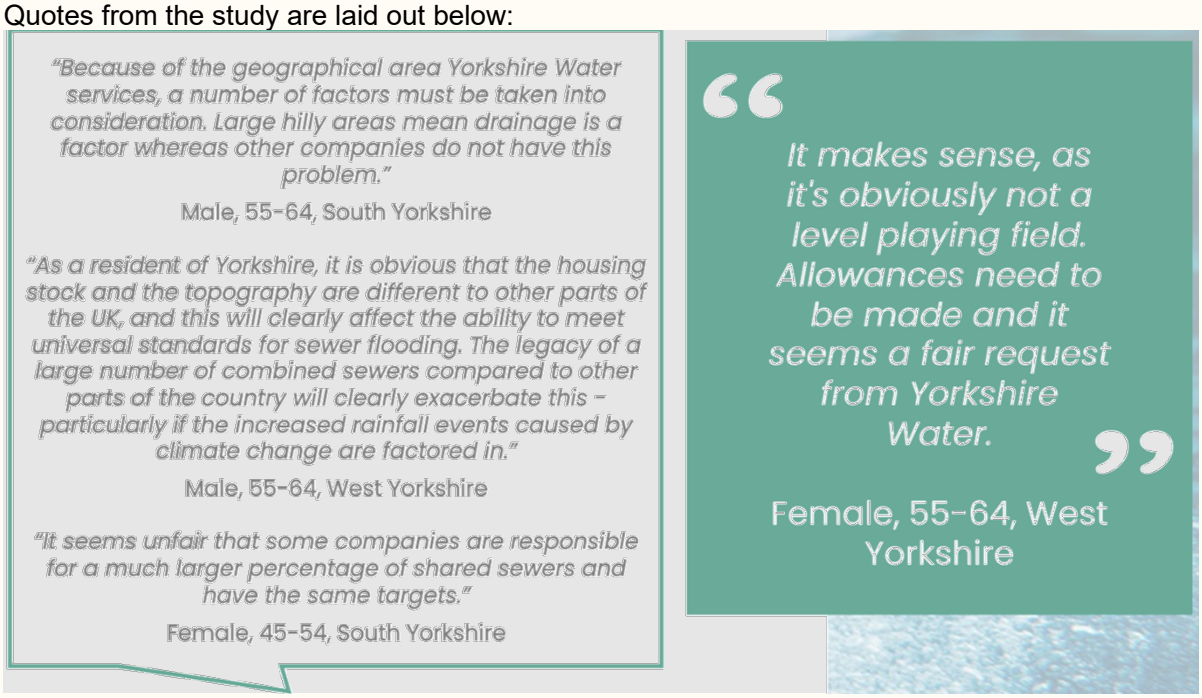
In our affordability and acceptability research, following Ofwat guidelines, we presented our plan including our planned target for ISF. This was acceptable to 78% of customers. In our own independent research, 79% of customers accepted our overall plan, including this target.

7.1 Customer engagement since business plan submission

Given the high likelihood of continually being penalised across the whole of AMP8 despite improvements in performance, we felt it necessary to understand what our customers thought about our unique position in Yorkshire with regards to ISF. We commissioned a survey[10] following our business plan Submission in October examining the fairness of common targets with 975 customers and weighted the sample to be representative of the demographics of our region.

Whilst we understand ISF is extremely unpleasant for those experiencing it and our customers want us to do all we can to avoid ISF, the study concluded that our customers sympathised with our housing-stock position and 77% of customers agreed that we should have company specific targets regarding ISF. High levels of support were attributed to the unfairness of standardised targets when all companies are not facing the same challenges and that 'Yorkshire Water shouldn't be penalised for what is out of our control or inherited'. In addition, 67% agreed that Ofwat should adjust the target to reflect region specific factors and 62% feel that it would be fair to do this.

Quotes from the study are laid out below:



[10] Common PC Target, May 2024