Cost Adjustment Claim

Average Pumping Head

ANH CAC 1.1

Anglian Water

June 2023

Document reference	Narrative file: ANH CAC 1.1 APH		
Title of cost adjustment claim	Average Pumping Head CAC		
Price control	Water Network Plus	Symmetrical?	YES/~~NO~~
Basis of claim	APH is generally accepted to be the best available measure of topography for cost modelling purposes. The concerns raised over the quality of APH data during PR19 and the subsequent CMA process have substantially been addressed by the industry since the start of AMP7		
Gross value (£m five years)		£1,780.6 million	
Implicit allowance (£m five years)		£1,650.1 million	
Net value of claim (£m five years)		£130.5 million	
How efficiency of costs are demonstrated		Cost efficiency is demonstrated by using Ofwat's suite of base cost models. Using APH, ANH is 4th most efficient with an efficiency score of 0.99	
Materiality (as % of totex for price control)		> 3.5%	
How customers are protected		Assurance on this CAC has been provided by Oxera	
Supporting document references		Excel file: ANH CAC 1.2 Oxera assurance: ANH_CAC_0.1 Assurance PR24 Template ANH_CAC_0.2	

Contents

1. Initial points to note

This CAC is submitted on a contingent basis. Anglian Water notes the use of APH by Ofwat in some of its suite of models released in April 2023 to take account of the impact of topography models on required costs in the Treated Water Distribution and Wholesale Water. If APH were to be included in all the relevant models used by Ofwat for PR24 as the only topography driver, then this CAC would not be required. Anglian is submitting the CAC in accordance with advice provided by Ofwat during the Cost Assessment Working Groups during 2021 and early 2022.

Anglian Water argued consistently during the PR19 and subsequent CMA process that APH ought to be included in its PR19 models. Both Ofwat and the CMA rejected this contention on the grounds that the data quality for APH was not adequate enough at that time. During the PR24 Cost Assessment Working Group process, Anglian Water once again argued that APH ought to be reinstated and proposed that there should be an industry-wide effort to improve data quality. The subsequent project led by Turner and Townsend and WRc and subsequent efforts by the industry has led to not just a material improvement in data quality but also a re-evaluation on the part of industry members of the value of APH within the business for assessing and improving pumping efficiency. As a result of this renewed focus on APH and its data quality and a separate exercise by Ofwat to assure the cost data used in recent months, the concerns which led it the PR19 claim being dismissed have now been addressed.

During the CMA process, Ofwat agreed that APH is its preferred variable to take account of topography in cost models. The superiority of APH compared to Pumping Stations per length of mains (PS/L) was also highlighted by CEPA in its modelling report (p. 23): "*Most pumping costs are related to treated water distribution so we would expect APH to be most relevant for explaining TWD costs*".[1] Given that Ofwat had been using APH within cost models for two decades, this is unsurprising. The clear causal relationship between APH and pumping power consumed, and the absence of a clear causal relationship for the alternative of Pumping Stations per length of mains (PS/L), made this position entirely uncontentious. In our base cost consultation response, we provided evidence on this point by showing the absence of correlation between PS/L and energy consumption. Consequently, as the only obstacle that stood in the way of using APH was the data quality, which has now been addressed, we would not expect to see any of the PR24 models use PS/L as a 'topography' driver.

Ofwat's triangulation ought to be between *equally valid* alternative explanations of cost causality. We do not think, therefore, that triangulating separate models with APH and with PS/L is valid: the latter is, at the very least, a much poorer measure of topography: we indeed would contend it is not a measure of topography at all.

We have included, and netted off, the Implicit Allowance (IA) included in the Ofwat models for APH. In line with our view of PS/L as not representing a measure of topography, we have taken the existing formulation of the proposed PR24 models as the basis for computing the IA.

[1] CEPA (2023), 'PR24 Wholesale Base Cost Modelling', April, p.23.

In line with the guidance provided by Ofwat, this CAC:

- Relates purely to base costs;
- Includes explicitly calculated IAs;
- Sets out the symmetric adjustments relevant to all other companies; and
- Is above the materiality threshold set for Water Network Plus.

The rest of this CAC is set out as follows:

- Section 2 addresses the need for adjustment
- Section 3 addresses the efficiency of the costs proposed in the CAC
- Section 4 sets out the structure of the CAC
- Section 5 sets out the table which make up the CAC
- Appendix 1 sets out this CAC's conformity with Ofwat's criteria for assessing CACs

2. Need for adjustment

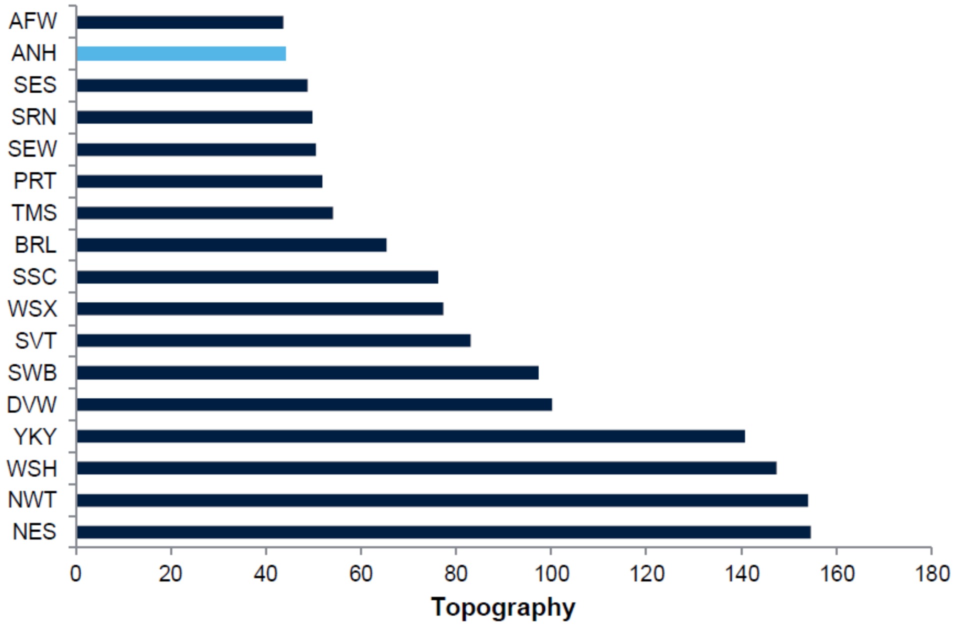
This section provides evidence setting out the unique circumstances which justify this CAC. It also demonstrates the exogeneity of these factors and, as such, that these factors are outside management control. (This section replicates and updates the analysis undertaken by Oxera for Anglian Water in 2020 for the CMA appeal in that year).

Anglian Water operates in a region with specific characteristics that drive higher pumping costs relative to other companies. Below, we set out the characteristics that, in combination, make Anglian Water unique, in particular with regard to topography, sparsity and abstraction.

Topography

First, Anglian Water operates in a very flat region relative to other water companies. This can be seen in Figure 1. To compute our measure of topography we have taken samples of elevation from Local Authority districts and calculated the standard deviation across this distribution for each water company region. A low score therefore represents a very flat region.

Figure 1: Topography of Water company regions



Source: Oxera analysis of topography data extracted using the Environment Agency's LIDAR Composite DTM (Digital Terrain Model) raster elevation model in combination with our inhouse GIS platform 'MapInfo Professional'.

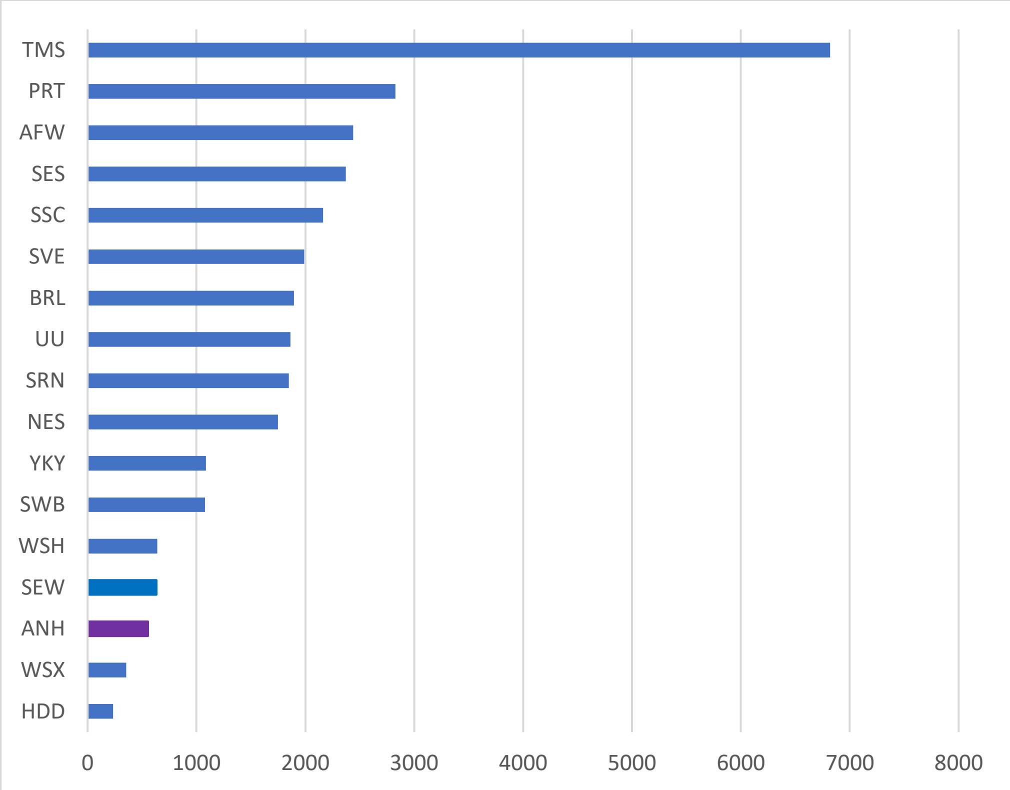
Companies that operate in very flat regions are less able to rely on gravity-fed systems of pumping, and instead must use more energy-intensive high lift pumps and water towers through the treated water distribution network to a much greater extent.

Sparsity

Anglian Water also operates in a very sparsely populated region. Figure 2 below plots the improved version of the density measure used at PR19, i.e. WAD LAD from MSOA water where a low number represents a sparsely populated region. Other things being equal, a sparser region with few dense areas in it means that more pumping will be required to bring water across relatively longer distances.

While sparsity may be captured, to some extent, in Ofwat's models, they do not capture the *combination* of external characteristics that affect Anglian Water's pumping costs. As such a CAC is incremental to Ofwat's models and we calculate the incremental impact relative to these models.

Figure 2: Density as measured by WAD LAD from MSOA water (2022 data)



Analysis: Anglian Water

Abstraction sources

A third characteristic that will have an impact on a water company's pumping costs is the proportion of distribution input that is abstracted from boreholes and pumped into pumped storage reservoirs. Water abstracted from boreholes and pumped into pumped storage reservoirs will have more energy-intensive pumping requirements compared with abstraction from rivers.

Table 1 shows the proportion of distribution input derived from impounding reservoirs, river abstractions and boreholes shown as a proportion of DI abstracted by source, expressed as a share of the industry average in 2022. We see that the proportion of distribution input that Anglian Water abstracts from boreholes and from pumped storage reservoirs is higher than the industry average, whereas the proportion coming from rivers is much lower.

Table 1: Proportion of DI abstracted by source, % of industry average

	Boreholes	Rivers	Pumped storage Reservoirs
Anglian Water	167%	27%	157%
Industry 25th percentile	55%	5%	4%
Industry 75th percentile	220%	155%	113%

Analysis: Anglian Water

Anglian Water's unique characteristics

We have considered the exogenous characteristics of water companies that are relevant to explaining why certain companies would incur higher pumping costs than others. Anglian:

- Operates in a very flat region;

- Has very low density measures;
- Derives a relatively high proportion of its distribution input from boreholes and pumped storage reservoirs.

We note that it is the *combination* of these three factors that results in Anglian Water being atypical with regard to the pumping costs it needs to occur. Other companies that operate in very flat regions do not necessarily also have a high level of population sparsity, for instance Affinity. Likewise, highly sparse water regions are often not especially flat (e.g. Wessex Water). Similarly, while Portsmouth has a high proportion of distribution input abstracted from boreholes, it is neither sparse nor flat. It also benefits from being able to use a mostly gravity-fed system (its APH is low both in aggregate and for Water Resources Plus).

SES has a high proportion of distribution input abstracted from boreholes and it is also quite flat (although fairly densely populated). Its APH is high in aggregate—at a similar level to Anglian Water. However, SES successfully secured a cost adjustment claim for abstraction pumping costs at PR19.[2]

We would also like to highlight that these unique characteristics have a direct impact on our energy usage and greenhouse gas emissions. We note that the normalisation of the new operational greenhouse gas emissions performance commitments will be based on distribution input and volume of wastewater treated. This misses a crucial driver of emissions, namely the level of pumping required to move water and wastewater to and from customers. While Ofwat will set company specific performance commitment levels for emissions, relative performance comparisons are less relevant for assessing ambition in performance and regard will need to be given to how proactive companies have been historically, as well as their operating conditions.

[2] See SES Water (2019), 'PR19 Business Plan Resubmission: Cost adjustment claim for wholesale electricity usage'

3. Demonstrate cost efficiency

In terms of cost efficiency, our starting point for this CAC was to replicate the approach used by Ofwat and the CMA for setting efficient cost assessments at PR19, but in the context of the PR24 modelling suite. The calculation is made on two separate bases: models excluding APH and instead using Pumping Stations/Length (PS/L) (used to derive the Implicit Allowance for the CAC) and including APH in the TWD and wholesale models in place of PS/L. The arithmetic difference between the two represents the value of the CAC. Taking this approach has the advantage that it automatically generates the value of the symmetric adjustments for all other companies at the same time.

However, we note that in both modelling scenarios the level of an Upper Quartile (UQ) efficiency challenge is above 1, implying that the application of a UQ challenge would increase costs. This is counterintuitive but not surprising given the higher cost pressures faced by the industry over the last two AMPs. Indeed, it is 1.021 when we rely exclusively on PS/L and 1.002 when we rely exclusively on APH. We note that this also applies in one of the two scenarios if the benchmark is set to the fourth most efficient company. In this context we do not consider that it is relevant to apply an 'inefficiency' challenge. As such, the estimation of our CAC is based on the difference in predicted costs between both scenarios without any efficiency challenge. This is not directly relevant to this CAC but the increase in efficiency scores raises concerns about the ability of Ofwat's modelling to capture higher cost trends within the water industry, so we would expect Ofwat to consider the issue in advance of PR24 (for example through our CAC on energy costs). In any case, we intend to re-estimate the level of the UQ once the 2022/23 data becomes available in order to check whether this issue is still present.

In 2022/23 Price Base, the Anglian Water APH CAC is estimated to be £130.5 million (see Section 5 below). At present, Anglian Water's Water Network Plus Totex for AMP8 currently estimated at around £3.5 billion. Given the level of materiality set by Ofwat for Water Network Plus CACs is 1% (i.e. £35 million), this CAC clearly exceeds the materiality threshold.[3] While this CAC is derived by comparing a scenario using models with APH only to a scenario using models with PS/L only, we would still submit a CAC if Ofwat were to use both equally in the models. In that case the amount of the claim would decrease to £65.3m while still exceeding the materiality threshold.

Anglian Water submits an Excel spreadsheet showing the different steps undertaken to get the final estimate of the CAC.

Third party assurance for this CAC is provided by Oxera.[4]

[3] This demonstrates materiality.
[4] See ANH_CAC_0.1 Assurance

4. Structure of this CAC

In this section we set out the approach we have taken to computing this CAC. Having used only industry data which are freely available and have been thoroughly scrutinised, the approach is both transparent and replicable.

The approach taken was to start from the Ofwat / CMA PR19 approach to assessing base costs[5] but by using Ofwat's proposed modelling suite for PR24 so as to generate an estimate of what may be expected from PR24 Draft Determination.

The Implicit Allowance (IA) is the base cost assessment using the 24 PR24 models for water (six Water Resource Plus, six Treated Water Distribution (TWD) and twelve wholesale models). This was generated using the data set and STATA do file issued by Ofwat in April 2023. Anglian Water then created an Excel file with the updated coefficients and modelled costs generated by STATA.

The models are generated using data from 2012 – 2022. The data sets used were those issued by Ofwat in April 2023. These are used to compute the Upper Quartile as defined by the CMA, which we intended to use for the catch up if it were not above 1. AMP8 cost drivers are generated in the Excel file using the methodology explained in the previous section. Actuals up to 2022 are used, followed by forecast data up to the end of AMP8 using, where appropriate, the same approach as Ofwat at PR19. Where Ofwat used averages of its trended number and the company forecast, we have used just the trended numbers as, naturally, we do not have all companies' forecasts for AMP8 available to us.

The comparator is provided by the same models with the PS/L variable replaced by APH_{TWD} in the three TWD models as well as in the six total wholesale water models.[6] This follows the approach taken by Ofwat in its April 2023 suite of models: Ofwat felt that the data quality for areas of APH other than Treated Water Distribution was still not sufficient to warrant its use in models. Consequently, APH_{TWD} was used in all wholesale models in place of APH_{Total}.

The computed figure is based on the currently available data panel as at early June 2023. When the 2022/23 data become available in mid July, the CAC will need to be updated to take account of the additional data.

[5] We have followed the same aggregation process as in PR19, namely: applying an equal weight to each model within a single cost aggregation (Treated Water Distribution, Water Resources Plus or Wholesale Water), applying an equal weight between the bottom-up approach and the top-down approach, computing the catch-up efficiency challenge on a historical basis based on triangulated costs.

[6] We have retained this approach as it was the one that required less modifications of Ofwat's do file. However, this is, of course, perfectly equivalent to removing all models with PS/L.

5. CAC data tables

As required by the table guidance[7] for CW18 (Water CACs)[8], Anglian Water quotes the IA before the application of Frontier Shift and RPE. For the sake of consistency, the same approach has been taken with the APH versions of the models. However, although Ofwat's guidelines are clear about the need to apply a catch-up efficiency challenge to compute the amount of the claim and the IA, we have not applied it here since the level of the UQ is above 1, which would result in a higher value for the claim.

The figures set out in the following tables are of modelled costs only.

£m, 22/23 PB	PS/L only used in all models	APH_{TWD} only used in all models[9]	Delta APH_{TWD} used in all models	Delta APH TWD only used %
ANH	1,650.1	1,780.6	130.5	7.9%
AFW	1,229.9	1,184.4	-45.5	-3.7%
BRL	420.2	398.7	-21.4	-5.1%
HDD	141.2	135.1	-6.1	-4.3%
NES	1,431.4	1,381.8	-49.5	-3.5%
NWT	2,503.5	2,306.9	-196.6	-7.9%
PRT	201.1	168.5	-32.6	-16.2%
SES	176.4	216.5	40.2	22.8%
SEW	721.4	779.3	57.9	8.0%
SRN	912.1	800.7	-111.4	-12.2%
SSC	503.8	589.5	85.8	17.0%
SVE	3,042.6	2,840.5	-202.1	-6.6%
SWB	795.1	890.4	95.3	12.0%
TMS	4,353.5	5,089.7	736.2	16.9%
WSH	1,317.3	1,207.7	-109.7	-8.3%
WSX	542.8	537.4	-5.4	-1.0%
YKY	1,749.7	1,542.9	-206.8	-11.8%

For the purpose of filling in table CW18, we have disaggregated the Anglian Water's AMP8 modelled costs based on both scenarios. As this CAC only impacts Treated Water Distribution, there is no loss in accuracy of the IA calculation by not splitting Treatment and Raw Water Distribution.

ANH with PS/L 22/23 PB £m	2026	2027	2028	2029	2030	AMP8
Water Resources	33.4	33.6	33.9	34.1	34.4	169.4
Treatment (& RWD)	80.1	80.7	81.2	81.8	82.4	406.2
TWD	211.9	213.4	214.9	216.4	217.9	1,074.4
Total ANH with PS/L	325.4	327.7	330.0	332.3	334.7	1,650.1

ANH with APH 22/23 PB £m	2026	2027	2028	2029	2030	AMP8
Water Resources	36.3	36.4	36.6	36.7	36.8	182.8
Treatment (& RWD)	87.1	87.4	87.7	87.9	88.2	438.4
TWD	230.5	231.2	231.9	232.6	233.3	1,159.4
Total ANH with ANH	353.9	355.0	356.1	357.2	358.3	1,780.6

[7] PR24 business plan table guidance part 3; Costs (wholesale) - water

[8] "The value of the implicit allowance should be calculated after the application of the catch-up efficiency challenge, but before the application of frontier shift and real price effects. Companies should clearly set out the assumption used for the catch-up efficiency challenge." 21.5 p. 88.

[9] In other words, APH_{TWD} has been used in both TWD and WW models.

ANH IA22/23 PB, £m	2026	2027	2028	2029	2030	AMP8
Water Resources	0.0	0.0	0.0	0.0	0.0	0.0
Treatment (& RWD)	0.0	0.0	0.0	0.0	0.0	0.0
TWD	28.5	27.3	26.1	24.9	23.7	130.5
Total IA	28.5	27.3	26.1	24.9	23.7	130.5

Appendix 1: Conformity with Ofwat's criteria for assessing CACs

Category	#	Issue	Response
Need For Adjustment: Unique Circumstances	1	Is there compelling evidence that the company has unique circumstances that warrant a separate cost adjustment?	Anglian Water does not contend that it faces unique circumstances regarding the use on non-use of APH within its models. Instead, its argument centres on how APH acts as an effective measure of topography and why Ofwat's concerns over APH data quality have now been addressed
	2	Is there compelling evidence that the company faces higher efficient costs in the round compared to its peers (considering, where relevant, circumstances that drive higher costs for other companies that the company does not face)?	Not relevant – see answer to 1 above.
	3	Is there compelling evidence of alternative options being considered, where relevant?	At its heart, this CAC focuses on the shortcomings of the alternative option used at PR19, Pumping Stations/Length
Need For Adjustment: Management Control	1	Is the investment driven by factors outside of management control?	The facts that a) topography is a factor influencing our costs; and b) that the topography of our region is outside management control are not at question
	2	Have steps been taken to control costs and have potential cost savings (eg spend to save) been accounted for?	Pumping costs are monitored closely so as to ensure the efficient use of power
Need For Adjustment: Materiality	1	Is there compelling evidence that the factor is a material driver of expenditure with a clear engineering / economic rationale?	Yes. The engineering and economic rationale were reprised in the work undertaken by Turner and Townsend and WrC
	2	Is there compelling quantitative evidence of how the factor impacts the company's expenditure? Adjustment to allowances (including implicit allowance)	Yes. The CAC above sets out the quantification of using APH as opposed to PS/L
	3	Is there compelling evidence that the cost claim is not included in our modelled baseline (or, if the models are not known, would be unlikely to be included)? Is there compelling evidence that the factor is not covered by one or more cost drivers included in the cost models?	As set out at the start of the CAC, this claim is contingent on APH not being included in the model suite used by Ofwat at PR24.

	4	Is the claim material after deduction of an implicit allowance? Has the company considered a range of estimates for the implicit allowance?	Yes
	5	Has the company accounted for cost savings and/or benefits from offsetting circumstances, where relevant?	Not relevant
	6	Is it clear the cost allowances would, in the round, be insufficient to accommodate the factor without a claim?	The impact of not using APH within the base model suite would be to understate the impact of topography upon cost allowances.
	7	Has the company taken a long-term view of the allowance and balanced expenditure requirements between multiple regulatory periods? Has the company considered whether our long-term allowance provides sufficient funding?	Not relevant – topography does not change from AMP to AMP
	8	If an alternative explanatory variable is used to calculate the cost adjustment, why is it superior to the explanatory variables in our cost models?	This is intrinsic to this claim. See section 2 above.
Cost efficiency	1	Is there compelling evidence that the cost estimates are efficient (for example similar scheme outturn data, industry and/or external cost benchmarking, testing a range of cost models)?	Yes – see associated Excel workbook
	2	Does the company clearly explain how it arrived at the cost estimate? Can the analysis be replicated? Is there supporting evidence for any key statements or assumptions?	Yes – see associated Excel workbook
	3	Does the company provide third party assurance for the robustness of the cost estimates?	Yes – this is provided by Oxera[10]
Need for investment	1	Is there compelling evidence that investment is required?	Not applicable
	2	Is the scale and timing of the investment fully justified?	Not applicable
	3	Does the need and/or proposed investment overlap with activities already funded at previous price reviews?	Not applicable
	4	Is there compelling evidence that customers support the need for investment (both scale and timing)?	Not applicable
Best option for customers	1	Did the company consider an appropriate range of options to meet the need?	Not applicable

[10] See ANH CAC 1.3

	2	Has a cost–benefit analysis been undertaken to select proposed option? There should be compelling evidence that the proposed solution represents best value for customers, communities and the environment in the long term? Is third-party technical assurance of the analysis provided?	Not applicable
	3	Has the impact of the investment on performance commitments been quantified?	Not applicable
	4	Have the uncertainties relating to costs and benefit delivery been explored and mitigated? Have flexible, lower risk and modular solutions been assessed – including where utilisation will be low?	Not applicable
	5	Has the company secured appropriate third-party funding (proportionate to the third party benefits) to deliver the project?	Not applicable
	6	Has the company appropriately presented the scheme to be delivered as Direct Procurement for Customers (DPC) where applicable?	Not applicable
	7	Where appropriate, have customer views informed the selection of the proposed solution, and have customers been provided sufficient information (including alternatives and its contribution to addressing the need) to have informed views	Not applicable
Customer Protection	1	Are customers protected (via a price control deliverable or performance commitment) if the investment is cancelled, delayed or reduced in scope?	Not applicable
	2	Does the protection cover all the benefits proposed to be delivered and funded (eg primary and wider benefits)?	Not applicable
	3	Does the company provide an explanation for how third-party funding or delivery arrangements will work for relevant investments, including the mechanism for securing sufficient third-party funding?	Not applicable