

Boundary box Cost Adjustment Claim

PR24 Draft Determination Representations – August 24



Covering page

Document reference	ANH_DD_009		
Title of cost adjustment claim	Boundary box replacements		
Price control	Water Network Plus	Symmetrical?	YES /NO
Basis of claim	<p>We were an early adopter in significantly rolling out metering. The housing of these meters ('boundary boxes') have a limited asset life and see deterioration over time due to material degradation exacerbated by ground movement. Because we installed meters earlier than other companies we are now experiencing higher rates of failure (and thus the cost to repair and replace) of this meter housing. We expect these volumes to materially increase in AMP8. This cost adjustment claim reflects our expected costs to resolve this increasing volume of failures.</p>		
Gross value (£m five years)	155.4		
Implicit allowance (£m five years)	17.4		
Net value of claim (£m five years)	138.0		
How efficiency of costs are demonstrated	The unit rate is derived from market testing of costs from potential suppliers of boundary box replacements. We have assumed a further efficiency challenge on the basis of economies of scale.		
Materiality (as % of totex for price control)	3.2 £138.0m as % of £4,254m		
How customers are protected	Customers would be protected through a price control deliverable mechanism		
Supporting document references	<p>We submitted these supporting documents with our June 2023 cost adjustment claim:</p> <p>ANH_CAC_6.2 – Meter penetration analysis ANH_CAC_6.3 – Boundary box failure analysis</p>		

Contents

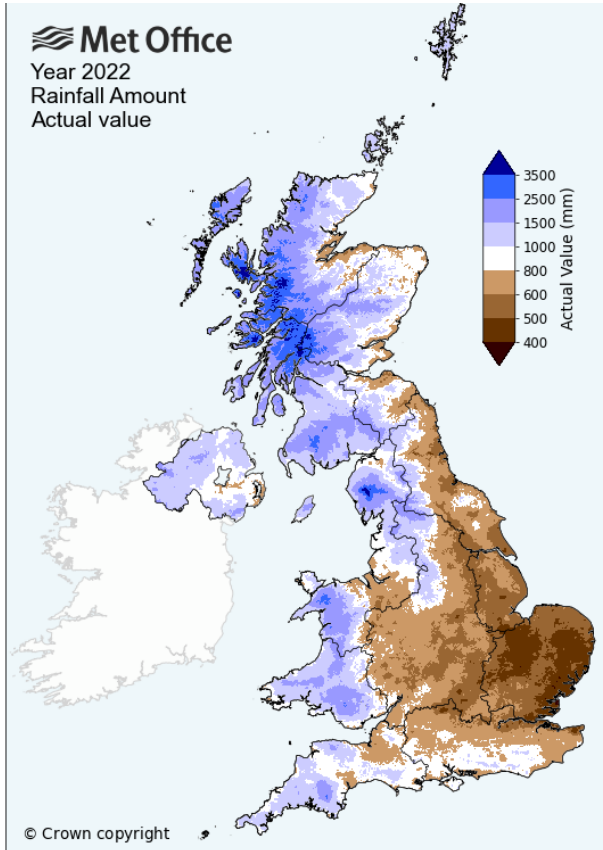
1. Need for adjustment	4
2. Cost efficiency	17
3. Need for investment	18
4. Best option for customers	20
5. Customer protection	22

1. Need for adjustment

1.1. Unique circumstances

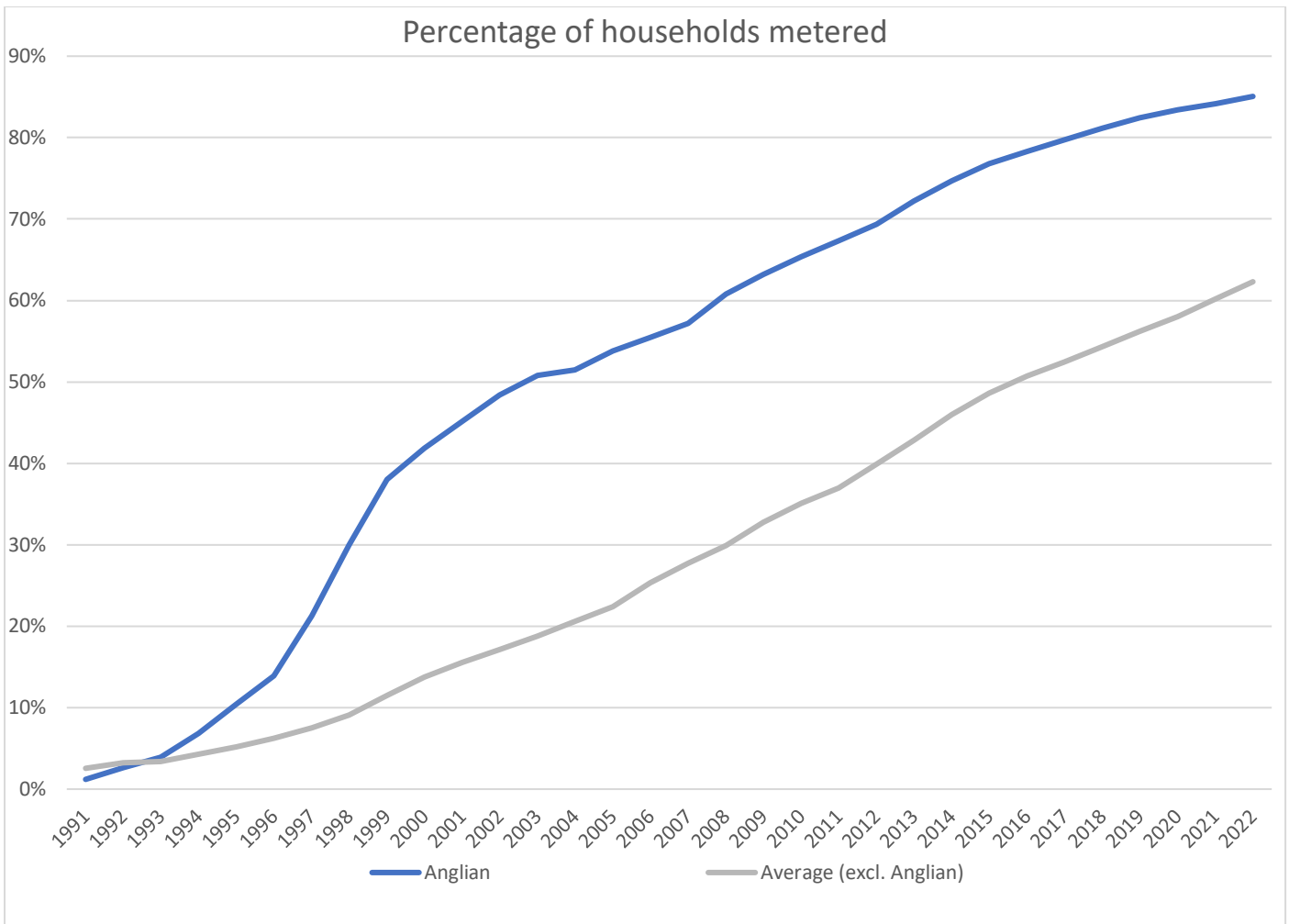
a) Is there compelling evidence that the company has unique circumstances that warrant a separate cost adjustment?

Anglian Water operates in the driest region of the UK. It has been recognised for multiple AMPs that this puts particular strain on the supply-demand balance compared to other companies. This can be seen by the 2022 rainfall amount as summarised by the below map from the Met Office.



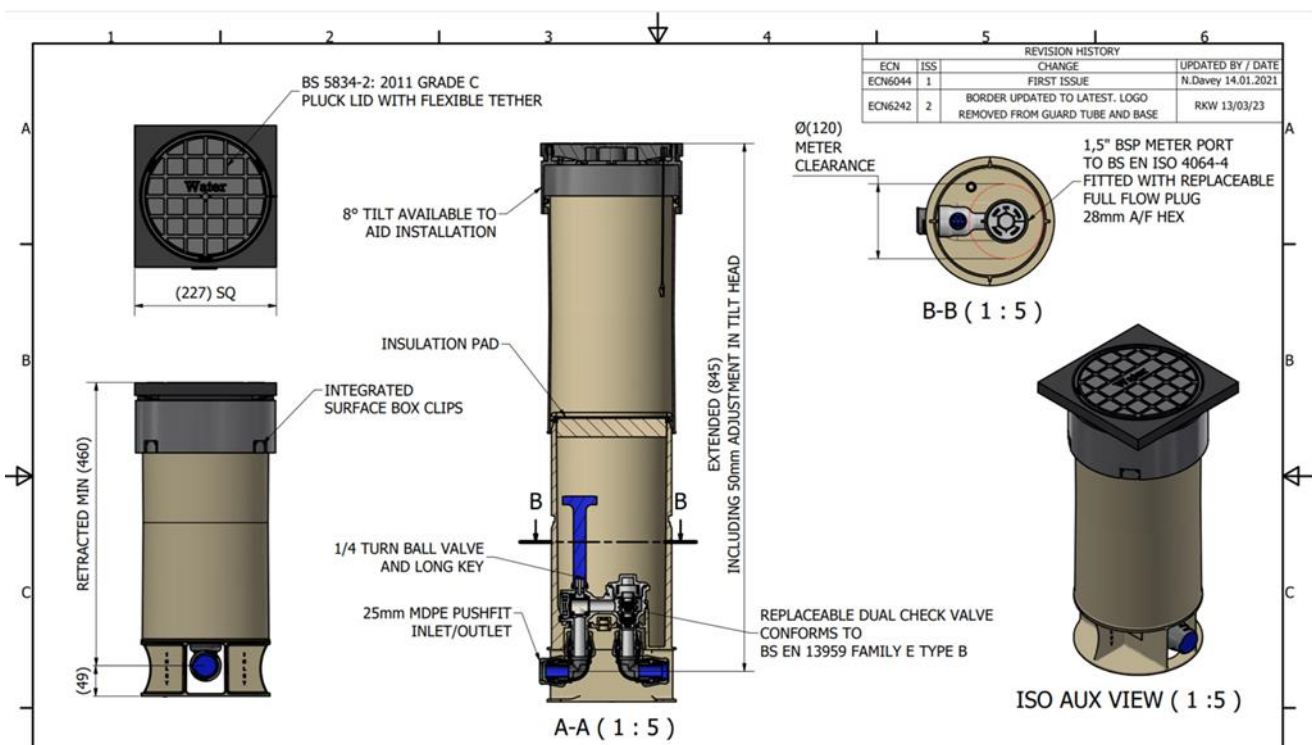
It is because of this that we have historically sought (and continue to seek) ways to ensure security of supply to customers whilst protecting the environment and being appropriately prepared for future supply-demand stresses from climate change, population growth and the need for greater environmental protection. This has required a twin-track approach of supply- and demand-side measures. There has been a historical preference to make sure that we make the most of demand-side measures to address the supply-demand balance. One of the ways to do this was to be the first mover on implementing the large-scale rollout of meters to allow customers to be charged based on their water usage (alongside programmes to drive down leakage and encourage water efficiency by customers). By 2000, we had reached a household meter penetration rate of 42%. This compared with a rate of the next highest company of 23% and an overall industry average (excluding Anglian) of 14%.

Our early adoption of water meters was strongly encouraged by Ofwat and financially supported through price controls.



Within our region most water meters are housed within a below-ground chamber ('boundary box') at the edge of a customer's property. This enables easy access to the meter, allowing it to be read. As with all assets, these boundary boxes have an asset life at the end of which one would expect it to be replaced.

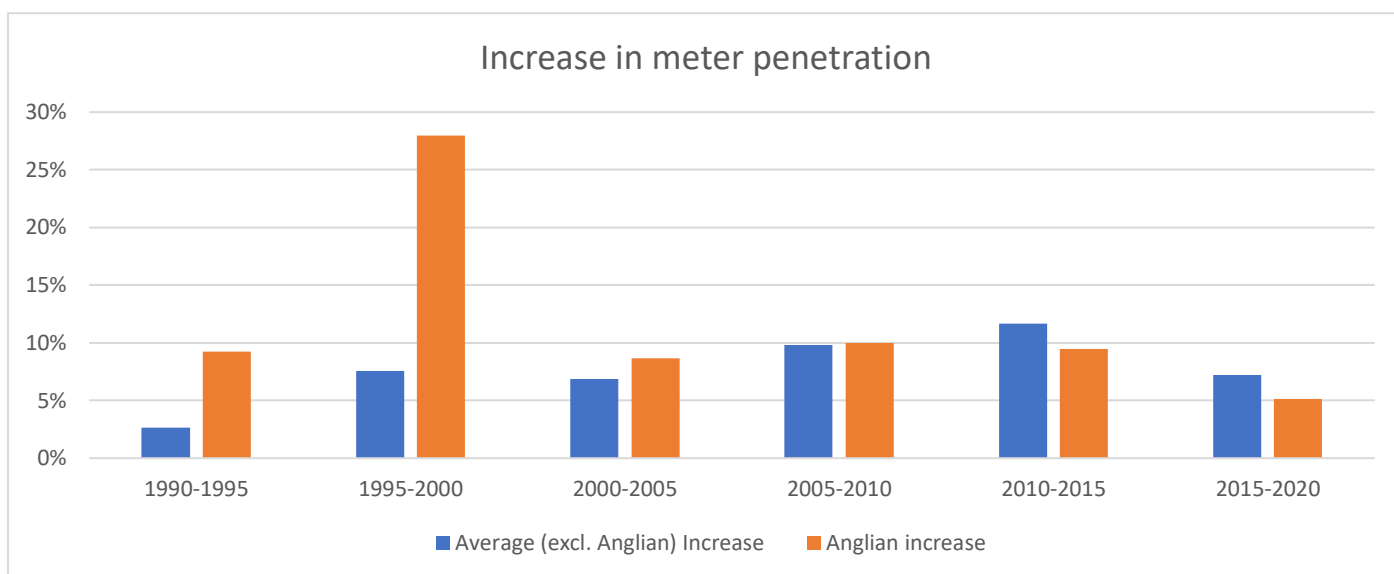
The image below provides an illustration of what an HDP boundary box looks like:



Due to the combination of high meter penetration, early installation of meters and their housing and the asset life of these boundary boxes, we are in a unique position of seeing significantly higher maintenance costs than other companies for the replacement of these boundary boxes in AMP8.

This is a new cost adjustment claim for PR24 (i.e. it has not been requested in previous price reviews) because the above factors are now coming together to cause a significant increase in boundary box replacement in AMP8 compared to AMP7 and previous AMPs. Given that we were the first company to install these assets at a large scale and other companies have subsequently seen an increase in their meter penetration, we would expect other companies to encounter the same maintenance challenge in future AMPs.

This is not a cost which balances out over multiple AMPs because our meter penetration rate is still c. 20 percentage points above the industry average. This is illustrated in the chart below, showing the increase in meter penetration over each five year period since 1990 (using the same data as the chart above). The blue bars show that boundary box replacements are likely to increase in future AMPs, with our rate broadly following the industry for installations after 2000, but before then Anglian faces a significant increase in replacements as those installed before 2000 reach the end of their asset lives.



As set out later in this cost adjustment claim, we are already experiencing increasing boundary box replacement volumes in AMP7 as those boundary boxes installed in the early 90s reach the end of their asset lives. Based on the installation dates above, we expect a further significant increase in AMP8.

b) 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)?

As previously stated, we face higher efficient costs of boundary box replacement than other companies because of the initial timing of meter installations (i.e. there is a period between meter installation and the boundary box reaching the end of its asset life where no maintenance costs are required to replace the boundary box). Boundary boxes have an expected asset life of 25-30 years, and so we are now experiencing a significant increase in the number of boundary boxes that need replacing as we reach 25-30 years after the initial installation of these boundary boxes. We see no related factor that compensates for this disadvantage.

c) Is there compelling evidence of alternative options being considered, where relevant?

We have carefully considered the different options available to us to manage the costs associated with maintenance of meters and their chambers, both upon initial installation and when the boundary box fails and needs replacing. These options typically come down to a) where the meter is located and b) the material that is used to house the meter.

Meter location

The key causes of boundary box failures include their exposure to the surrounding environment, deterioration of the boxes in line with their expected asset life and impact from other external factors such as traffic. The alternative option to externally located meters would be to house meters internally within the customer's property. This would reduce the exposure of the boundary box to the strains which cause them to fail or remove the need for a boundary box at all. However, these benefits must be considered alongside the other impacts this would have and the context within which meters were first installed.

Historically, meters have been located externally for a number of reasons:

- In 1995, our increase in meter penetration was brought about by high customer demand for switching from unmeasured to measured charges. This meant that the meters being installed were at existing properties with existing infrastructure in place (external stop taps, a communications pipe from the main to the stop tap and a customer's supply pipe from the stop tap to the property.)
- The ability to be able to monitor the supply pipe for leakage. Having an external meter upstream of the supply pipe allows this. Supply pipe leakage accounts for about of third of total leakage.
- Manual meter reading of external meters is cheaper and less disruptive to our customers than having to gain access to read an internal meter.
- Meter replacement costs are significantly cheaper for external meters than for internal ones.

Further to this, internal housing would have led to much greater direct disruption for customers (and, indirectly, higher costs) for smart meter installation. Overall, in the vast majority of cases, housing meters externally rather than internally offers greater adaptability and greater value to customers.

Meter housing material

When installing a new meter externally, there are four baseline options: high density plastic (HDP) boundary boxes, wall mounted meter boxes, cast iron chambers and composite chambers. The choice of casing depends on a number of factors including the cost to install, the expected asset life and associated maintenance costs. In addition to these direct cost related factors, the adaptability and level of regret associated with each option needs to be considered. Most important, as we transition from visual-read meters to smart meters, is the compatibility of the boundary box with smart metering technology.

	HDP boundary box	Wall mounted meter boxes	Cast iron chamber	Composite chamber
ROM cost to install/replace	Reactive: £1,011 Proactive: £965 Avg: £987	N/A – installation infeasible due to incompatibility with smart metering (see below)	N/A – installation infeasible due to incompatibility with smart metering (see below)	£8,738
Expected asset life	25-30 years			30-40 years
Compatible with smart metering?	Yes	No - Current versions do not have enough space in them to accommodate smart meters	No – smart meter signal would not be able to pass through cast iron, and boxes are too small to house a smart meter (therefore requiring a retrofit)	No –signal would not be able to pass through. This can however be mitigated by using a plastic rather than metal lid.
Additional Benefits	<ul style="list-style-type: none"> • Small excavation footprint • Use of recycled material 			<ul style="list-style-type: none"> • Security of cover (lockable)

	<ul style="list-style-type: none"> Ease of installation and adjustment to surface type 			
Overall level of regret	Low	High	High	High

As the table above demonstrates, whilst other housing options may have longer asset lives, they have higher installation costs and - crucially - are less adaptable than HDP boundary boxes. This is particularly important with the rollout of our smart meter programme. For example, had we installed cast iron chambers for meters, they would have needed to be replaced well before their expected asset life with chambers that allows smart meter capability to be exploited, resulting in a much higher whole life cost.

We have the option to replace HDP boundary boxes with an alternative boundary box upon failure. On the basis of the analysis above, we have decided against this. Cast iron chambers are incompatible with smart meters which will cover over 50% of our meter stock by the start of AMP8 and over 95% by the end of AMP8. Composite chambers would significantly increase the size of this cost adjustment claim at a price review where there is already a very large capital programme and significant pressure on customer bills. They would present a higher regret option should technological developments in metering in future AMPs mean that these assets become redundant or need replacing early, as would have been the case if we had initially installed meters within brick built chambers on initial installation.

Retrofitting of wall mounted boxes at existing properties, whilst technically possible, would create additional future risks. Replacing a meter in an existing boundary box with one in a wall mounted box in another location requires locating the entry point at the property, and two excavations to remove the old box and install the new one, increasing the cost significantly. Wall mounted boxes are also predominantly made out of HDP and do not offer a significantly longer asset life.

1.2. Management control

d) Is the investment driven by factors outside of management control?

In a long-term context, this investment is driven by the combination of the age of our meter boundary boxes and their asset lives. Our boundary boxes are older because we responded sooner than other companies to emerging supply-demand challenges. This was driven by exogenous characteristics of our region, such as climate and population growth. Our decision to embark on a metering strategy in the 1990s was supported by Ofwat both in principle and in practical terms through its setting of our price controls.

In a shorter-term context, this investment is driven by assets which are known to have failed either from a customer contact, a leak, low pressure, supply interruption or a meter being inoperable. This means that we have to respond to failures quickly; deferring replacement of a failed box is not an option.

e) Have steps been taken to control costs and have potential cost savings (e.g. spend to save) been accounted for?

The decision on which type of boundary box to install, and therefore the asset lives of the boundary boxes, is within management control. However, the choice of boundary box was made with the long-term costs and benefits in mind (see 1c).

We have also considered other options that would reduce costs, including:

- Options to repair rather than replace boundary boxes
- Actions to increase the life of boundary box assets
- Options to maximise the value of the boundary box replacements
- Potential to reduce costs through economies of scale

- Planned Repair Programme for boundary boxes to reduce customer impact and improve efficiency of delivery.

Options to repair rather than replace boundary boxes

Whether a boundary box needs to be replaced or repaired (i.e. replacing only part of the asset) depends on the failure mechanism of the boundary box. The types of failure which most commonly provide the opportunity for a repair over replace resolution are failures of the lid, external casing, pipe work or the meter spindle.

The table below sets out the options that are available to us to address any of these failures.

	Option 1	Option 2	Option 3
Lid	Minor Split or wearing to the lid surface: Repair lid	Damaged Lid Seal: Replace Seal	Cracked/Broken Lid: Replace Lid
External casing	Misaligned Upper or Cracked Surround: Reseat or Repack	Damaged Upper (cracked or crumbling): Replace Box	Collapsed Box Casing or significant structural failure (e.g the base): Replace Box
Pipe work	Leaking Inlet/Outlet Join: Tighten or Replace fitting	Leaking Ball Valve or Double Check Valve: Replace the Valve	Split Internal Pipe or Hole in Moulded Internal Pipe: Replace the box
Meter spindle	If Light Wear and Tear: Look to repair or replace spindle (depending on box type)	Spindle Stripped or Significant Structural Deterioration: Replace the Box	Spindle Cracked, Split or Broken: Replace the Box

In the case of each failure, we will progress with the best value option, rather than an automatic response of replacing the entire boundary box. This triage approach resulted in *circa* 8,300 boundary boxes being repaired rather than replaced in 2022/23. This cost adjustment claim refers only to the costs required where the appropriate response to a failure is to replace the boundary box (i.e. where a failure can be fixed by a repair, we are assuming that the costs of doing so are part of the implicit allowance from the botex models).

Increasing the life of existing meter assets

As a means of limiting the cost impact of boundary box maintenance, we have considered if there are options to extend the life of assets to allow phasing of replacements. As the assets are highly dispersed, taking actions which can increase the asset life of boundary boxes is not possible. The factors that drive the failure of assets - including the soil type and geology of the earth surrounding the boundary box - are also outside management control.

Maximising the value of boundary box replacements

Given the scale of the meter rollout undertaken by Anglian, we have recognised that the maintenance of these assets will be an important base cost driver in future. Therefore, we have taken an active role in the development of boundary boxes to ensure that we can maximise the value of the new boundary boxes that we install (e.g. by ensuring the asset life of the new box increases over time).

To this end, we have worked with suppliers on the development of technical changes and product development. This learning then formed the basis of the testing criteria for the re-let of the boundary box framework. As illustrated by the tables below, the test criteria were broken into three headline categories of Installation, Usability and Maintenance, with each supplier being assessed against the questions within each category.

Boundary Box Product Trial Scoring

20 questions: all to be given a score between 0 to 10 (with 10 being the highest score)

Installation	AVK 1	AVK 2	Honeywell 3	Honeywell 4	Talis 5	Talis 6	Talis 7	Talis 8	Groundbreaker 9	Question Weighting	Category Weighting
Is height adjustment easily made	7	9	5	5	9	9	9	10	7	2	1
Can the lid frame be adjusted to align with sloping ground	5	4	2	2	2	6	6	6	0	3	1
Are the side materials strong enough not to be crushed or pierced during backfill compaction	10	10	10	10	6	10	10	10	10	1	1
Pipe inserts need to be easily removable from box tails	8	8	8	8	8	8	8	8	8	1	1
If the joints are dis-assembled and re-assembled will they still be water tight	8	8	9	10	5	5	5	5	9	2	1
Can the box withstand the passage of traffic without damage or sinking	9	7	9	9	4	8	7	7	0	3	1
Can the installation be made without reconfiguring the existing pipework	9	9	7	6	9	9	9	9	1	3	1
TOTAL	56	55	50	50	43	55	54	55	35		

AVK 1	AVK 2	Honeywell 3	Honeywell 4	Talis 5	Talis 6	Talis 7	Talis 8	Groundbreaker 9
14	18	10	10	18	18	18	20	14
15	12	6	6	6	18	18	18	0
10	10	10	10	6	10	10	10	10
8	8	8	8	8	8	8	8	8
16	16	18	20	10	10	10	10	18
27	21	27	27	12	24	21	21	0
27	27	21	18	27	27	27	27	3
117	112	100	99	87	115	112	114	53

Usability	AVK 1	AVK 2	Honeywell 3	Honeywell 4	Talis 5	Talis 6	Talis 7	Talis 8	Groundbreaker 9	Question Weighting	Category Weighting
Can the Lid be easily identified as "Water"	10	10	10	10	10	10	10	10	0	2	3
Is a specific tool required for opening the cover	8	8	8	8	8	8	8	8	4	1	3

AVK 1	AVK 2	Honeywell 3	Honeywell 4	Talis 5	Talis 6	Talis 7	Talis 8	Groundbreaker 9
60	60	60	60	60	60	60	60	0
24	24	24	24	24	24	24	24	12

Is the cover easy to open and close without damaging any seals	6	6	8	8	4	7	7	7	10	3	3
Can the stop tap be operated easily	7	7	3	5	7	8	8	6	6	3	3
Does the stop tap indicate when it is in the "On or Off" position	4	4	2	2	4	8	8	4	2	2	3
Can the meter easily be accessed and read	7	9	4	8	10	7	7	9	10	2	3
Does the box prevent ingress of ground / surface water	7	7	8	8	7	7	7	7	10	3	3
TOTAL	49	51	43	49	50	55	55	51	42		

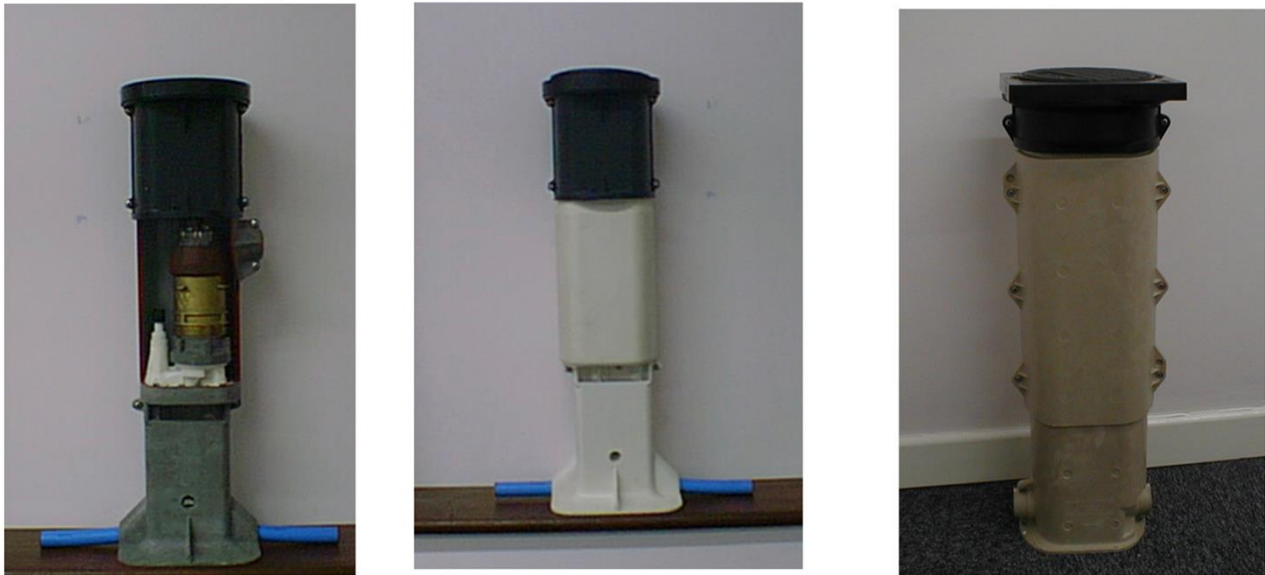
54	54	72	72	36	63	63	63	90
63	63	27	45	63	72	72	54	54
24	24	12	12	24	48	48	24	12
21	27	12	24	30	21	21	27	30
63	63	72	72	63	63	63	63	90
309	315	279	309	300	351	351	315	288

Maintenance	AVK 1	AVK 2	Honeywell 3	Honeywell 4	Talis 5	Talis 6	Talis 7	Talis 8	Groundbreaker 9	Question Weighting	Category Weighting
Do the internal dimensions allow for easy and adequate cleaning before a meter installation	7	8	6	7	10	1	1	9	10	3	2
Is the box easily found when covered by use of a meter detector	10	10	0	0	10	9	10	10	0	3	2
Does the stop tap interfere with the installation of a meter, or can it be removed – is it easily replaced	4	3	5	6	6	8	8	7	6	2	2
How easy is it to strip down and replace with spares	5	5	5	5	5	5	5	5	5	1	2
Does the box allow for additional smart metering technology	2	4	5	5	5	9	9	9	3	3	2
Is the lid connected to the box by way of a strap	0	0	10	10	0	8	8	8	0	1	2
TOTAL	28	30	31	33	36	40	41	48	24		
GRAND TOTAL	133	136	124	132	129	150	150	154	101		

AVK 1	AVK 2	Honeywell 3	Honeywell 4	Talis 5	Talis 6	Talis 7	Talis 8	Groundbreaker 9
42	48	36	42	60	6	6	54	60
60	60	0	0	60	54	60	60	0
16	12	20	24	24	32	32	28	24
0	0	0	0	0	0	0	0	0
12	24	30	30	30	54	54	54	18
0	0	20	20	0	16	16	16	0
130	144	106	116	174	162	168	212	102
556	571	485	524	561	628	631	641	443

On the basis of this assessment, we awarded the framework to the Talis 8 box supplier, including the provision of spares (e.g. lids) for older generations of boundary boxes.

Where we replace HDP boundary boxes in AMP8, these will be third-generation boundary boxes which have improved capabilities from previous first, second and third generation models pictured left to right below. We will continue to develop the solutions further moving forward.



Notable updates in design between generations of box:

- Generation 1 to Generation 2:
 - Improved material used for body of the box itself, less brittle
 - Improvement to the internal manifold and non-return valve structure.
- Generation 2 to Generation 3:
 - Significant re-design to the box casing to allow for greater flexibility in depth of installation
 - Improved materials used in construction
 - Addition of the supporting lip around the lid to improve stability of the box and reduce movement once installed
 - Change to push-fit connection increasing flexibility of installation and reduces risk of leakage on joints over previous models
 - Updated internal manifold with improved materials and functions.

Economies of scale

The extent of metering in the Anglian region shows that the need for maintenance relating to boundary boxes requires a large scale investment. We therefore consider that whilst the scale of capital maintenance will increase, scaling up provides opportunities to reduce the unit cost of replacement when compared to the past when fewer replacements were made. These opportunities include bulk purchase of materials, improved scheduling of jobs to reduce travel time and opportunity to introduce one-stop end-to-end (E2E) delivery. The increase in the work basket has also unlocked the potential to approach delivery of the replacements in new ways so as to make the most of the scheduling and E2E opportunities in particular (see Planned Repair Programme detail below). In finalising our AMP8 plan costs we have applied a unit cost which is not based on the costs we are currently seeing and have seen historically, but have built in an efficiency assumption which acknowledges the economies of scale we should be able to leverage as the number of replacements rises (see table below).

Historical unit cost	£987/ replacement
CAC unit cost (with economies of scale)	£649.45/ replacement

Planned Repair Programme

Recognising the increasing number of boundary box replacements and the challenges this presented, even when taking into account economies of scale, we have recognised that the delivery model needed to be expanded. To this end we developed a new process in 2021 under the title of *Planned Repair Programme* on the principle of batching work together so as to more efficiently deliver it in a planned and programmatic way. The figure below expands on how this founding principle was further developed and the productivity benefit realised to date, which contributes to the efficiency of the wider boundary box replacement workbasket.



1.3. Materiality

f) Is there compelling evidence that the factor is a material driver of expenditure with a clear engineering / economic rationale?

We have analysed the actual number of boundary box replacements required in AMP7 to 2021/22¹ and the expected replacements needed in AMP8 to understand the scale of replacements expected in AMP8 and future AMPs. Using data on expected failures from the date of meter installation, the expected asset life of 30 years (see q1a 'increase in meter penetration' chart²), the observed increase in boundary box failures in AMP7 and statistical trend analysis of likely failures in future years, we expect to see a material increase in the number of replacements required in AMP8. The chart below shows the expected forecast increases of replacements using statistical analysis carried out by Aecom. The estimated number of replacements required in AMP8 is 239,331.

¹ While we now have data also for 22/23 and 23/24 we have not re-run our forecast of replacements required in AMP8. Importantly, the numbers of replacements we have observed since 21/22 are consistent with the forecasts we made on the basis of data up to 21/22.

² Note that we do not expect the number of replacements to exactly mirror the number of installations from 30 years ago, as while the expected asset life is 30 years, the observed asset lifespan will be a spread around this figure (i.e. some will fail earlier, and some later than 30 years)



g) Is there compelling quantitative evidence of how the factor impacts the company's expenditure?

The observed average costs to replace each failed HDP boundary box is £987 per replacement. With the increase in volumes expected in AMP8, and the potential this provides for more proactive replacements and potential economies of scale we aim to reduce this unit rate to £649.45 per replacement. Multiplying this unit rate by our expected number of meter replacements gives a total expected expenditure requirement of £155.4m in AMP8 (the gross value of this cost adjustment claim). This represents 3.2% of our gross water totex in AMP8.

Adjustment to allowances (including implicit allowance)

h) 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?

The cost drivers for the water network plus base models do not include factors which reflect the age of metering assets for each company, nor do any of them indirectly reflect the variability between companies of the cost drivers that are increasing our costs for boundary box replacements.

The number of boundary boxes that will need replacing in the next AMP clearly shows a significant increase above the level of replacements undertaken by us in previous AMPs. It is substantially higher than the number of boundary box replacements undertaken by the industry over previous AMPs. Given that the base cost models are informed by the expenditure of the industry since 2011/12, which has not featured the cost of boundary box replacement to any material degree, the cost of replacing the number we will encounter in AMP8 cannot be controlled by the base cost model allowances.

The table below shows the actual number of boundary box replacements we have made since 2017/18. It shows that our actual volumes of replacements has doubled since 2017/18.

Year	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24
Volume	12,000	11,423	12,175	14,994	16,196	23,334	24,588	24,931	24,667

i) Is the claim material after deduction of an implicit allowance? Has the company considered a range of estimates for the implicit allowance?

Considering that the cost drivers in the base cost model do not include factors that reflect the boundary box replacement rates behind this cost adjustment claim, it is not possible to calculate an implicit allowance through the exclusion of cost drivers in the base models.

We have therefore sought to understand the implicit allowance for boundary box replacements by following the same engineering and economic rationale which forms the basis of these claims (i.e. using the expected meter failure rates across the industry using data available on meter installation dates).

To do this, we have analysed the data submitted by companies through APRs and June Returns on the level of meter penetration since 1990. The only continuously running dataset relating to this is on the proportion of properties with metered billing. Whilst an imperfect measure of meter installation rates (i.e. some households will have a meter but not be billed by a meter) we consider this to be a reasonable proxy to compare the proportion of meters installed for Anglian against the industry as a whole (and by extension, a reasonable proxy to compare the volume of boundary boxes installed in each period for Anglian compared to the industry average).

Given the expected asset life for boundary boxes of 30 years, we assume that the base models reflect the activity required on average to replace the boundary boxes installed with new meter installations up to the year 1995 (i.e. thirty years before the start of the PR24 period). We have then compared the new meter installation volumes observed by Anglian in the period 1995-2000 (i.e. thirty years before AMP8) as it is these installations which will drive the bulk of our expected boundary box replacements in AMP8.

This data shows that the industry as a whole increased its meter penetration rate by 3.14 percentage points over the 1990-95 period. Over 1995-2000 we increased our meter penetration rate by 27.99 percentage points. We have therefore assumed that 11.23% of the expected costs for boundary box replacements referred to in this cost adjustment claim are reflected implicitly within the base models.

On this basis the assumed implicit allowance for this cost adjustment claim is shown in the table below, along with the adjusted value of the claim following deduction of this implicit allowance:

	Base cost (£m)
Total expected cost	155.4
Implicit allowance (total cost x 0.1123)	17.4
Cost adjustment claim	138.0

The cost adjustment claim value is therefore greater than the materiality threshold for water network plus³ and therefore qualifies as a cost adjustment claim.

j) Has the company accounted for cost savings and/or benefits from offsetting circumstances, where relevant?

The activity covered by this cost adjustment claim is to maintain current levels of service to customers rather than delivering any improvements. There are a number of activities which this investment will support, but all activities covered by this cost adjustment claim are needed to maintain existing capabilities.

One of the key issues with broken boundary boxes is that they contribute to an increase in leakage. These are not existing leaks that enhancement leakage activity seeks to drive down, but leaks that would increase the level of leakage were no further action taken. We therefore consider that, whilst with this funding the level of leakage would be lower than the counterfactual (i.e. replacements are not undertaken), the activity only prevents a deterioration in performance. Further details on our assumptions of the leakage impact are highlighted in response to q3a. It should also be noted that because this CAC is referring to activities which have not taken place at this scale in the past, it does not overlap with the leakage cost adjustment claim (which reflects the efficient rate of maintaining leakage at the industry frontier based on historical data across the industry).

k) Is it clear the cost allowances would, in the round, be insufficient to accommodate the factor without a claim?

We consider that cost allowances in the round include:

- Modelled base costs allowances

³ 3.9% versus a materiality threshold of 1.0%

- Unmodelled base cost allowed (including other cost adjustment claims)
- Enhancement cost allowance.

We have set out above how we consider that this cost adjustment claim is net of any modelled base cost allowances.

Of the unmodelled base cost allowances, we consider that there is no overlap. There is a separate cost adjustment claim to maintain current frontier levels of leakage. Whilst leakage forms part of the performance that this boundary box CAC seeks to maintain, the allowance requested for the leakage CAC takes a top-down view, drawing from existing observations of leakage performance and costs from companies across the industry. The scale of boundary box replacement activity that this CAC covers is not something which has previously been observed in the industry, and therefore the new increase in required replacement rates are not factored into the leakage CAC.

Our business plan includes enhancement activity on both leakage and metering. These enhancement activities are distinct from the activities covered by this cost adjustment claim. The leakage enhancement activity covers specific activities to expand our capability to reach lower levels of leakage through additional capability which we do not currently have. The metering enhancement covers upgrading the meter itself (rather than its chamber which in most cases will not need to change) to a smart meter, or the installation of new meters at properties which do not currently have a meter.

Without this claim, boundary box replacement will take up a significant proportion of our total water capital maintenance allowance. If we spend to our allowance maintenance of other critical assets will be reduced and performance to customers may suffer. If we continue with our planned level of maintenance on other assets we will be unfairly treated in comparison to other companies who, in due course, will likely have these costs allowed to them.

l) 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?

We have taken a long-term view of the expected replacements required in future AMPs to support our view of expected activity required in future AMPs. Our current estimates over a four AMP period are as follows.

AMP	Boundary box replacements
6 (2015-20)	66,788
7 (2020-25)	122,203
8 (2025-30)	239,331
9 (2030-35)	332,890

This increase in the number of replacements is reflective of asset lives and the number of meter installations over multiple AMPs in the past. This data shows that this is an area which will require significant activity and investment in future AMPs. Ultimately, we expect this to be a cost which the whole industry incurs in the longer term and will eventually be reflected within the modelled allowance. However, as these costs have not historically been incurred by companies they are not materially included within current base allowances and there is a need for a cost adjustment claim at PR24 to reflect our first mover disadvantage.

m) If an alternative explanatory variable is used to calculate the cost adjustment, why is it superior to the explanatory variables in our cost models?

The key alternative explanatory variable that would be used to control for this cost would be some measure of boundary box age. None of the explanatory variables within the proposed Treated Water Distribution cost models reflect (directly or indirectly) this factor or, therefore, control for this cost.

2. Cost efficiency

a) 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)?

Comparable cost data on boundary box replacements are not available at an industry or international level and so industry benchmarking is not straightforward. Cost models do not currently take into account age of metering assets so industry cost models are unavailable for use.

One of the closest comparable datasets that we have considered for cost benchmarking is the enhancement benchmark models for new meter installations. However, this does not provide a suitable comparator because of the different characteristics of the activity of new meter installations compared to new boundary box replacements. For example, many new meter installations are internal and screw-in meter installations which do not require excavation of footpaths, unmade ground or carriageways which are more costly and make up the entirety of meter boundary box replacements. We would therefore expect unit costs for boundary box replacements to be greater than meter installation costs. Without industry data on the proportion of different meter installation types, a reliable cost comparison cannot be made to undertake cost benchmarking.

For this cost adjustment claim we have therefore considered that market testing is the most effective way to understand cost efficiency. We have sought unit costs for boundary box replacements from different suppliers and based this cost adjustment claim on the lowest unit rate we currently have available.

b) 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?

Our cost estimate has been derived from market testing of costs to replace boundary boxes (as described above). This has given a cost estimate for boundary box replacements where these are carried out in a carriageway (typically highest cost), footway and unmade ground (typically lowest cost). The table below shows how the cost estimate of this cost adjustment claim has been arrived at using these assumptions.

Replacement surface type (expected % of total volume)	Number of expected boundary box replacements	Unit cost (£)	Total cost (£m)
Unmade (23%)	55,046	495	27.3
Footway (74%)	177,105	685	121.4
Carriageway (3%)	7,180	933	6.7
Total / weighted average	239,331	649	155.4

c) Does the company provide third party assurance for the robustness of the cost estimates?

No. We note that (a) the forecast of boundary box replacements required in AMP8 is sourced from work undertaken by an independent consultancy and (b) our unit cost estimates were provided by potential suppliers in the market. As set out in 1(e), the unit costs we propose are substantially below the costs we have incurred in the price control period to date.

3. Need for investment

a) Is there compelling evidence that investment is required?

The ultimate driver of this investment is the age profile and lifespan of boundary boxes. Where boundary box failure occurs and no action is taken this would lead to significant deterioration in customer service.

Impact on leakage maintenance

One significant impact of boundary box failure is an increase in the level of leakage. Not replacing the boundary boxes included in this cost adjustment claim would lead to an increase in leakage of 70.56 MI/d by 2030 above base levels. This is based on observations that where a boundary box fails, 50% of these failures lead to a leakage impact, with an average leakage of 720 l/Day for visible leaks (30% of failures) and 216 l/day for non-visible leaks (70% of failures). With the expected volumes of failures of 239,331 we expect this to lead to an additional 15.68 MI/d impact each year with a cumulative 70.56 MI/d leakage impact by 2029/30 should the failed boundary boxes not be replaced.

In addition to the direct leakage impacts, there are associated safety and behavioural impacts of boundary box failures. Where leaks occur, they are close to the ground surface, leading to a very visible leakage impact. This would have a further impact on public safety by presenting slip and trip hazards to the public, and also impact on resilience during times of water shortage. Our customer engagement has demonstrated that customers are less likely to feel they should reduce their own water usage where they perceive that their water company is not playing its part by addressing leaks.

Low pressure and interruptions to supply

In addition to the leakage, health and safety and behavioural impact of failures, there are impacts on low pressure at affected properties. Where a failure occurs, we have seen that 0.5% of boxes that leak lead to low pressure impacts. This would lead to low pressure issues at an additional 120 properties per annum.

Customers may also experience interruption to supply from severely failed boundary boxes. We approximate this to be affecting 0.2% of boxes which are leaking, affecting approximately 48 customers on average per annum.

Customer experience

At 31 March 2024 we had over two million billed and void metered customers as well as a substantial number of customers with meters but still paying unmeasured charges. At an average expected failure rate in AMP8 of 47,868 boundary boxes/year, we expect around 2.3% of our customers with a water meter to be affected by the failure of boundary boxes and remediation per annum. Whilst the work we carry out will improve customer experience relative to the counterfactual where the boundary box failure persists, this is ultimately activity carried out to maintain service and avoid negative impacts to customers rather than improve customer experience.

b) Is the scale and timing of the investment fully justified?

The scale and timing of this investment is based on the need to avoid the negative impact on customers highlighted above, and on expected failure rates in AMP8 and future AMPs should no action be taken. Any phasing of investment by delaying the replacement of boundary boxes would extend the period over which the negative impacts of boundary boxes would be experienced by customers, and push investment into future AMPs where the number of boundary box replacements required will be even higher. In any case, as previously stated, ignoring boundary box failure is rarely a feasible option.

Conversely, we do not consider that it would be appropriate to bring additional boundary box replacements into PR24. Whilst this would in effect increase the number of proactive replacements which take place before failures occur, this needs to be balanced against feasible deliverability and customer affordability when the expected scale of investment required in PR24 is much higher than has been seen in previous AMPs.

c) Does the need and/or proposed investment overlap with activities already funded at previous price reviews?

This investment does not overlap with activities funded at previous price reviews. Previous price reviews have covered the costs of new meter installation through enhancement allowances. However, this reflects the one-off costs of installing a new meter and not its ongoing maintenance. Base cost allowances are determined on the basis of historical base expenditure levels by the industry. However, because of the relatively recent transition to meters in England and Wales, expenditure on meter and boundary box maintenance has yet to reach a steady state and this is not a cost that the industry has incurred to date .

d) Is there compelling evidence that customers support the need for investment (both scale and timing)?

This investment is ultimately driven by the supply-demand needs of our region and the desire in the 1990s for our customers to be charged based on their water usage. The scale and timing of this investment is ultimately based on these expenditure drivers.

4. Best option for customers

a) Did the company consider an appropriate range of options to meet the need?

See 1c.

b) 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?

See 1c.

c) Has the impact of the investment on performance commitments been quantified?

The main performance commitment that this would have an impact on is leakage. As set out in response to 3a, if we only invested the base implicit allowance in meter chamber replacements, we estimate that this would have the effect of reducing leakage performance in 2030 by 70.56ML/d compared to the 2025 baseline. This is an impact that we would not see were we not a company which had made an early start on significant meter penetration in the 1990s. The investment requested from this cost adjustment claim will be enough to maintain current leakage levels from boundary boxes, not to deliver any improvement in performance.

Failure to replace boundary boxes would have further impacts on per capita consumption and C-Mex, that we have not quantified.

d) 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?

Cost uncertainties exist in relation to this cost adjustment claim in that the cost of boundary boxes may change between now and the actual date of boundary box replacement. Should the out-turn costs vary from that expected from our current market testing, then the pain/benefit from this will be shared with customers through cost sharing.

On benefits, we have a high level of certainty that our proposed solution will deliver the expected benefits (i.e. that meters will be housed in a new boundary box, removing the negative customer impacts of leakage, low pressure etc. referred to earlier).

We are confident that there will be high utilisation of the solutions. Smart meters are a pivotal part of our Long-Term Delivery Strategy and Water Resources Management Plan. There is therefore a negligible risk that the investment delivered through this cost adjustment claim will lead to stranded assets as every smart meter needs to be appropriately housed in a chamber which allows it to function effectively.

e) Has the company secured appropriate third-party funding (proportionate to the third party benefits) to deliver the project?

The issues that this investment resolves (i.e. on leakage and customer experience) ultimately benefit two parties: the generality of Anglian customers and the specific customer whose boundary box is replaced. It could reasonably be proposed therefore that the costs of this investment (or a portion of the costs) should be borne by the individual customer rather than the generality of our customer base. However, as the housing of meters is currently the sole responsibility of water companies, and not individual customers, there is no existing mechanism to reflect third-party funding from the individual customer benefitting from this cost adjustment claim. We therefore do not consider there to be third-party funding sources to support this cost adjustment claim.

f) Has the company appropriately presented the scheme to be delivered as Direct Procurement for Customers (DPC) where applicable?

The investment is heavily integrated into the network and our business, with each boundary box being closely integrated into our network. Information on which boundary boxes are in need of being replaced is also heavily

integrated into our business, making this investment indistinct from other parts of our business. We have therefore concluded that this activity would not be appropriate for delivery through DPC.

g) 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

In selecting the preferred option we have taken into account customer views on smart metering, leakage and asset replacement, alongside other criteria for the selection of the proposed solution outlined in 1c. Our customer engagement has shown that customers are less willing to take action to reduce their own water consumption if there is a perception that we are not doing everything we can to manage leakage and look after our assets.

5. Customer protection

a) Are customers protected (via a price control deliverable or performance commitment) if the investment is cancelled, delayed or reduced in scope?

We propose that customers would be protected through a price control deliverable based on the efficient unit rate to deliver each boundary box replacement. This would return the proportion of the cost adjustment claim back to customers should any of the expected boundary box replacements not be required in AMP8.

b) Does the protection cover all the benefits proposed to be delivered and funded (e.g. primary and wider benefits)?

By tying a price control deliverable to the delivery of boundary box replacements, the mechanism would inherently cover all the benefits that would be delivered from this cost adjustment claim.

We have considered alternative customer protection mechanisms tying to leakage or low pressure but consider that a) a single protection mechanism which is directly linked to the delivery of the CAC is both simpler and better serves the principle of customer protection than multiple outcome-focussed PCDs, b) has less reliance on assumptions around benefits that will be delivered by the CAC, and c) reflects the asset health benefits which are more difficult to reflect in multiple outcome-focussed protection mechanisms.

c) 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?

As highlighted in 4e, we do not anticipate any third-party funding for this investment.