Maintaining our commitments to eradicating water poverty: A statement from our Board

May 2025

A Frontier Economics report commissioned by Northumbrian Water Limited.

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Foreword

An assessment of the impact of the CMA appeal on the affordability of Northumbrian Water's bills

We know from our research and engagement with customers that affordability is a key concern[1] so we always look to ensure that the essential services we provide remain affordable.

That is why we were one of the first companies to sign up to eradicating water poverty[2] and why we offered both the largest bill reduction at PR19 (AMP7)[3] and the smallest bill rise in PR24 (AMP8)[4]. Our bills are the lowest in the country and would remain so even after the increases we propose in our CMA PR24 statement of case[5].

Our Business Plan included c.£400m of efficiencies to minimise bill increases for customers. Additionally, we increased the level of affordability support available by four-fold, including £20m of direct support from our shareholders to help those struggling to pay[6].

When the Board made the difficult decision to seek a redetermination from the Competition and Markets Authority we did so because we did not consider that the Ofwat Final Determination was the right long-term settlement for our customers.

In particular it does not provide sufficient funding to enable us to maintain the complex and ageing asset base we have or to ensure that those assets and the essential services they provide are resilient to the growing number of severe weather events we face in our changing climate. Finally, it does not provide an investable proposition that would enable us to attract the substantial new capital we will need over the next 20 years.

While research shows that these are important concerns for our customers too[7], we knew that a redetermination by the CMA could increase bills, further increasing affordability pressures. Our own case requests a further 7% increase in bills on average and Anglian Water, who provide wastewater services to many of our customers in Essex and Suffolk have also requested a redetermination. We engaged Frontier Economics to review our affordability package in light of the additional funding requests made in companies Statements of Case to the CMA.

Figure 1: Average household bill comparison

Bill type (£, 22/23 prices)	24/25 £	29/30 £	% increase
Ofwat PR24 Final Determination[8]	422	510	21%
NWL CMA case request	422	545	29%
NWL CMA case request with est. Anglian wastewater CMA request	422	556	32%
Weighted Average Bill across all Water and Sewerage Companies [9]	440	597	36%

Notes: All NWL bills are for NWL Combined (i.e. a composite of Northumbrian and Essex & Suffolk bills)

[1] See PR24 BP Customer Affordability, Appendix A1, NES02 Sept 23, Section 1, nes02.pdf
[2] NES - PR19 CMA Redetermination: Statement of case (NWL PR19 SoC), 02 April 2020, pg.1 - FN.8, SOC287. NWL_PR19_Statement_of_Case_2.4.2020
[3] PR19-final-determinations-Overview-of-final-determinations, page 17
[4] Customer_bills_1., WASCs combined bills
[5] Northumbrian_Water_-_Statement_of_Case, Figure 1
[6] business-plan-2025-30/nes02, page 59
[7] NWG - Deliberative research into complex bill drivers for 2025-30: Research report (NWG Complex Bill Drivers), December 2022, SOC284. deliberative-research-into-complex-bill-drivers-for-2025-30
[8] Ofwat Table 3: pr24-final-determinations-our-approach
[9] Ibid

Our Business Plan 2025-30 contained a clear commitment to ensuring that no customer spends more than 5% of their household income on water and wastewater charges[10] and we have always been transparent in presenting the impact of our plans on customer bills.

The Frontier Economics report, which follows, suggests that under some scenarios we could face a gap in the level of support we have to be able to meet our commitment. It also highlights that there may be an opportunity to increase the size of our support package where our social tariff cross-subsidy, for example, is still one of the smallest in the sector[11] (reflecting local customer support for this) and also references the UK Government's proposal[12] to develop a national social tariff which could also support affordability pressures.

The CMA is currently considering the determination in the round and the outcome of the appeal is uncertain. It could result in a reduction or an increase in customer bills.

Our Board wants to make clear to our customers and the CMA that if the redetermination results in increased bills, then we will put in place sufficient support to ensure that our water affordability target can be met.

Northumbrian Water
May 2025

[10]After housing costs – per CC Water definition CCWater/Independent-review-of-water-affordability
[11]The level of Social tariff cross subsidies rules depends on the level of local customer support, see: social-tariffs-guidance, paras 2.6-2.8
[12]Water Special Measures Bill 2025 s143AA: https://www.legislation.gov.uk/ukpga/2025/5/section/13/enacted
[13]Summary-of-water-companies-published-plans-for-affordability-for-2025-30-2/

Figure 2: Comparison of shareholder support for affordability

Water & Sewerage Company	Total funding from shareholders to support social tariffs (£m)	Funding to support debt matching schemes (£m)	Total funding from shareholders to support other affordability schemes (£m)	Total funding from shareholders
Anglian	-	6.24	8.05	0.06%
Dwr Cymru	63.44	7.86	1.57	0.42%
Hafren Dyfrdwy	-	0.02	0.27	0.09%
Northumbrian	15.86	13.11	4.17	0.23%
Severn Trent	-	15.56	34.64	0.16%
South West	-	15.95	7.82	0.22%
Southern	-	10.00	6.25	0.09%
Thames	-	8.10	0.30	0.02%
United Utilities	68.66	86.38	17.37	0.48%
Wessex	-	-	1.43	0.01%
Yorkshire	-	30.00	6.13	0.23%

Source: Ofwat Summary of water companies' published plans for affordability for 2025-30, Table 1.3[10]

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AN ASSESSMENT OF THE IMPACT OF THE CMA APPEAL ON THE AFFORDABILITY OF NORTHUMBRIAN WATER'S BILLS

15 MAY 2025

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frontier economics

Executive summary

Northumbrian Water (NES) is one of a number of companies currently appealing its price determination (PR24) to the Competition and Markets Authority (CMA). This process may lead to higher bills for households up to 2029-30 (FY2030) than that assumed by Ofwat, potentially worsening household affordability in NES's service area.

In its Statement of Case (SoC), NES expressed confidence that under any CMA outcome their support package would allow them to achieve their PR24 Business Plan commitment of ensuring that no customer spends more than 5% of their household income on water bills by 2030 (which is one measure of affordability). As this commitment relies on the outcome of the redeterminations of Anglian Water and Thames Water (providers of services to some of NES's customers and also appealing the PR24 determinations), NES committed to review its position after receiving their SoC.[1]

In this context, on 8 April 2025,[2] NES engaged Frontier Economics to assess the likely impact on the estimate of water bill affordability[3] in its region if the CMA were to accept companies' SoC in full,[4] using the most commonly applied indicator of affordability, i.e., where bills are greater than 5% of household income.

We find that the potential bill impacts in NES's region would likely lead to an additional 0.4%-1.6% of NES's households falling above the 5% affordability threshold by FY2030.[5] While negative affordability impacts will be unwelcome to the households affected, this is a relatively small impact against this measure in the context of the relatively wide range of bill affordability levels that exists across water and sewerage companies in England and Wales. For example, in 2021, Water UK consultants calculated a range across companies to be between 3.6% and 12.0% with NES at 8.0% (henceforth, the 2021 Water UK study).[6]

Table 1 below shows that the 0.4%-1.6% variation in our own impact estimates is caused by:

- the precise measure of affordability used; and

1 Northumbrian Water Limited Statement of Case (March 2025), PR24 CMA redetermination, para 55. https://assets.publishing.service.gov.uk/media/67e1784f64220b68ed6a702e/Northumbrian_Water_-_Statement_of_Case.pdf

2 We were engaged before Ofwat's reply to NES's SoC.

3 Where we refer to water affordability this includes bills for both water and sewerage services.

4 As some of NES's households receive water or wastewater services from Anglian Water and Thames Water, the outcome of all of these appeals could impact the total affordability of water and wastewater charges in NES's service area.

5 Given that NES supply approximately 1.8m households this is approximately 7,300 to 29,500 households. Note, we have assumed the number of households served remains constant up to FY2030.

6 CEPA for Water UK (2021), Quantitative analysis of water poverty in England and Wales, p. 9. https://www.water.org.uk/sites/default/files/wp/2021/04/Quantitative-analysis-of-water-poverty-in-England-and-Wales.pdf

- whether we include Anglian Water's (ANH) bills increase in line with their SoC.[7]

Table 1 Potential affordability impact of appeals in NES region in FY2030

	Water affordability in FY2030 (net of impact of social tariffs only) – proportion of households with bills >5% of income			
Metric used	**Ofwat's Final Determination**	**NES SoC only**	**NES & ANH SoC**	**Impact of CMA appeal**
Current metric	8.7%	9.7%	10.3%	+1.0% to +1.6%
Improved metric	4.4%	4.8%	5.0%	+0.4% to +0.6%

Source: Frontier Economics analysis

Note: The impact of CMA appeal has been calculated as follows:

- *Current metric: 1.0%=9.7%-8.7%; 1.6%=10.3%-8.7%*
- *Improved metric: 0.4%=4.8%-4.4%; 0.6%=5.0%-4.4%.*

The two measures of affordability we used were:

- **Current metric**. This metric was used by Ofwat to define water affordability at PR24 and has been used by the industry since 2021. It calculates the ratio of bills to equivalised[8] net income after housing costs (AHC) and compares this to an affordability threshold for combined bills of 5%.
- **New (improved) metric**: This metric was developed by Frontier in 2024 for a group of five companies (including NES) with the intention of addressing some of the limitations with the current metric, including to make it more aligned with precedent in other sectors. It uses a sequential test to first identify households that are low income or vulnerable, and then compares their combined bills as a proportion of (non-equivalised) net income AHC to an affordability threshold of 5%.

Our recommendation is that most weight is placed on the lower impacts of the CMA appeal identified by the improved metric, i.e., +0.4% to +0.6%.

We assess the strengths and weaknesses of the metrics in the main body of this report,[9] where we conclude that the new metric likely provides a more accurate representation of affordability, both reducing the number of households wrongly identified as having and of not having water affordability issues. The older metric's primary use in our view is now as a point of comparison

7 We have not included the impact of potential changes to Thames Water's bills on NES served households as there is uncertainty on the potential increases, however this will only impact a relatively small proportion of NES's households (c. 10%) and for one service only so we expect that this assumption will only have a minor impact on our assessment.

8 Equivalisation considers the number of people living in the household and their ages, such that households of different compositions can be compared fairly once their income has been adjusted for their spending needs. The equivalisation factor used by Ofwat is based on the OECD-modified equivalised scale and defined as: (1+0.5*(adults-1) +0.3*children).

9 See Section 2.2 and Annex B .

against previous estimates and against other companies' estimates of affordability (when based on that metric).

In both cases, our simulation approach to estimation uses projections of bills, income, and socio-economic characteristics based on NES's billing data and data from the ONS Family Resources Survey. A simulation approach is required because we do not have access to income and other characteristics at the household level. This approach is similar to the approach taken in the 2021 Water UK study. We used the following bill assumptions in our scenarios:

- **Baseline.** Bills increasing in line with those assumed by Ofwat in the PR24 Final Determinations.
- **NES SoC only.** NES's bills increasing by an additional 7% above those assumed by Ofwat by FY2030 as per its SoC.
- **NES & ANH SoC.** NES's bills increasing by an additional 7% and ANH's bills increasing by an additional 13% by FY2030 as per ANH's SoC.

As part of the assessment, NES asked us to estimate total affordability taking into account the likely impact of planned changes in NES's social tariffs (both eligibility criteria and additional take-up) and in WaterSure tariff (additional take-up). We have done this consistently across all of the scenarios and we note that our analysis suggests this requires additional cross-subsidy beyond that which the company currently has household support (which is the second lowest level of cross-subsidy in the industry together with Hafren Dyfrdwy).[10]

Social tariffs are just one part of NES's broader affordability strategy, our affordability estimates should therefore not be interpreted as an assessment of the affordability level that NES will actually achieve in FY2030.

We have not modelled the impacts on NES of any changes in ANH's (nor TMS)[11] social tariffs to FY2030, nor their broader affordability strategy. Similarly, we have not modelled the potential impact of any future national social tariff on NES.[12] We also note that all three

10 NES's expected level of cross-subsidy by FY2030 is £14 per dual service customer (in 2022-23 constant prices). This is the second lowest level amongst the water and sewerage companies, and materially below the industry average of £26 per dual service customer. See Section 3.3.1 for more details and Ofwat (Dec 2024), Summary of water companies' published plans for affordability for 2025-30, Table 2.2. https://www.ofwat.gov.uk/wp-content/uploads/2024/12/Summary-of-water-companies-published-plans-for-affordability-for-2025-30.pdf

11 See Footnote 7 for an explanation of the rationale.

12 In recent months, two consumer protection groups, CCW and Independent Age, argued for a national social tariff. Last January, Utility Week reported that the Labour administration is considering a national social tariff. Recent amendments to the Water (Special Measures) Act 2025, Section 143AA gives Government the powers to make the cross subsidies necessary for a national social tariff. See: CCW (Jan 2025), Urgent action needed to protect cash-strapped households from soaring water bills https://www.ccw.org.uk/news/urgent-action-needed-to-protect-cash-strapped-households-from-soaring-water-bills/; Independent Age (Apr 2025), Charting a course: opportunities and practicalities when implementing a single social tariff for water bills. https://www.independentage.org/sites/default/files/2025-04/%27Charting%20a%20course%27%20-%20Research%20Briefing_0.pdf; Utility Week (Jan 2025), Single social water tariff resurrected. https://utilityweek.co.uk/single-social-water-tariff-resurrected/ (behind paywall). Water (Special Measures) Act 2025, Section 143AA. https://www.legislation.gov.uk/ukpga/2025/5/crossheading/consumer-charges

companies have proposed larger levels of affordability support outside of social tariffs.[13] If we had incorporated these non-social tariff actions into our analysis we would have likely estimated an improved level of affordability in FY2030 against these metrics.

[13] Northumbrian Water Business Plan 2025-2030, pages 2, 34-39. https://www.nwg.co.uk/globalassets/business-plan-2025-30/nes01.pdf: Anglian Water PR24 Business plan, pages 34-46. https://www.anglianwater.co.uk/siteassets/household/about-us/pr24/anh01-our-plan-2025-2030.pdf: Thames Water PR24 Business Plan. https://www.thameswater.co.uk/media-library/home/about-us/regulation/our-five-year-plan/pr24-2023/our-business-plan.pdf

1 Introduction

1.1 Context and scope of work

Northumbrian Water (NES) provides water and wastewater services in the North East of England – excluding Hartlepool, where Anglian Water (ANH) provides water services – and water-only services in parts of Essex and Suffolk, where Thames Water (TMS) and ANH provide wastewater services, respectively.

In February 2025, NES, ANH, and TMS referred Ofwat's PR24 final determinations to the Competition and Markets Authority (CMA) for appeal. The outcome of these appeals could lead to an increase in NES's household bills above the final determinations levels by 2029-30 (FY2030), potentially worsening household affordability in NES's service area.

In its Statement of Case (SoC), NES expressed confidence that under any CMA outcome their support package would allow them to achieve their PR24 Business Plan commitment of ensuring that no customer spends more than 5% of their household income on water bills by 2030 (which is one measure of affordability). As this commitment relies on the outcome of the redeterminations of ANH and TMS, NES committed to review its position after receiving their SoC.[14]

In this context, NES has engaged Frontier Economics to evaluate the potential *impact* of the CMA appeals on household affordability as indicated by the number of households paying more than 5% of their income on water charges.

1.2 Interpretation

To evaluate the potential impact, we estimated household affordability both with and without potential bill increases resulting from the CMA appeals, and then calculated the difference between these two estimates.

When estimating overall household affordability, NES asked us to focus solely on the impact of planned changes in their social tariffs through FY2030. Social tariffs are just one part of NES's broader affordability strategy and therefore our affordability estimates should not be interpreted as an assessment of the affordability level that NES will achieve in FY2030.

For example, we have not modelled any changes in ANH or TMS social tariffs to FY2030, nor their broader affordability strategies. Similarly, we have not modelled the potential impact of a

[14] Northumbrian Water Limited Statement of Case (March 2025), PR24 CMA redetermination, para 55. https://assets.publishing.service.gov.uk/media/67e1784f64220b68ed6a702e/Northumbrian_Water_-_Statement_of_Case.pdf

national social tariff on NES.[15] We also note that all three companies have proposed larger levels of affordability support outside of social tariffs.[16] If we had considered this, we would have likely found a lower number of households above the 5% affordability threshold in FY2030.

Box 1 – Description of NES's affordability strategy from SoC

"We reviewed and updated our affordability and inclusivity strategy and increased our affordability support package by more than four times (compared to 2020-25), including a substantial increase in our social tariff as well as through innovation and partnership working. Our shareholders will also provide significantly more financial support (£20m) to households through a new hardship fund. Alongside our social tariffs, this also includes supporting households through our compulsory metering programme, identifying households who need assistance and providing free advice and leak repairs; actively promoting and encouraging households to use debt advice providers to help maximise their income; and working with partners to develop online benefit checking and tariff eligibility tools to help households get the support they are entitled to."

Source: NES's SoC, para 126, https://assets.publishing.service.gov.uk/media/67e1784f64220b68ed6a702e/Northumbrian_Water_-_Statement_of_Case.pdf

1.3 Structure of the remainder of the report

The rest of this report is structured as follows:

- Section 2 outlines our approach to estimating water affordability.
- Section 3 presents our results for the three bill scenarios.

  The annexes provide more details on our assessment of the strengths and weaknesses of different metrics of affordability and a summary of our estimation methodology.

15 In recent months, two consumer protection groups, CCW and Independent Age, argued for a national social tariff. Last January, Utility Week reported that the Labour administration is considering a national social tariff. Recent amendments to the Water (Special Measures) Act 2025, Section 143AA gives Government the powers to make the cross subsidies necessary for a national social tariff. See: CCW (Jan 2025), Urgent action needed to protect cash-strapped households from soaring water bills https://www.ccw.org.uk/news/urgent-action-needed-to-protect-cash-strapped-households-from-soaring-water-bills/; Independent Age (Apr 2025), Charting a course: opportunities and practicalities when implementing a single social tariff for water bills. https://www.independentage.org/sites/default/files/2025-04/%27Charting%20a%20course%27%20-%20Research%20Briefing_0.pdf; Utility Week (Jan 2025), Single social water tariff resurrected. https://utilityweek.co.uk/single-social-water-tariff-resurrected/ (behind paywall); Water (Special Measures) Act 2025, Section 143AA. https://www.legislation.gov.uk/ukpga/2025/5/crossheading/consumer-charges

16 Northumbrian Water Business Plan 2025-2030, pages 2, 34-39. https://www.nwg.co.uk/globalassets/business-plan-2025-30/nes01.pdf; Anglian Water PR24 Business plan, pages 34-46. https://www.anglianwater.co.uk/siteassets/household/about-us/pr24/anh01-our-plan-2025-2030.pdf; Thames Water PR24 Business Plan. https://www.thameswater.co.uk/media-library/home/about-us/regulation/our-five-year-plan/pr24-2023/our-business-plan.pdf

2 Our approach to estimating water affordability

To assess the impact of the PR24 redeterminations on the affordability of combined water and wastewater bills of households served by NES (including those receiving wastewater services and water services from ANH and TMS) we have considered three potential future bill scenarios and two affordability metrics. The metrics are each based on the most commonly applied indicator of affordability, i.e., where bills are greater than 5% of household income, but differ in their detailed calculation. We have then applied our estimation methodology of affordability using these scenarios and metrics, and accounting for NES's proposed changes in its social tariff (i.e. eligibility and take-up).

In the following sections we provide more details on our bill scenarios, affordability metrics, the social tariffs we have modelled, and the methodology we have used to estimate water affordability.

2.1 Bill scenarios

The impact of the potential CMA PR24 redetermination on combined bills for NES households is uncertain so we therefore consider three combined bill scenarios which represent a plausible range of outcomes by FY2030.

We derive these scenarios using information from NES and ANH's SoC on the potential increase in bills by FY2030. We have considered ANH's SoC as c. 31% of NES's households receive wastewater services by ANH. These are the households in NES's Suffolk service area. There is also a small proportion of households (0.01%) in the North East receiving water services by ANH (in Hartlepool).

While approximately 10% of NES's households receive wastewater services from TMS, we have not been able to take into account the potential increase in TMS's bills as TMS has not published its SoC due to the deferral of its formal reference. Given the relatively small proportion of NES's households served by TMS this is likely to have a relatively small impact on our assessment.

The three combined bill scenarios are:

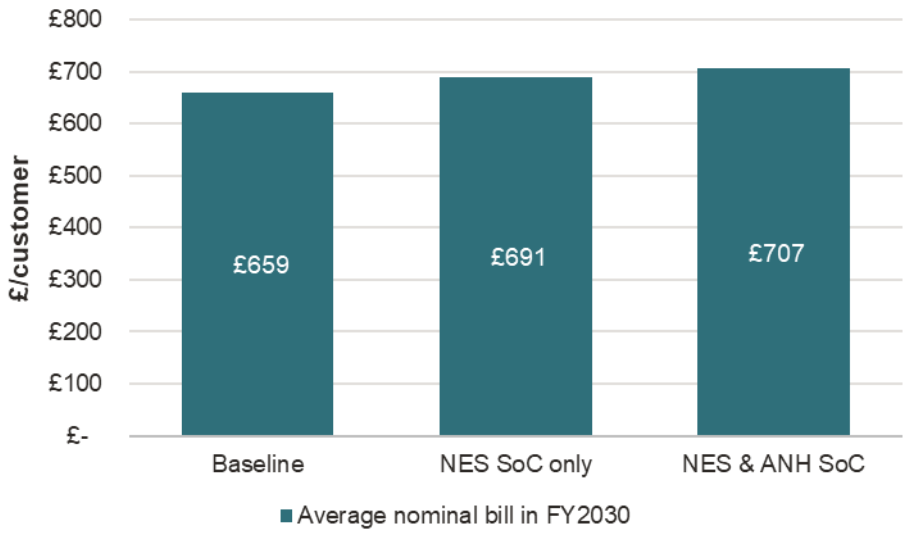
1. **Baseline**. The final determination bill levels for NES, ANH and TMS.
2. **NES SoC only**. NES's bills increasing by an additional 7% above those assumed by Ofwat by FY2030 as per its SoC.[17]

[17] Northumbrian Water Limited SoC, PR24 CMA redetermination (March 2025). https://assets.publishing.service.gov.uk/media/67e1784f64220b68ed6a702e/Northumbrian_Water_-_Statement_of_Case.pdf

3. **NES & ANH SoC**. NES's bills increasing by an additional 7% (same as the 'NES SoC only' scenario) and ANH's bills increasing by 13% by FY2030 as per ANH's SoC.[18] Only the combined bills of NES's households in Suffolk (and Hartlepool) will be affected by the increase in ANH's bills.

The bar chart below shows the expected bills under the three scenarios we have considered. We estimated these bills by increasing our projection of the average combined bill in FY2030 based on NES's billing data[19] by the potential increase in bills as set out above.

Figure 1 NES's average combined bill in FY2030 by bill scenario (nominal £)



Source: Frontier Economics

2.2 Water affordability metrics

Broadly speaking, water affordability is a measure of the number of households that would find it difficult to pay their water and wastewater bills without experiencing financial hardship. The drivers of water affordability are varied and include household disposable income, bill size, and household vulnerability.

Water affordability is typically assessed by comparing a ratio of bill to income against an affordability threshold. Over the past decade several approaches to measuring water affordability have been used in the UK, varying across the definition of income used (e.g.

18 Anglian Water SoC, PR24 CMA Redetermination (March 2025). https://assets.publishing.service.gov.uk/media/67e17805c6194abe97358ceb/Anglian_Water_-_Statement_of_Case.pdf

19 This is c. 3% higher than the value stated in Ofwat's Final Determination billing profile. See Section 3.3.3 for further details.

household income or net disposable income), how income has been equivalised,[20] and the threshold of bills over income used to define water affordability (e.g. 3% vs 5% of income spent on bills).[21]

The latest definition from Ofwat's 2023 PR24 business plan data table guidance defines the affordability metric as the ratio of bills over net *equivalised*[22] disposable income after housing costs (AHC) (henceforth, the 'current metric').[23] This metric is then compared to an affordability threshold of 5% for combined bills.

However, we have found that this definition has the potential to lead to false positives (due to high income households classed as having affordability issues) as well as false negatives (due to an inconsistent approach to 'equivalisation' between household bills and income), amongst other issues. Therefore, in 2024 we developed an improved metric for a group of five companies (including NES) (henceforth, the 'new metric'). The new metric uses the same affordability indicator of 5% and a sequential test to mitigate the impact of the issues identified under the current metric. (the sequential test is illustrated in Figure 3, below).

Hence, in this report, we adopt two separate water affordability metrics: the 'current metric' and our proposed improved 'new metric'. We introduce both metrics in turn together with a summary of their strengths and weaknesses. Overall, we consider the new metric likely provides a more accurate representation of affordability by reducing the number of households wrongly identified as having or not having water affordability issues. We include the results from the current metric to provide the reader with results that are comparable with past estimates and against other companies' estimates of affordability (if they are based on that metric).

2.2.1 Current metric

Figure 2 below shows the affordability test applied under the current metric.

In Ofwat's guidance, net disposable income AHC is defined as gross income net of government and council taxes and National Insurance, housing costs, and disability benefits. Income is also 'equivalised' across households. The equivalisation factor used by Ofwat is

20 'Equivalisation' is the process of accounting for the fact that households with many members are likely to need a higher income to achieve the same standard of living as households with fewer members. It considers the number of people living in the household and their ages, such that households of different compositions can be compared fairly once their income has been adjusted for their spending needs.

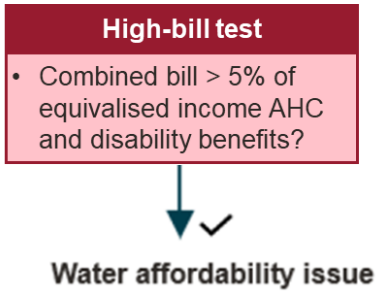
21 We summarise the approaches we have reviewed in Annex A .

22 Equivalisation is the process of accounting for the fact that households with many members are likely to need a higher income to achieve the same standard of living as households with fewer members.

23 Ofwat (2023), PR24 Final methodology submission table guidance – Section 10: Supplementary tables. https://www.ofwat.gov.uk/wp-content/uploads/2023/08/PR24-BP-table-guidance-part-10-SupplementaryV5.pdf

based on the OECD-modified equivalised scale and defined as: (1+0.5*(adults-1) +0.3*children), where an adult is defined as an individual over 14 years old.[24]

Figure 2 Affordability test of the current metric



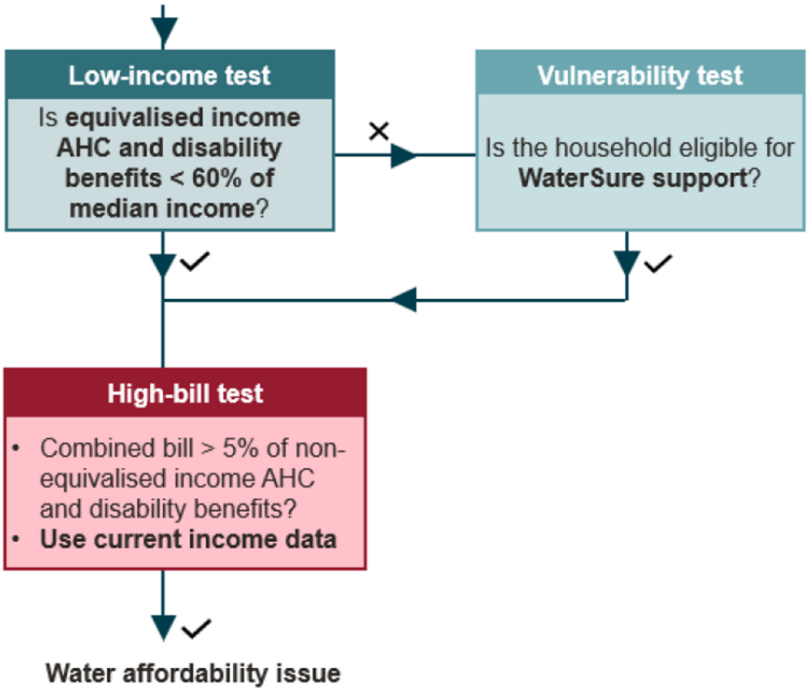
Source: Frontier Economics

2.2.2 New metric

Figure 3 below shows the affordability test applied under the new metric. The new metric uses a sequential test to first identify households that are low income or vulnerable (low-income test and vulnerability test) before comparing their combined water and wastewater bill as a proportion of non-equivalised net income AHC to a 5% threshold (high-bill test).

[24] ONS (2015), Chapter 3: Equivalised Income. https://www.ons.gov.uk/peoplepopulationandcommunity/personalandhouseholdfinances/incomeandwealth/compendium/familyspending/2015/chapter3equivalisedincome

Figure 3 Affordability test of the new metric



Source: Frontier Economics

The low-income test is based on *equivalised* income AHC and benefits received for a care need or disability. We use the same equivalisation approach used for the current metric. Equivalisation at the income test stage is appropriate given that the objective of this step is to establish circumstances of relative poverty (i.e., vis-à-vis other households). We consider it appropriate that disposable income is measured net of non-discretionary expenditure which is not otherwise captured in the equivalisation process (i.e., disability benefits).

The application of a vulnerability test is informed by Ofwat's latest guidance to companies to protect households in vulnerable situations.[25] As a readily available solution, we have identified households in vulnerable situations as those who are receiving WaterSure support (which companies already hold data on). WaterSure is national scheme which offers support to households who are certain benefit and require high water use due to medical reasons or number of children.[26]

[25] CCW (2023), Guidance for water companies: testing customers' views of the acceptability and affordability of PR24 business plans. https://www.ofwat.gov.uk/wp-content/uploads/2022/12/Guidance_for-water_companies_testing_households_views_of_the_acceptability_and_affordability_of_PR24_business_plans.pdf

[26] Citizens advice, WaterSure scheme – help with paying water bills. https://www.citizensadvice.org.uk/consumer/water/problems-with-paying-your-water-bill/watersure-scheme-help-with-paying-water-bills/

The high-bill test is based on water bills divided by *non-equivalised* income after housing costs and benefits received for a care need or disability. We consider it inappropriate to equivalise income at the high-bill test stage. This is because the high-bill test considers the *absolute* level of affordability for households already identified as having low relative income. The level of the threshold itself is retained at 5% and is consistent with the 2019 Public Interest Commitment made by Water UK on behalf of the water industry.

2.2.3 Comparison of metrics

The figure below summarises strengths and weaknesses of the two metrics and Annex B provides more details.

The additional steps involved in the sequential test result in the new metric providing a more accurate estimate of water affordability, both reducing the number of households wrongly identified as having and of not having water affordability issues. Therefore, our recommendation is that when interpreting the results presented in this report most weight is placed on findings based on the improved metric.

Figure 4 Comparison of metrics

	Description	Strengths	Weaknesses
Current metric	▪ Affordability calculated by comparing ratio of bills to equivalised net income AHC to an affordability threshold.	▪ **Simplicity**: Based on a simple ratio of income to bills ▪ **Comparability**: Used across English water industry the past few years	▪ **Low accuracy**: incorrectly identifies false positives and false negatives

Improved metric	▪ Based on a sequential test comprised of three steps:
	  ▪ Low-income test
	  ▪ Vulnerability test
	  ▪ High-bill test
		▪ **Higher accuracy**: reduces instances of false positives and negatives
		▪ **Precedent**: approach is consistent with the approaches taken in other sectors and jurisdictions
			▪ **Non-zero number of false negatives:** The vulnerability test fails to eliminate all false negatives as it cannot identify uses with a high non-discretionary water use but who do not receive benefits.

Source: Frontier Economics

2.3 NES's social tariff to FY2030

Households eligible for NES's social tariff receive a discount of up to 50% on their bills. Eligible households are those households with a gross income below a certain threshold and whose combined bill is greater than 5% of the household income net of income taxes and housing costs. The discount received depends on the level of discount required to pull the households below the affordability thresholds. This is provided in 10% bands up to 50%. In FY2025, c. 7.8% of NES's households are on a social tariff.

We have assumed that the take-up of NES's social tariff will increase to 10.7-11.3%, depending on the outcome of the CMA appeal, which is the equal to the total number of households eligible for the social tariff in FY2030. This is below the take-up assumed in NES's business plan[27] because our simulation finds that there will not be enough households to meet the desired levels of take-up.[28] We have also assumed that social tariff eligibility criteria will become less stringent with the income threshold increasing from £26,000 in FY2025 to £50,000 by FY2030 (as planned by NES) and that NES will have sufficient household acceptability for the cross-subsidy required (or sufficient shareholder funding) to deliver the proposed changes in its social tariff.[29] For WaterSure households, we have assumed that take-up will increase to 2.2% by FY2030, in line with NES's business plan.[30] Finally, we have assumed that those households on a social tariff in FY2025 will remain on the social tariff in FY2030 (and will receive the same discount).

As a simplifying assumption, we have not assumed any changes to ANH and TMS's social tariffs and take-up (or their broader affordability strategy). Both companies are proposing to increase the support provided,[31] which if modelled would likely lead to a reduction in the water affordability estimates (all else equal) in the NES region. This assumption should not affect our estimate of the impact of the increase in bills through the CMA appeal as that higher level of support would impact all scenarios.

2.4 Our estimation methodology

Implementing each of the current and new metrics requires data on household bills as well as data on household income and non-discretionary expenditure (e.g. taxes, disability benefits, household composition and/or housing costs etc.). Whilst we have access to household-level

27 NES PR24 Business plan tables – version 6, sheet SUP15. https://www.nwg.co.uk/globalassets/business-plan-2025-30/nesbpt01.xlsb

28 We note that NES estimates that 15% of households will be on a social tariff. Based on our estimation there are only 10.7-11.3% of households eligible, depending on the outcome of the CMA appeal.

29 The Floods and Water Management Act 2010, requires that companies can show that its level of cross subsidy has broad household acceptability

30 Northumbrian Water Business Plan 2025-203. https://www.nwg.co.uk/globalassets/business-plan-2025-30/nes01.pdf

31 Anglian Water PR24 Business plan, pages 34-46. https://www.anglianwater.co.uk/siteassets/household/about-us/pr24/anh01-our-plan-2025-2030.pdf; Thames Water PR24 Business Plan. https://www.thameswater.co.uk/media-library/home/about-us/regulation/our-five-year-plan/pr24-2023/our-business-plan.pdf

water bill data from NES, there are no publicly available sources that provide household-level inputs to measure different definitions of household income.

To overcome this challenge, we have simulated these household-level inputs for each household in our dataset by drawing on a range of public datasets including the Family Resources Survey[32] and Income Estimates for Small Areas.[33] We adopt a Monte Carlo simulation – a well-established statistical approach commonly used in similar contexts, for example in the 2021 Water UK study. We describe the simulation approach in more detail in Annex C . This provides a simulated dataset in which each household has both a combined bill and an estimated net income from which we can apply the current and new metric.

32 DWP, Family Resources Survey. https://www.gov.uk/government/collections/family-resources-survey--2

33 ONS, Income estimates for small areas, England and Wales. https://www.ons.gov.uk/employmentandlabourmarket/peopleinwork/earningsandworkinghours/datasets/smallareaincomeestimatesformiddlelayersuperoutputareasenglandandwales

3 Our results

In this section we present our assessment of the impact of the CMA appeals on the measures of NES's water affordability considered. We first present our findings, including an option that would mitigate the relatively small impact identified. We then explain how these findings should be interpreted in the context of assumptions made around the cross-subsidy available and the company's broader affordability strategy.

3.1 Key findings

Table 2 below shows our estimates of on water affordability in FY2030 under the three bill scenarios and two metrics considered. This analysis includes the impact of NES's social tariff over the same period.

Table 2 Impact of CMA's appeal on affordabiltiy of NES's region in FY2030

	Water affordability in FY2030 (net of impact of social tariffs only) – Proportion of households with bills > 5% of income			
	Ofwat's FD	NES SoC only	NES and ANH SoC	Impact of CMA appeal
Current metric	8.7%	9.7%	10.3%	**+1.0% to +1.6%**
Improved metric	4.4%	4.8%	5.0%	**+0.4% to +0.6%**

Source: Frontier Economics analysis

Note: The impact of CMA appeal has been calculated as follows:

- *Current metric: 1.0%=9.7%-8.7%; 1.6%=10.3%-8.7%*
- *Improved metric: 0.4%=4.8%-4.4%; 0.6%=5.0%-4.4%.*

If companies' SoC were to be accepted in full, the potential bill impacts in NES's region would likely lead to an additional 0.4%-1.6% of NES's households falling above the 5% affordability threshold in FY2030 as measured by the two metrics.[34] The variation in these estimates is caused by:

- the precise measure of affordability used; and
- whether we include ANH bills increase in line with their SoC.[35]

[34] Given that NES supply approximately 1.8m households this is approximately 7,300 to 29,500 households. Note, we have assumed the number of households served remains constant up to FY2030.

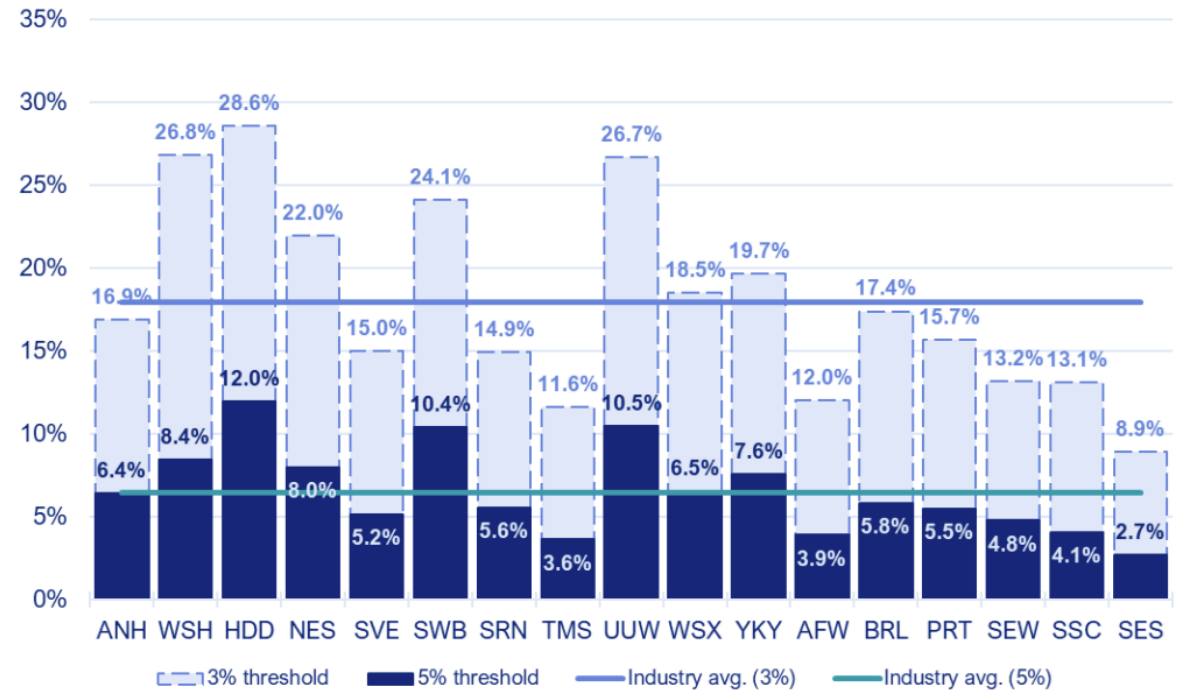
[35] We have not considered the impact of potential changes to Thames Water's bills on NES served households however these will only impact a relatively small proportion of NES's households (c. 10%) and there is uncertainty around the potential increase in those bills. We expect that this assumption will only have a minor impact on our assessment.

The incremental impact of the modelled appeal outcomes on affordability aligns with the projected bill increases. If only NES's SoC is fully accepted, the average combined bill in FY2030 would be 5%[36] higher than under the FD, with a 0.4% rise in households exceeding the affordability threshold under the new metric. If ANH's SoC is also fully accepted, bills would increase by an additional 2%, with a further 0.2% increase in households above the affordability metric.

While any negative affordability impacts will be unwelcome to the households affected, it can be considered a relatively small impact against this measure in the context of the relatively wide range of bill affordability levels that exists across water and sewerage companies in England and Wales (e.g., in 2019-20 the range was calculated to be between 3.6% and 12.0% with NES at 8% as shown in the figure below)[37]

Figure 5 Water UK 2021 – Households above 3% and 5% affordability threshold in 2020

Figure 4.1: Estimated incidence of water poverty by company, 2019/20



Source: CEPA for Water UK (2021), Quantitative analysis of water poverty in England and Wales.
Note: The range for water and sewerage companies quoted in the text excludes SES which is a water only company

[36] If NES's SoC is fully accepted, bills for their services will increase by 7%. Single service customers in Suffolk and Essex receive only water services from NES, and wastewater services from Anglian and Thames respectively. Combined bills for these customers increase by less than 7% as the increase only applies to their water services. Bills for wastewater services from Anglian and Thames under the first billing scenario do not increase. Due to this, the weighted average combined bill across all households served by NES increases by 5%.

[37] CEPA for Water UK (2021), Quantitative analysis of water poverty in England and Wales. https://www.water.org.uk/sites/default/files/wp/2021/04/Quantitative-analysis-of-water-poverty-in-England-and-Wales.pdf

3.2 An option to mitigate the impact

Our simulation identified that a material number of NES's households projected to be on the social tariff in FY2030 would need a social tariff discount greater than 50% to fall below the water affordability threshold. The charts below show our assessment of the discount required for those households. As can be inferred from the charts:

- Under the current metric there are c. 38,000 households which are on the social tariff in FY2030 which would require a discount higher than 50% to be lifted out of water affordability issues. This is c. 19% of the social tariff households projected at FY2030.
- Similarly, under the improved metric there are 34,000 such households or 17% of NES's social tariff households at FY2030.

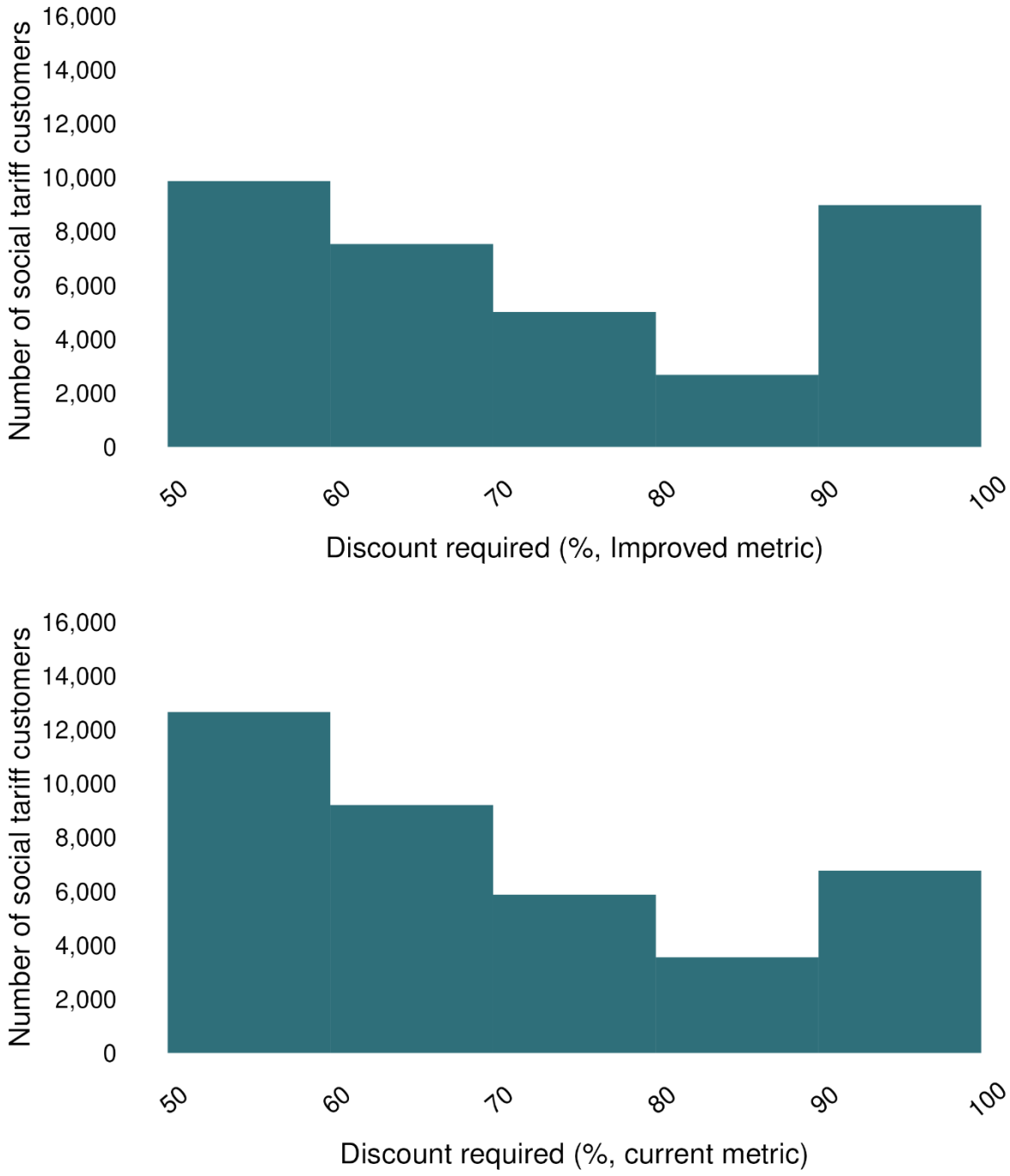
Based on this analysis, one option that NES might have to mitigate the impact of the CMA appeals would be to increase the discount provided to those households. For example, we estimated that:

- For the current metric, an increase in discount by 10 percentage points would improve water affordability by 0.7%[38] or 12,700 households.
- For the improved metric, an increase in discount by 10 percentage points would improve affordability by 0.5%[39] or 9,800 households.

[38] As can be seen from Figure 6, we estimated that c. 12,700 households which are on the social tariff in FY2030 would require a discount of up to 60% to be removed from water affordability issues. This is c. 0.7% of NES's household base of c. 1.8m.

[39] Similarly for the improved metric, shown in Figure 6.

Figure 6 Discount required to lift households on a social tariff out of water affordability in FY2030 – current metric and improved metric



Source: *Frontier Economics*

Note: *We have estimated the discount required by simulating by how much the discount provided should be to lift the households out of water affordability issues.*

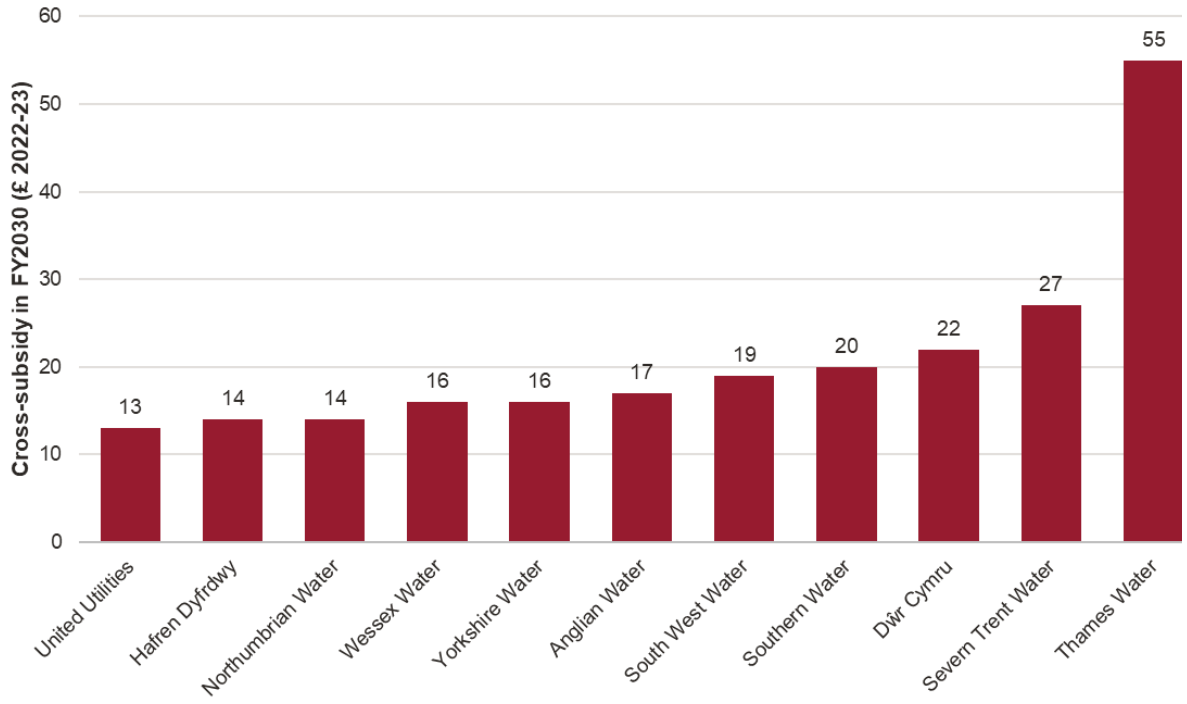
3.3 Considerations in interpretation

3.3.1 Cross-subsidy

As part of the assessment, NES asked us to estimate total affordability taking into account the likely impact of planned changes in NES's social tariffs (both eligibility criteria and additional; take-up) and in WaterSure tariff (additional take-up). We have done this consistently across all of the scenarios.

We note that our analysis suggests this requires additional cross subsidy beyond that which the company currently has household support. Specifically, under our new metric, we estimate that a cross-subsidy of between £29-£33[40] per standard tariff households will be required by FY2030 (depending on the bill scenario considered). This is higher than the current level of cross-subsidy of £14 per standard tariff household (in 2022-23 constant prices)). As shown in the table below, NES (and Hafren Dyfrdwy) has the second lowest level of cross-subsidy amongst the water and sewerage companies.

Figure 7 Cross-subsidy per dual service customer in FY2030 according to PR24 business plans (2022-23 constant prices)



Source: Frontier Economics based on Ofwat's summary of PR24 business plan. Ofwat (Dec 2024), Summary of water companies' published plans for affordability for 2025-30. https://www.ofwat.gov.uk/publication/summary-of-water-companies-published-plans-for-affordability-for-2025-30-2/

[40] Total cross-subsidy is £48m-58m and we have estimated c. 1.6m of NES's households will be on a standard tariff in FY2030.

3.3.2 NES's broader affordability strategy (and ANH and TMS's strategies)

Our affordability estimates should not be interpreted as an assessment of the affordability level that NES will actually achieve in FY2030. This is because those estimates:

- Only reflect changes in NES's social tariffs, which is just one part of NES's broader affordability strategy
- Do not reflect changes in ANH and TMS's social tariffs and affordability strategies.

We have also not modelled the impact of a potential national social tariff.

If we had incorporated these non-social tariff actions into our analysis, we would have likely estimated an improved level of affordability in FY2030.

3.3.3 Billing data

The raw data provided by NES has an average bill value in FY26 which is £17 (3.2%) higher than the value stated in Ofwat's final determination billing profile. In our modelling we take the raw billing data in FY26 as the starting point and inflate forwards using the expected percentage bill increases up to 2030, rather than aligning bills with the absolute bill value forecast in the FD. This approach reduces the risk of underestimating the impacts on affordability.

Annex A – Affordability metrics used in England since 2015

Table 3 Summary of metrics reviewed

Study	Reference	Metric	Income equivalised?	Water affordability threshold
Ofwat (2015), Affordability and debt 2014-15	https://www.ofwat.gov.uk/wp-content/uploads/2015/12/prs_web20151201affordability.pdf	Bill over non-equivalised disposable income AHC	No	3% and 5%
Water UK (2019), Public Interest Commitment	https://www.water.org.uk/sites/default/files/wp/2019/04/Public-Interest-Commitment-2.pdf	Bill over income	Not specified	5%
CEPA for Water UK, (2021), Quantitative analysis of water poverty in England and Wales	https://www.water.org.uk/sites/default/files/wp/2021/04/Quantitative-analysis-of-water-poverty-in-England-and-Wales.pdf	Bill over net equivalised disposable income AHC	Yes	5%
Ofwat (2023), PR24 final methodology submission table guidance – Section 10: Supplementary table.	https://www.ofwat.gov.uk/wp-content/uploads/2023/08/PR24-BP-table-guidance-part-10-SupplementaryV5.pdf	Bill over net equivalised disposable income AHC	Yes	5% for WaSCs; 2.5% for WoCs

Source: Frontier Economics' review of studies indicated in the table.

Annex B – Comparison of the two affordability metrics used in our analysis

B.1 Current metric

Current metric definition

At PR24, Ofwat adopted a single measure of water affordability, consistent with the definition used in the Consumer Council for Water's (CCW) affordability review.[41,42] This metric is based on a simple ratio of bills to household income, with affordability thresholds set at 2.5% for water or wastewater bills and 5% for combined bills.

Table 4Table 4 below shows the formula and affordability thresholds used in this approach.

Table 4 Current metric definition

Bill	Affordability metric	Affordability threshold
Combined bill	$\frac{\text{Water bill plus sewerage bill}}{\text{Equivalised net income AHC}}$	5%
Single bill	$\frac{\text{Water bill or sewerage bill}}{\text{Equivalised net income AHC}}$	2.5%

Source: *Ofwat's PR24 business plan data table guidance (August 2023))*

Note: *Net disposable income AHC is defined as gross income net of government and council taxes and National Insurance, housing costs, and disability benefits. Income is also 'equivalised' across households.*

Equivalisation is a method used to adjust household income based on the number and age of household members, allowing for fair comparisons across different household types. The equivalisation factor used by Ofwat is based on the OECD-modified equivalised scale and defined as: (1+0.5(adults-1) +0.3*children), where an adult is defined as an individual over 14 years old.*

Current metric strengths

Simplicity

This metric is relatively simple to understand as it is based on a simple ratio of income to bills relative to an intuitive threshold. As such, it can provide a helpful first view of affordability as it is easier to calculate and understand.

41 Ofwat (2023), PR24 Final Methodology submission table guidance – Section 10: Supplementary tables. https://www.ofwat.gov.uk/publication/pr24-final-methodology-submission-table-guidance-section-10-supplementary-tables-3/

42 CCW (2021), Independent review of water affordability. https://www.ccw.org.uk/our-work/affordability-and-vulnerability/affordability-review/affordability-review-recommendations/

Comparability

As Ofwat's chosen metric to use at PR24, there should be data on the affordability of every company's bills using it. As such, the results produced by this metric in this report could be compared to other companies' water affordability.

Current metric weaknesses

The simplicity of Current metric also means it is unable to correctly capture and account for all the factors which drive water affordability. The result being that whilst this measure is simple to calculate and interpret, it is not an accurate measure.

In this regard, we have identified three key issues.

False positives for high-income households

The metric incorrectly identifies some relatively high-income households as having an affordability problem. While some high-income households may legitimately have affordability problems due to non-discretionary needs (e.g. disability needs), we identify two high-income groups which may be wrongly identified:

1. **High income households with high housing costs** (e.g. rent): For these households, water bills are not a key driver of affordability, and it would be expected that they would reduce housing costs if unable to afford water.
2. **High income households with high discretionary water consumption**: Whilst these households may have high bill-to-income ratios, it is a choice and not an affordability issue.

False positives due to inconsistency in equivalisation process

The metric uses income equivalised for household size and composition but makes no adjustment to bills. This is an inconsistent approach, as both income and bills vary with household size and their specific needs and hence both should be adjusted or neither. This inconsistency may lead to some households being incorrectly identified as having affordability problems, due to their household size and composition and not because they experience affordability issues from a high bill-to-income ratio.[43]

[43] For example, consider two households that each contain one adult. In their separate households, both adults have a bill-to-income ratio which is below the affordability threshold. However, if they moved into one shared household together and each had the exact same expenses as previously then they may now be identified as having water affordability problems. This is because, whilst their combined water bill is 2X their individual bills, their income has been equivalised and hence is lower than 2X their individual income, despite their expenses remaining unchanged.

These false positives further create an inaccurate measure of water affordability, which is too high. This point has previously been acknowledged by Ofwat, who used non-equivalised income instead to avoid the issue in their 2014-15 affordability and debt report. [44]

False negatives for households with high essential costs or additional needs

The metric fails to capture some households that incur additional unobservable expenditures which could generate affordability issues. For example, households with members living with a disability may face extra costs that exceed the support provided by state benefits.

B.2 New metric

New metric definition

In light of the issues above, we developed an improved water affordability metric for Water UK, which drew upon the UK's approach to measuring fuel poverty. This metric, summarised in Figure 8, is based on a sequential test which is comprised of three components:

- **Low-income test**: this first step is designed to remove false positives for high-income households. It screens out households which may have high bills, but which do not have affordability issues, by removing households with income greater than 60% of median income. This threshold is appropriate as it is widely used by the ONS and other government bodies for assessing relative low income.[45]
- **Vulnerability test**: this step is designed to reduce false negatives for households with high essential costs or additional needs. It identifies the households that may have high income but are eligible for support through WaterSure because they receive disability benefits and flags them for affordability issues subject to the final test.
- **High-bill test**: this final step is designed to reduce false positives due to inconsistency in equivalisation process. It calculates the bill-to-income ratio using non-equivalised income.[46]

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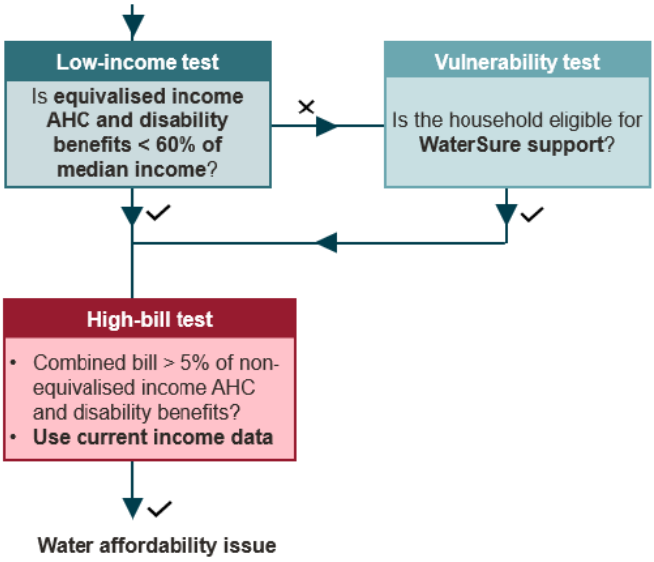
44 Ofwat (2015), Affordability and debt 2014-15 – supporting information. https://www.ofwat.gov.uk/wp-content/uploads/2015/12/pap_tec20151201affordabilitysupp.pdf

45 House of Commons Library (2025). https://commonslibrary.parliament.uk/research-briefings/sn07096/#:~:text=Relative%20low%20income%3A%20This%20refers,year%2C%20usually%202010%2F11.

46 The affordability threshold for this metric is 5% of the combined water and sewerage bill, which is different to Current metric, where the affordability thresholds for WaSCs and WoCs differ. This is to reduce instances where households are identified as having affordability issues where only their water or sewerage bill exceeds a threshold, whilst their combined bill is below the combined threshold (i.e. false positives).

Figure 8 New metric: Sequential test



Source: Frontier Economics

New metric strengths

Greater accuracy

The additional steps involved in the sequential test increase the accuracy of new metric relative to Current metric by reducing the number of households wrongly identified as having or not having water affordability issues. This was explained in the steps above outlining the test and again below:

Reduced false positives

New metric eliminates false positives in three ways:

1. The low-income test reduces false positives for high-income uses.
2. The high-bill test reduces false positives due to inconsistency in equivalisation process.
3. An affordability threshold is used only for the combined water and sewerage bill (set at 5%), removing instances where households are identified as having affordability issues where only their water or sewerage bill exceeds a threshold.

Reduced false negatives

New metric reduces false negatives by applying a vulnerability test. The test examines the households that fail the low-income test and identifies any households that receive benefits which could indicate they may have high bills-to-income ratios due to high non-discretionary use. These households are added back into the group which face the final high-bill test.

Consistent with approaches taken in other sectors and jurisdictions

The approach taken for new metric is more consistent with the approach used to assess water affordability in Scotland and continental Europe as well as on fuel poverty in the energy sector in the UK. In particular:

- Sequential tests are used in the energy sector in England and Scotland.[47] These tests consist of an income test to identify low-income households followed by a high-bill test.
- Additional vulnerability tests are often used to assess water affordability in continental Europe[48] and in the Scottish energy sector higher heating requirements are applied to vulnerable households.
- In both the water and energy sectors,[49] in most cases high-bill tests are based on a comparison of bills with non-equivalised income.

New metric weaknesses

Vulnerability test fails to eliminate all false negatives

We note that a downside of this metric is that although the vulnerability test reduces the number of false negatives relative to Current metric, it is unable to identify them all. In particular, using the data available we are only able to identify the households eligible for WaterSure due to receiving benefits and not the households eligible because they have high non-discretionary use.

47 England: Low Income Low Energy Efficiency (LILEE), Scotland: Fuel Poverty Act 2019

48 WAREG (2017), Affordability in European water systems. In 9 member states, additional vulnerability criteria were considered in measuring water affordability.

49 Scotland: Fuel Poverty Act 2019. Are modelled annual fuel costs greater than 10% of income after housing costs?

Annex C – Our estimation methodology

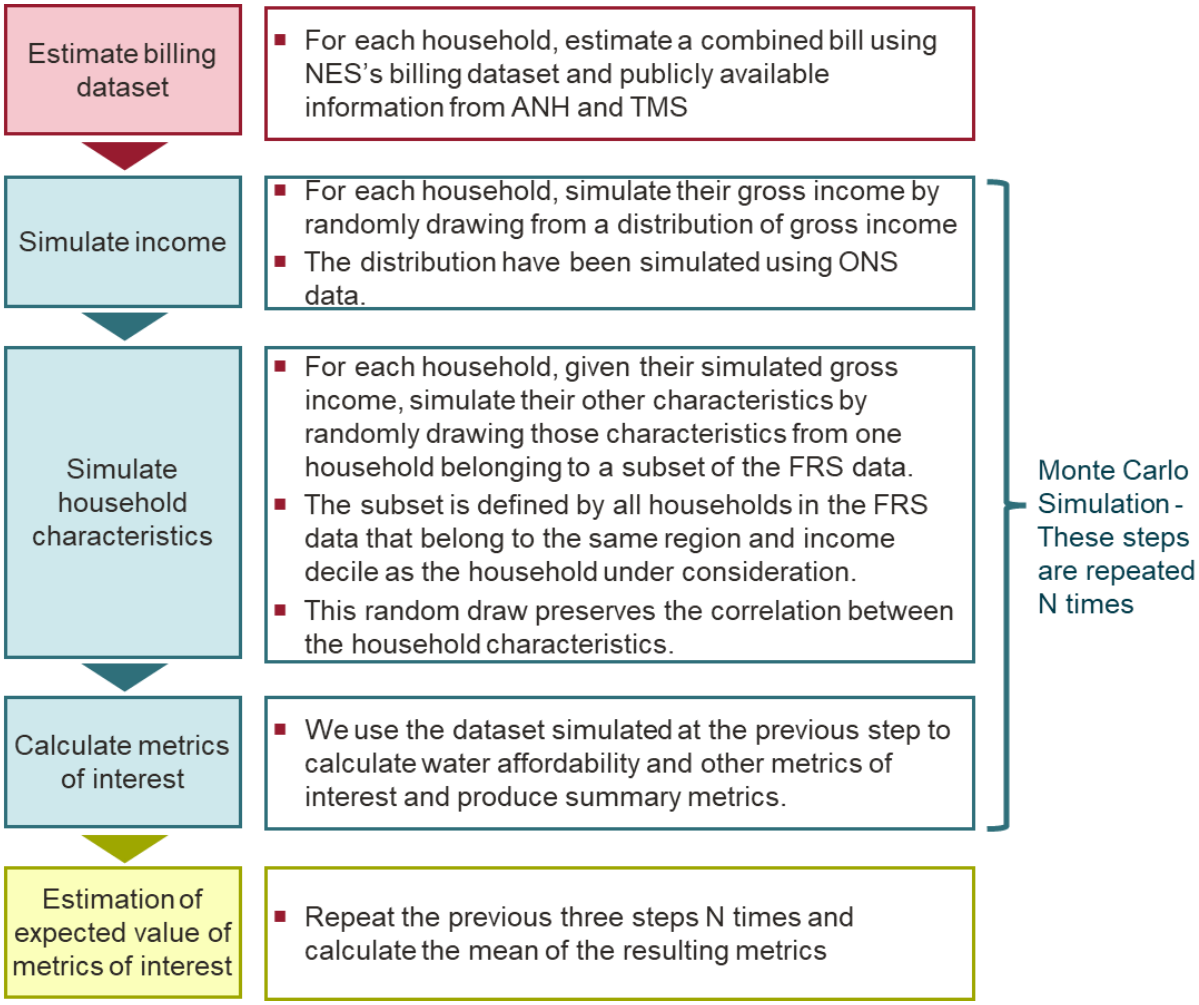
C.1 Overview

For this report, we employed a statistical simulation methodology to estimate the affordability of NES's bills. Affordability is determined by estimating the number of NES's households likely to have affordability challenges based on the two metrics detailed in this report. As the metrics depend on household bills and their socio-economic characteristics (e.g. income, number of children, benefits received), our methodology consists of combining projected billing information with simulated household-level socio-economic data. The core steps are:

- **Bill estimation:** We utilised FY2025 actual bill data provided by NES for combined water and sewerage services. To account for NES's water-only services (Essex and Suffolk) and wastewater-only services (Hartlepool) services, we integrated publicly available data from ANH and TMS. These combined bills were then projected to FY2030 under three different bill increase scenarios based on Ofwat's Final Determination and potential outcomes of CMA appeals (as explained in the main body of this report), incorporating assumptions about the uptake of NES's social tariffs and WaterSure.
- **Income data simulation:** As household-level income data was unavailable, we simulated this using distributions derived from OBR's reported growth in household disposable income from the most recent Economic and Fiscal Outlook. These characteristics were then forecast to FY2030 assuming that income grows with CPIH inflation based on response to information request, at the rates provided by NES.
- **Socio-economic data simulation:** As household-level socio-economic data was unavailable, we simulated this using distributions derived from the Office for National Statistics (ONS) FY2023 Family Resource Survey (FRS). Key characteristics such as number of children, and benefits received were included in the simulation. Our simulation considered the relationship between those socio-economic characteristics and the income derived at the previous steps. These characteristics were then forecast to FY2030 based on anticipated growth in income.
- **Affordability assessment:** The simulated socio-economic data was then matched with the projected billing data. We used this dataset to estimate affordability according to the two defined metrics (e.g., bill exceeding 5% of AHC equivalised disposable income under the current metric).
- **Accounting for uncertainty:** Recognising the inherent uncertainty in the simulated socio-economic data, we employed a Monte Carlo approach. This involved repeating the data simulation and affordability calculation numerous times. The average affordability across these simulations provides a robust estimate of the expected affordability levels. This same approach was used to estimate other metrics of interest, such as the cross-subsidy required.

Figure 9 summarises the key steps of our methodology. We discuss each of them in more detail in the following sections.

Figure 9 Overview of our estimation methodology



Source: Frontier Economics

C.2 Estimate billing dataset

To estimate combined water and sewerage bills for NES households in FY2030, we integrated FY2025 billing data provided by NES with publicly available information on ANH and TMS bills. Our projections to FY2030 are based on three bill scenarios outlined in this report, drawing upon Ofwat's Final Determinations and information from NES and ANH's SoC submissions.

NES provided FY2025 annual bill data at different levels of aggregation:

- **Social tariff and WaterSure households:** Household-level bills were provided both before and after applicable discounts.

- **Standard tariff households:** Bill information was aggregated at the Lower layer Super Output Area (LSOA) level, indicating the number of households within specific bill bands (starting at £0 and increasing by £20). This data included combined bills as well as water-only or wastewater-only bills, depending on the services provided by NES in each LSOA. NES also identified the other water or wastewater service providers operating in their area.

Our process to create the consolidated and projected bill dataset involved the following steps:

- **Household-level estimation for standard tariffs households:** For standard tariff households, we generated a household-level bill by assuming each household within a given LSOA and bill band paid the average bill for that band. For example, if 10 households in an LSOA were within the £400-£450 bill band, we estimated each of those households had a bill of £425.
- **Consolidated FY2025 household bill dataset:** We then merged the household-level bills for social tariff households with the estimated household-level bills for standard tariff households to create a FY2025 dataset.
- **Estimation of Combined Bills for Specific Service Areas:**
  - **Essex and Suffolk (NES provides water services, ANH and TMS provide wastewater services):** We estimated combined bills for single service households in these regions by adding the NES water bill to an estimated wastewater bill. The wastewater bill was derived by multiplying NES's water bill by a ratio. This ratio was calculated using DiscoverWater data as the average wastewater bill divided by the average water bill for the relevant region, specifically:
    - Ratio 1.40 for Anglian Water (ANH) service areas.
    - Ratio 1.07 for Thames Water (TMS) service areas.
  - **Hartlepool (NES provides wastewater services, ANG provides water services):** Northumbrian have confirmed they bill on behalf of Anglian in this service area, as such combined bills for these households were provided.
- **Projection to FY2030:** We projected the FY2025 bills to FY2030 by applying:
  - NES's inflation assumptions for the period.
  - Projected real bill increases based on Ofwat's Final Determinations and, for CMA scenarios, information from NES and ANH's SoC. Notably, we did not model potential bill increases for TMS beyond the Final Determination levels, as mentioned in the main report.

Table 5 and Table 6 below summarise our key assumptions to forecast bills.

Table 3 Projected average annual bill increase by FY2030 by bill scenario

		Additional % increase to FD bill value	
	Baseline (FD)	NES SoC	NES & ANH SoC
NES's bills	3.8% p.a.	7% p.a.	7% p.a.
ANH water bills	5.1% p.a.	0% p.a.	13% p.a.
ANH wastewater bills	5.1% p.a.	0% p.a.	13% p.a.

Source: Ofwat final determinations, NES SoC, ANH SoC

Table 4 Inflation assumption

	FY24	FY25	FY26	FY27	FY28	FY29	FY2030
CPIH inflation	5.55%	3.16%	3.20%	2.20%	1.83%	2.00%	2.00%

Source: NES's response to Frontier's data request

- Finally, we considered the impact of increasing the take-up of NES social tariffs on bills by:
  - Households who are on the social tariff in FY25 remain on the social tariff and continue to receive discount
  - Applying a discount to households moving to a social tariff
  - Proportionally[50] increasing the bills of households remaining on the standard tariff to account for the higher cross-subsidy requirements to fund the higher take-up.

As mentioned in the main body of the report, we assumed that by FY2030 all households eligible for NES's social tariff will be on the tariff. We have also assumed the number of households served does not increase across 2025-2030.

C.3 Simulating gross income

This section details the methodology for simulating household gross income. First, we have simulated an income distribution by Middle Super Output Area (MSOA) and household type (standard tariff households, social tariff households) for the NES region. Then, we have matched each household to a plausible income level depending on their MSOA and tariff they are on.

[50] The underlying assumption is that the standard tariff charges would increase proportionally to reflect the higher cross-subsidy required to fund a higher social tariff take-up.

Step 1: define income distribution by MSOA and household type (standard or social tariff)

We estimated income distributions at the MSOA level using a combination of the ONS income estimates for small areas and FRS data. Consistent with the ONS we assumed that income is log-normally distributed at the MSOA level.[51] The mean is assumed to be equal to the mean estimated by the ONS at the MSOA level; the standard deviation is assumed to be equal to the standard deviation at the region level from the FRS data. We truncate the distribution at £7,000. This approximates to the minimum gross income amount available for a single-person household of working age with no earned income through Universal Credit and housing benefit.[52]

We define two distributions: one for households on a social tariff, and the other for households not on a social tariff (standard tariff households).

- Social tariff households have a truncated distribution of gross income between £7,000 and £26,000. The upper bound is based on eligibility criteria for NES social tariff.
- Standard tariff households have the 'residual income distribution', such that the combination of the distribution of standard tariff households and social tariff households is equal to the assumed distribution at the MSOA level. The residual distribution was simulated for each MSOA as follows:
  - Draw a random sample of 1,000 observations from the MSOA income distribution truncated at £7,000.
  - Calculate proportion of households in the MSOA that are on the social tariff from the company dataset (6.7%).
  - Consider the subset of observations from the random sample for which gross income is less than £26,000 and remove at random 6.7% of those observations.
    - The resulting dataset is a simulation of the residual distribution. We draw gross income of standard tariff households based on this simulated distribution.

51 ONS, Income estimates for small areas, England and Wales. https://www.ons.gov.uk/employmentandlabourmarket/peopleinwork/earningsandworkinghours/datasets/smallareaincomeestimatesformiddlelayersuperoutputareasenglandandwales

52 We recognise that it is possible for households to have less income than this, for instance if a household does not have earned income but is not eligible for benefits due to savings (Universal Credit is not available for those with £16,000 or more in money, savings and investments. https://www.gov.uk/universal-credit/eligibility) or if an individual does not have access to the UK benefits system due to their immigration status. If households with these very low levels of income with savings persist in having very low income, they will become eligible for Universal Credit and therefore receive this minimum income amount at a future date once their savings reduce.

Step 2: for each household draw gross income from its corresponding distribution

For each simulated household, we randomly drew a gross income value from the appropriate distribution based on their tariff type (social or standard) and the MSOA they reside in. Subsequently, we assigned each household to a regional income decile identified in the FRS dataset based on their drawn gross income. This is needed to match other socio-economic characteristics, as described in the following section C.4.

Output of the simulation

The output from this simulation is a dataset with households with gross income.

It is likely that bills are correlated with some of the household characteristics, including income. However, we consider that water bill data in FRS data was not sufficiently reliable to base a correlation on as it is survey data on what households paid for water and wastewater and not what their bills were (i.e. it will include any existing social tariffs, bad debt and where individuals are not clear on what their bill is – for example if the price of water is included in rent). We did not use it to determine a correlation between income and bills; and we note that the previous 2021 Water UK study found a very small correlation between these factors.

C.4 Simulating household characteristics

Having allocated an income to the household, we then simulate the other characteristics of the households by randomly drawing from the subset of households in the FRS dataset which belong to the same region and income decile. We rely on the FRS data for this allocation of characteristics because the distribution of these characteristics is not available at the MSOA level. By picking at random one of those households and assign their characteristics to the household under consideration, we preserve the relationship between the household characteristics. We repeat this process for all households (sampling with replacement).

For each household, we calculate the following variables:

- Benefits and housing costs are estimated by applying the proportion of benefits and housing costs out of gross income calculated from the FRS dataset to the gross income draw. By applying the proportion, we preserve the relationship between gross income and benefits, and gross income and housing costs observed in the FRS data.
- Equivalised, disposable income. For the equivalisation we use household size data, and the OECD modified scale which is (1 + 0.5*(adults-1) + 0.3*children[53]. Disposable income is defined as gross income minus housing costs and tax. We use

[53] https://www.oecd.org/els/soc/OECD-Note-EquivalenceScales.pdf

a simplified income tax estimate, applying the 2020/21 rates[54] to income net of benefits as we assume that benefits are not taxed. We do not make tax adjustments based on the number of people in the household.

The output from this step and the previous step is a dataset with households with gross income and household characteristics for FY2023. We forecast income and household characteristics to FY2030 using the following assumptions:

- Gross income. Increase in line with inflation based on response to information request, at the rates provided by NES (outlined in Table 4).
- Benefits. Increase in line with Gross income as above.
- Housing costs. Increase in line with inflation based on response to information request, at the rates provided by NES (outlined in Table 4).

C.5 Calculation of metrics of interest given simulated dataset

We are interested in the number of households with affordability problems in FY2030. We calculated this by counting the number of households which are identified with affordability challenges under the two metrics based on the dataset of bills, income, and socio-economic characteristics estimated at the previous step.

C.6 Estimation of expected value of metrics of interest

To address the uncertainty in the random draws from the previous steps, we use a Monte Carlo approach and repeat the simulation of the income and socio-economic characteristics 100 times. We then take the average of the resulting statistics as our best estimate of the expected value of those statistics, i.e. affordability and cross-subsidy.

54 https://www.gov.uk/government/publications/rates-and-allowances-income-tax/income-tax-rates-and-allowances-current-and-past