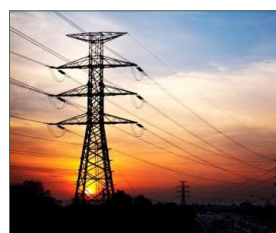


# Water & Sewerage Services Price Control 2015-21

Final Determination – Annex L  
Cost Base Efficiency Analysis  
December 2014



## Contents page

# Water and Sewerage Services Price Control 2015-21 Final Determination Annex L Cost Base Efficiency Analysis

<b>1.0 Capital Productivity: Cost Base .....</b>	<b>1</b>
1.1. Purpose of the cost base .....	1
1.2. Process to final determination.....	1
1.3. Accuracy of the standard costs submitted.....	2
1.4. Regional Price Adjustment.....	3
1.5. Choice of benchmark.....	7
1.6. Rate and length of catch-up.....	8
1.7. Asymmetric / symmetric adjustment.....	9
1.8. Special factors .....	10
1.9. Adjustments to PR09 data .....	10
1.10. Cost base workings .....	15
1.11. Continuing efficiency.....	17
<b>2.0 Results of Cost Base Analysis.....</b>	<b>19</b>
2.1. Summary of assumptions used.....	19
2.2. Results of cost base analysis.....	20
2.3. Impact on capital enhancement .....	21
<b>Appendix A – PR09 Definitions of Confidence Grades ..</b>	<b>25</b>
<b>Appendix B – PR09 Standard Cost Specifications .....</b>	<b>26</b>
<b>Appendix C – Historic Movement in Standard Costs .....</b>	<b>31</b>
<b>Appendix D – PR09 Standard Costs – Adjusted .....</b>	<b>37</b>

# 1.0 Capital Productivity: Cost Base

## 1.1. Purpose of the cost base

- 1.1.1 The cost base (as developed and previously adopted by Ofwat) is used to assess the relative efficiency of water and sewerage companies in procuring and delivering capital projects. These compare unit costs across a wide range of water and sewerage activities, including both infrastructure and non-infrastructure capital works.
- 1.1.2 Since its introduction in PR94, Ofwat continually refined the scope and standardisation of the cost base at each successive price review. The cost base has been subject to independent scrutiny, and in 2000, the Competition Commission, in its report on the price limits for Mid-Kent and Sutton & East Surrey, concluded the approach had worked well since 1995.
- 1.1.3 The latest cost base data available (for PR09) consists of an extensive database of 78 standardised unit costs for a range of capital works activities, typically undertaken by the 21 companies in England and Wales.<sup>1</sup>
- 1.1.4 During PC10, the Utility Regulator (UR) utilised this standardised cost data as an important and informative benchmark upon which to compare NI Water against. Although Ofwat, in their move to menu-style regulation, have since discontinued the cost base and are not undertaking this analysis for their current PR14 price control, the UR believes that the cost base, as was used in PR09, can still form a useful benchmark for PC15.<sup>2</sup>
- 1.1.5 The cost base has therefore been used both to establish NI Water's absolute and relative progress on capital costs since PC10 and also used to assess NI Water's scope for capital efficiencies for PC15.

## 1.2. Process to final determination

- 1.2.1 In May 2013, the UR formally outlined its intention to use the cost base during the PC15 process as a comparative tool to assess NI Water's capital expenditure. We also issued our cost base information requirements and associated guidance on completing the cost base. In order to ensure a full like-for-like comparison, NI Water were asked to compile their cost data using the same definitions and specifications as Ofwat had stipulated to companies in England and Wales at PR09.
- 1.2.2 NI Water submitted their initial cost base data (v1.0) in December 2013, with these figures being subject to scrutiny from both the Reporter and the UR.

---

<sup>1</sup> [http://www.ofwat.gov.uk/pricereview/pr09phase3/pr09phase3letters/ltr\\_pr0940costbase](http://www.ofwat.gov.uk/pricereview/pr09phase3/pr09phase3letters/ltr_pr0940costbase)

<sup>2</sup> We engaged First Economics to consider a range of options for undertaking efficiency analyses at PC15 and discussed these with the company in March 2013 before publishing our minded to approach to efficiencies, for both opex and capex, in May 2013.

Feedback was provided to the company based on this analysis and the company were asked to address any outstanding issues before submitting their final cost base (v2.0).

- 1.2.3 NI Water submitted their final cost base (v2.0) figures along with their March 2014 business plan. Both the Reporter and the UR consider the feedback provided by ourselves to have been substantively addressed by the company in their final submission.
- 1.2.4 Following the company's submission in March 2014, the UR undertook its analysis of NI Water's standard costs, comparing NI Water against their own historic costs and against benchmark water and sewerage costs from those companies in England and Wales. The results of this analysis were included within our draft determination in July 2014 and used (in conjunction with other analyses) to set a 9.1% NI Water's capital enhancement catch-up efficiency target within our PC15 draft determination.
- 1.2.5 NI Water, along with Jacobs UK Ltd, responded in October 2014 to our draft determination, making a number of comments on the approaches used by the UR in its cost base analysis and offering a revised and more challenging efficiency target than their business plan. These, along with comments made within all other PC15 consultation responses and any other new information have been considered by the UR in setting our final determination.

### **1.3. Accuracy of the standard costs submitted**

- 1.3.1 As was previously the case with the companies in England and Wales when Ofwat last used a cost base approach, the UR asked NI Water to judge the robustness of their standard costs against key principles relating to best estimating practice. These principles cover scope, cost, risk and compliance, with the accuracy judgements ranging from 1 to 5 - with 5 being the most accurate rating.
- 1.3.2 Appendix A defines the Ofwat scoring system for the cost base's confidence grades to which NI Water proposed their own grades.
- 1.3.3 NI Water's proposed confidence grades were then examined by the Reporter and in a number of cases the company changed its accuracy rating for particular standard costs on the basis of the Reporter's representations and feedback.
- 1.3.4 Overall, the assigned confidence grades of NI Water's final cost base submission were reasonable and have improved somewhat since their PC10 cost base submission. Water and sewerage infrastructure standard costs data quality was very high, with the majority of estimates having a 4 or 5 grading - being based upon company experience of the capital works activity being assessed.
- 1.3.5 The quality of NI Water's standard cost estimates for both water and sewerage infrastructure are therefore highly comparable to what the companies in England and Wales reported during PR09. Coverage of the infrastructure standard costs was also good, with NI Water able to populate nearly all the unit cost fields in this service area from their capital works experience.

- 1.3.6 Non-infrastructure estimates were deemed to be of a lower quality however, with confidence grades ranging from 1 to 5 across the various criteria. Water non-infrastructure grades were slightly better than those for sewerage non-infrastructure. It was also the case that NI Water was unable to populate a number of the unit cost fields for non-infrastructure. This was largely to be expected as the prevalence of PPP in this service area means that many of the non-infrastructure standard cost lines would not be represented within NI Water's capital programme.
- 1.3.7 Taking the cost base figures as a whole however, we believe the standard cost estimates from the company are of sufficient reliability and coverage to allow a meaningful, like-for-like comparison between NI Water and the benchmark costs in England and Wales.

## 1.4. Regional Price Adjustment

- 1.4.1 In order to allow a fair comparison to be made between companies located in a high cost region (such as in the south-east of England), with those in lower cost regions, Ofwat adjusted the company standard cost data by a company-specific regional factor. This regional price adjustment was undertaken to correct for variation in costs which would not be attributable to company efficiency or inefficiency, but rather, down to a regional variation in construction prices.
- 1.4.2 Ofwat at PR09 adjusted each England and Wales companies' standard costs by the independent and well established BCIS index. The adjustment had the effect of increasing the standard costs of a company in a low cost region by a certain percentage, and conversely lowering the standard costs of a company in a high cost region. This ensured all companies were being compared on a fair basis.
- 1.4.3 As was previously determined in PC10, the UR considers that a regional price adjustment (RPA) is required for NI Water's capital costs given that it will be affected by local construction price relativities. As Northern Ireland is a lower cost region when compared to England and Wales, it is evident that some adjustment to NI Water's cost data is warranted and that this figure will be negative.<sup>3</sup>
- 1.4.4 While it is highly likely that any RPA for a water company in Northern Ireland should be negative, there is some doubt as to the appropriate magnitude of the adjustment once various other construction related relativities are examined. Potential RPA options are therefore discussed in detail below.

### BCIS approach

- 1.4.5 To be fully consistent with the Ofwat cost base approach, the UR could use the same BCIS index as Ofwat used in PR09, but adopt the latest data for Northern Ireland. To account for the fact that a certain proportion of a water company's costs are procured in a national market (such as mechanical & electrical equipment and design services) Ofwat only applied a proportion of regional

---

<sup>3</sup> Although the RPA figure will be negative, in following the Ofwat methodology, this will have the effect of increasing NI Water's standard cost estimates for comparison.

variations derived from BCIS datasets, which varied by infrastructure and non-infrastructure spend.

- 1.4.6 During PC10, it was believed that with a Northern Ireland location factor of 67% to the UK average of 100% (i.e. -33% difference), much lower than Ofwat used for the England and Wales companies, the BCIS figure was somewhat excessive and might reflect small sample bias for Northern Ireland rather than real construction cost relativities. The BCIS approach was not adopted by the UR in PC10 as a result.
- 1.4.7 With the magnitude of the Northern Ireland location index figure being so great and markedly different to other regions, BCIS have undertaken a review of the Northern Ireland figure. BCIS have stated that the results of the review indicate that the calculation methodology is sound and that prices in the province are indeed significantly lower than the rest of the UK. They do caution however, that the individual project tender price indices do not reflect the price of all trades and there may be other factors that affect the results.<sup>4</sup>
- 1.4.8 At the present time, the location index for Northern Ireland stands at around 60%, relative to the UK mean of 100% (i.e. -40% difference), after falling for several years. For PC15, as in PC10, the UR will give careful consideration as to whether the BCIS location factor would be an appropriate figure to use, thus ensuring consistency with the Ofwat PR09 approach.
- 1.4.9 As Ofwat have determined for PR09, this BCIS figure would only be applied to 43.1% of infrastructure costs and 33.5% of non-infrastructure costs. For the UR to follow this approach, would lead to an overall, combined RPA of around -15% for NI Water's cost base standard costs.

### Re-use the PC10 approach

- 1.4.10 In PC10, the UR commissioned Mott McDonald to undertake an alternative estimate to the BCIS location index. This RPA was engineering based, less geared towards relative general construction costs, but more focused on the specialist costs which a Northern Ireland water and sewerage company would face, and their combined relativity to their counterparts in the rest of the UK.
- 1.4.11 The costs which were compared included labour, materials, disposal and plant & equipment. This approach was chosen (with some adjustments) for PC10.
- 1.4.12 Based on this analysis, an RPA of -12.2% was deemed appropriate for Northern Ireland Water at PC10; however, like Ofwat with the BCIS location index, it was only applied to a proportion of infrastructure and non-infrastructure costs.
- 1.4.13 Once Ofwat's local / national application factors were applied, the RPA for infrastructure was -5.3%, while the equivalent figure for non-infrastructure was -4.1%. In order to ensure the possibility of full consistency with PC10, the UR has considered re-using these figures again for the purpose of the PC15 cost base.

---

<sup>4</sup> BCIS made the results of their review available in March 2014.

## CEPA ‘top-down’ approach

- 1.4.14 Similar to the approach at PC10, the UR for PC15 employed Cambridge Economic Policy Associates (CEPA) to undertake a fresh analysis of what a regional price adjustment for a water and sewerage company should be. However, while the PC10 approach relied upon a ‘bottom-up’ engineering judgment based approach, CEPA adopted a ‘top-down’ approach based on the best available regional data. A copy of CEPA’s RPA Report to the UR can be found at Annex M to this final determination.
- 1.4.15 The CEPA ‘top-down’ approach mirrors the methodology which CEPA adopted to provide a relative price adjustment for the UR in the RP5 price control determination for NIE. For PC15 however, they targeted their ‘top-down’ approach toward relative capital costs faced in the Northern Ireland water and sewerage industry.
- 1.4.16 CEPA undertook a number of sensitivity checks on their model, with their baseline model yielding an RPA range between 87.3% and 95.9%. CEPA recommended an overall RPA of 93.8% (i.e. –6.2% difference) would be an appropriate figure for the UR to use to adjust NI Water’s capital costs at PC15.

## Chosen RPA

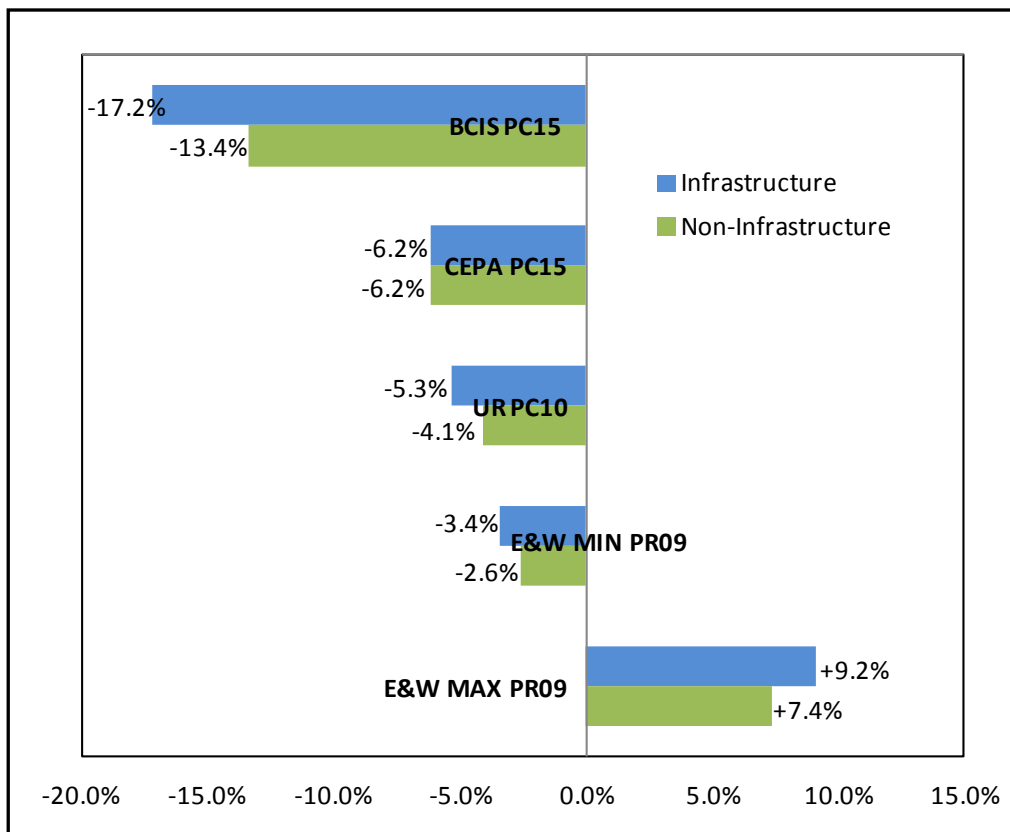
- 1.4.17 The UR has carefully considered all potential RPA figures to use for NI Water within the cost base analysis. For comparison, the highest and lowest RPA figures for the England and Wales water and sewerage companies used by Ofwat in PR09 are shown in Figure 1.1 below.<sup>5</sup>
- 1.4.18 It should be noted that in order to ensure a straightforward comparison, these PR09 RPA figures for England and Wales relate to sewerage infrastructure and non-infrastructure. NI Water’s boundaries do not differ by water or sewerage and so the RPA figures shown in the graph for NI Water are the same for both water and sewerage service areas.
- 1.4.19 For PR14 Ofwat have used updated RPA figures within their wholesale cost models, ranging from -5.2% RPA for Northumbrian Water and +9.6% for Thames Water for sewerage infrastructure, and a respective -4.0% and +7.8% range for sewerage non-infrastructure.<sup>6</sup> These figures appear to indicate an increased regional price disparity in construction costs since the PR09 price control.

---

<sup>5</sup> As calculated by UR from pages 18 & 20 of Ofwat’s Cost Base Feedback Report:  
[http://www.ofwat.gov.uk/pricereview/pr09phase3/pr09phase3letters/ltr\\_pr0940costbasereport.pdf](http://www.ofwat.gov.uk/pricereview/pr09phase3/pr09phase3letters/ltr_pr0940costbasereport.pdf)  
 Ofwat’s final figures may differ slightly due to rounding issues.

<sup>6</sup> [www.ofwat.gov.uk/pricereview/pr14/wholesale/prs\\_web140404pr14wholesalecostassess](http://www.ofwat.gov.uk/pricereview/pr14/wholesale/prs_web140404pr14wholesalecostassess)



**Figure 1.1 – Comparison of RPA approaches**

- 1.4.20 As can be seen, there is a marked difference in applying Ofwat's BCIS approach to Northern Ireland compared to adopting the CEPA and PC10 approaches. For the PC15 cost base, the UR has decided against adopting the PC10 RPA figure since it is now five years old.
- 1.4.21 BCIS's Northern Ireland location index figure, as in PC10, is illustrative of a high cost differential to the UK. It is reassuring to observe that the BCIS review of the Northern Ireland figure has confirmed that the calculation methodology is sound, and that while sample sizes for the province are small, they support a consistently very low index for Northern Ireland.
- 1.4.22 However, while BCIS provides an informative metric, it may not be fully representative for the purposes of the cost base analysis. As such there may be a risk that it is overly representative of general construction, even after employing Ofwat's national/local application factors. By contrast, since CEPA's analysis is entirely focused on a water and sewerage company's relative costs, the UR believes CEPA's analysis will better reflect the capital investment market costs which NI Water can expect to encounter.
- 1.4.23 In conclusion, the UR has adopted CEPA's robust RPA figure of -6.2% within its cost base analysis. Since CEPA already took account of the mix of costs a water company would face, there is no need to apply the national / local application factors. Unchanged from the approach taken at the draft determination, the - 6.2% RPA applies in full to all costs in our final determination analysis.



## 1.5. Choice of benchmark

- 1.5.1 When estimating the scope for efficiency based on standard costs, the UR must decide the appropriate comparator to use as a benchmark.
- 1.5.2 In PR09 Ofwat used the median as the benchmark cost, linked to their 'menu regulation' process, referred to as the Capital Expenditure Incentive Scheme. This placed emphasis on new incentives for companies to reveal efficiencies up front rather than incentivise out-performance of relative efficiency targets set by Ofwat. At PR04 Ofwat set benchmark costs on a 'case-by-case' basis, examining the returns within each standard cost and deciding upon the appropriate benchmark, subject to the satisfaction of Ofwat's selection criteria.
- 1.5.3 Conversely, in PC10 the UR used upper quartile costs (i.e. the 25<sup>th</sup> percentile) as their benchmark. This provided sufficient challenge to NI Water in the absence of any menu-style regulation in Northern Ireland, and aimed to incentivise the company to move towards the efficiency frontier.
- 1.5.4 For the PC15 draft determination, the UR primarily used upper quartile as its benchmark cost. We also examined the scope to catch-up to upper decile costs (i.e. the 10<sup>th</sup> percentile) but in examining the results of this analysis did not believe that the achievement of upper decile costs was a realistic target for the company for PC15 purposes.
- 1.5.5 In their response to our approaches at the draft determination, NI Water and their advisors Jacobs have stated that the UR has "used upper quartile without cognisance of the reliability of the data." The company also remarked that the use of the upper quartile was not adopted at PR09, with Ofwat deciding to use median figures as the benchmark - this was partly because of a lack of confidence in some of the figures quoted.
- 1.5.6 NI Water stated that at PR04, the benchmarks were set manually based on the confidence grades of the returns and that those figures which were based on a quotation were ignored for benchmarking purposes as the company had not actually delivered to that cost. The company also state that due to issues of scale, programmes such as Northern Ireland's relatively small metering programme make the use of an upper quartile benchmark unrealistic for the company for certain cost categories.
- 1.5.7 In considering NI Water's comments, the UR believes that although the upper quartile is quite a challenging benchmark, it should be noted that due to some inherent uncertainty, the company have been only asked to close 75% of the gap to the upper quartile.
- 1.5.8 In addition, expecting companies to achieve costs consistent with an upper quartile performer is a common expectation amongst regulators. WICS, in SRC 2010-15 used the upper quartile for benchmarking Scottish Water, while Ofgem in its 2009 determination used upper quartile, upper third and median benchmark costs.
- 1.5.9 Very recently, Ofwat for the PR14 draft determination has undertaken its cost comparisons to the upper quartile in its draft determination analysis. Within its price control documentation they have carefully assessed the merits and any

weaknesses of this approach but concluded that overall upper quartile provides the right balance for both customers and companies between frontier costs and an 'average' challenge.<sup>7</sup> It is not known at this time of writing if this will be the approach taken by Ofwat at final determination however.

- 1.5.10 While the Competition Commission (foremost due to practical reasons) did not adopt an upper quartile benchmark in its NIE / RP5 final determination, they did set the benchmark as the fifth placed company (out of 15 DNO's).<sup>8</sup> Hypothetically speaking, for a standard cost with 15 company submissions, our cost base model would place the upper quartile benchmark as being between the 4<sup>th</sup> and 5<sup>th</sup> best company.
- 1.5.11 Having considered all the arguments, the UR will keep the upper quartile as its benchmark in its final determination cost base analysis. However, in light of the additional information provided by NI Water we will not adopt an upper decile benchmark comparison for our PC15 final determination. Nonetheless, as NI Water continues to improve its capital efficiency performance, there may be merit in later price controls to compare against costs more illustrative of the efficiency frontier.

## 1.6. Rate and length of catch-up

- 1.6.1 For PR09, under their 'menu-style regulation approach', Ofwat expected companies to close 100% of the gap to the benchmark for infrastructure costs, and 50% catch-up for non-infrastructure costs. In PR04 however, under the traditional Ofwat cost base approach, a catch-up rate of 75% was expected for both infrastructure and non-infrastructure.
- 1.6.2 In terms of length of catch up, Ofwat in PR04 and PR09 determined that for capital enhancement, the percentage gap should be closed in full in each first year of the respective price control periods. Ofwat applied these catch-up factors to the whole capital enhancement programme. Unlike capital maintenance which had a phased efficiency target over three years, capital enhancement was subject to immediate targets as the savings associated with the procurement of new plant, buildings or materials was felt to be readily realisable in the first year of each price control.
- 1.6.3 WICS, in its Strategic Review of Charges 2002-2006 set an 80% catch-up target for all capital expenditure (taking Scottish Water towards the benchmark via an asymmetric approach further detailed below in the next section) over a four year regulatory cycle. The UR in PC10 adopted the same approach as Ofwat in PR04 by setting a 75% catch-up target to be applied in the first year of the price control period.
- 1.6.4 In line with regulatory precedent, the UR in the PC15 draft determination adopted a 75% catch-up in the first year of the six-year price control.

---

<sup>7</sup> [www.ofwat.gov.uk/pricereview/pr14/det\\_pr1408draftappendixwholesale.pdf](http://www.ofwat.gov.uk/pricereview/pr14/det_pr1408draftappendixwholesale.pdf)

<sup>8</sup> [www.gov.uk/cma-cases/northern-ireland-electricity-price-determination](http://www.gov.uk/cma-cases/northern-ireland-electricity-price-determination)

- 1.6.5 NI Water, in their consultation response to the draft determination stated that the rate of catch-up as adopted by the UR was not realistic as it assumed immediate savings – in years one and two.
- 1.6.6 The company also stated that they were still in the process of fully engaging with their “supply chain for the PC15 period and accordingly areas such as the potential savings via supply chain engagement will take some time to deliver efficiencies. Jacobs’ assessment was that a longer catch-up period is more appropriate than a  $P_0$  cut and proposed an efficiency ‘glide-path’ which gradually profiled the assumed efficiencies.
- 1.6.7 For the final determination the UR will keep to its approach of setting a 75% catch-up target as adopting a higher target may not fully recognise some inherent uncertainty within the model (especially within non-infrastructure costs). The UR is unconvinced by the argument that catch-up efficiencies are not achievable in year one of the price control and so this approach also remains unchanged for the final determination. Further details on the rationale for this decision by the UR are available in Section 2.3

## 1.7. Asymmetric / symmetric adjustment

- 1.7.1 In PR04 Ofwat made no allowance when standard costs were below benchmark, therefore any efficient standard costs could not be used to offset inefficient costs. It was simply assumed that such efficient procurement required no subsequent adjustment. In PR09 however, Ofwat applied efficiencies symmetrically, thus potentially reducing the overall efficiency challenge faced by companies.
- 1.7.2 In PC10, the UR followed the same approach as Ofwat in PR09, thus enabling costs which were below benchmark to offset against costs which were above benchmark costs. As NI Water’s standard costs were typically somewhat above the upper quartile benchmark on most costs, this was only of relatively small benefit for the company at PC10.
- 1.7.3 For PC15, NI Water have made significant cost reductions since PC10 in a number of standard costs (resulting in better than benchmark performance on sewerage infrastructure for example); allowing a symmetrical approach to (in)efficiencies now works significantly in the company’s favour.
- 1.7.4 The UR has therefore considered the impact of both approaches for the purposes of the cost base. The base approach adopts the same modelling technique as the UR undertook in PC10, namely by allowing symmetrical efficiency adjustments.
- 1.7.5 In addition to this, the UR has also modelled alternative calculations based on Ofwat’s PR04 cost base approach. Given that the UR is following the Ofwat PR04 approach for most of its calculations and assumptions, there may be merit in following the PR04 Ofwat methodology more fully in all respects.
- 1.7.6 It should be noted that for our final determination, Scenario B has changed since our draft determination, with asymmetrical efficiencies being applied. Scenario A remains unchanged from our draft determination by allowing symmetrical

efficiencies, whilst Scenario C also remains unchanged by applying an asymmetrical efficiency approach.

## **1.8. Special factors**

- 1.8.1 NI Water made no formal application for any special factor treatment of standard costs.

## **1.9. Adjustments to PR09 data**

- 1.9.1 As Ofwat discontinued the cost base in their move to a new regulatory approach, the PR09 cost base is the latest available standard cost database available to the UR for comparison. Although it contains a comprehensive collection of up to 78 standard costs across 21 England and Wales water companies, the UR is mindful that the cost data may have been surpassed by construction market events from 2009 until the present day. The UR has therefore made some adjustments to the data to account for these factors, namely to correct for the impact of construction inflation and to account for any medium/long-term change in capital unit costs since the PR09 cost base exercise.

### **Correcting for the impact of inflation**

- 1.9.2 To ensure a fair comparison, the UR has transformed the PR09 cost base data submission into 2012-13 prices using Construction Output Price Indices (COPI) to ensure consistency with NI Water's PC15 business plan. It should be noted that with the steep fall in construction prices during the recession and its subsequent recovery, the COPI index is actually similar to its 2007-08 levels, so the nominal figures submitted at PR09 do not see much change once rebased.
- 1.9.3 It should be noted, that COPI is a national index. Therefore any additional reduction in prices that occurred in a Northern Ireland context since PR09 would not be fully reflected. However, as the UR has undertaken an updated RPA analysis for PC15, this should take into account any regional differential with the Ofwat comparators.

### **The long-term cost base trend**

- 1.9.4 The second step the UR has taken with respect to dealing with less than current cost base data is to establish a long-term trend for capital unit costs. This has involved examining a number of sources to ascertain whether assuming a 'stationary' cost base (in real terms) database over the five years since PR09 is realistic and logical.
- 1.9.5 While COPI encompasses construction costs, these are for a range of construction activities and it would be fair to state that water and sewerage industry costs may not perfectly track COPI. For example, while RPI tends to ordinarily increase year-on-year, IT costs, which would form part of the RPI basket of goods, would tend to see reducing prices due to technological change and productivity improvement, even if in general, costs were steadily increasing.

- 1.9.6 As NI Water are being compared to an upper quartile benchmark, it was then necessary to establish whether the frontier adjustment should be positive or negative, and then by what magnitude it would have shifted.
- 1.9.7 The UR has made an England and Wales adjustment within their opex models to allow for changes in operating costs from 2010-11 (the last year of comprehensive opex COLS model England and Wales data) to 2012-13. See Annex R to the PC15 final determination for further information on this model adjustment.
- 1.9.8 Work undertaken by Ofwat, through Reckon LLP<sup>9</sup> and London Economics<sup>10</sup> has shown historically that standard costs for the water and sewerage industry, when corrected by inflation, have exhibited decreasing unit rates from price control to price control over the 15 year period from PR94 to PR09. These decreases have tended to be around 10-20% at each successive price control.

**Table 1.1 – Historic change in standard costs**

Service Area	PR94 – PR99, % Change (London Economics) <sup>11</sup>	PR99 – PR04, % Change (Reckon) <sup>12</sup>
<i>Water Infrastructure</i>	-10%	-20%
<i>Water Non-Infrastructure</i>	-20%	-13%
<i>Sewerage Infrastructure</i>	-10%	-18%
<i>Sewerage Non-Infrastructure</i>	-15%	-30%

- 1.9.9 Using cost base data provided by Ofwat, Appendix C shows UR illustrations of the change in standard costs since the PR99 price control. From this analysis it can be seen that not only are the standard costs becoming less dispersed through time, but also frontier costs typically tend to reduce at each respective price control. This occurs across a wide range of costs, but is especially the case for water and sewerage infrastructure.
- 1.9.10 Figure 1.2 below is an excerpt from the UR's analysis and clearly shows that for the mains laying in urban highways - water infrastructure category, the range of standard costs observe a marked real terms downward shift at each successive price control.

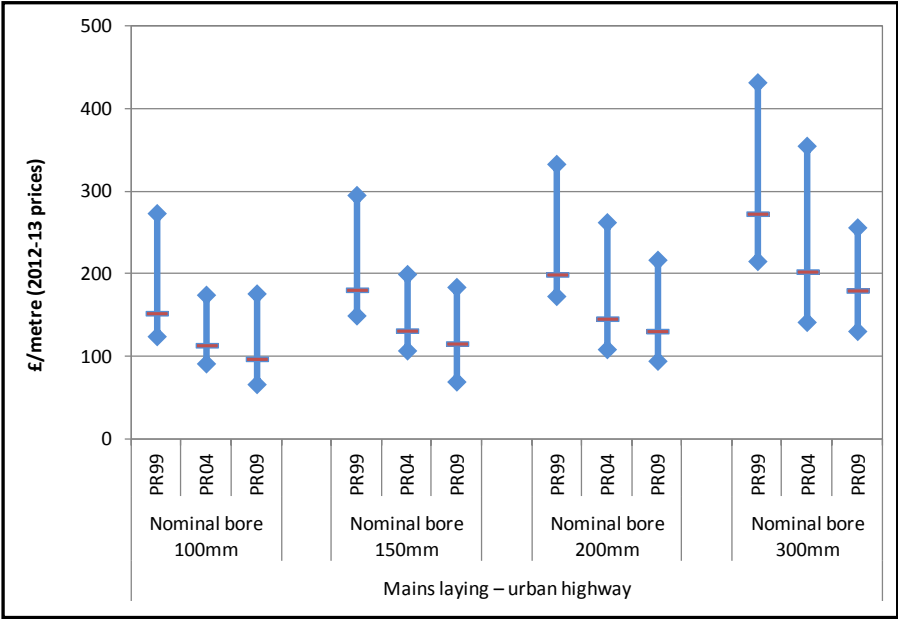
<sup>9</sup> Source: PR09 Scope for Efficiency Studies – Final Report to Ofwat by Reckon LLP - 2008

<sup>10</sup> Source: PR04 Scope for Efficiency Studies – Final Report to Ofwat by London Economics, Black & Veatch Consultancy and Professor Maurice F Shutler – November 2003.

<sup>11</sup> Note: Relative to COPI.

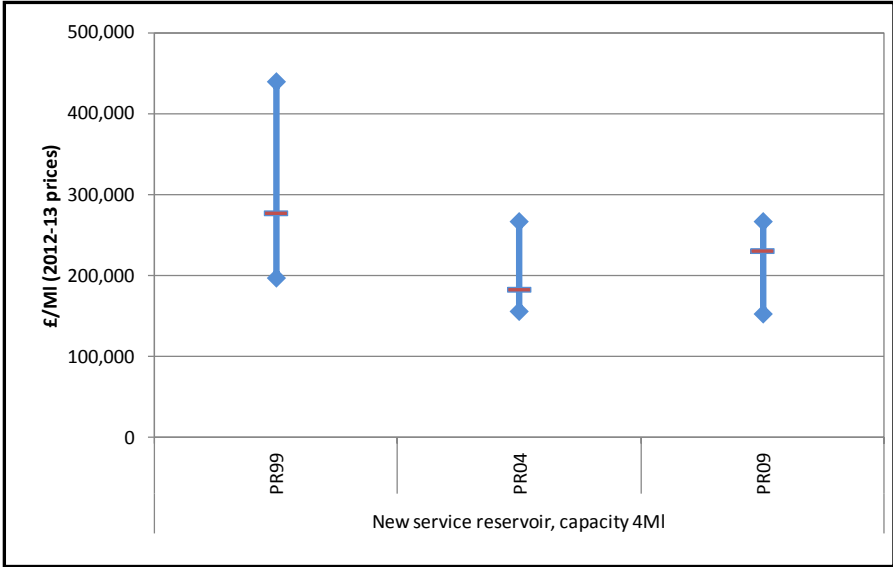
<sup>12</sup> Note: Relative to RPI. Percentage change over 5 years has been calculated from compound annual rates as published in Reckon Report.

**Figure 1.2 – England & Wales companies’ high, low and median standard costs – mains laying**



- 1.9.11 Non-infrastructure costs have also seen shifts in unit costs between successive price controls. While historically we observe a downward trend, this is a more mixed picture between PR04 to PR09 as some non-infrastructure capital unit costs have increased in the latter price control.
- 1.9.12 Figure 1.3 below shows an illustration from the UR analysis of how non-infrastructure costs have developed. The graphic, which shows the company cost base submissions for a 4MI/d Service Reservoir clearly shows how these have generally reduced in real terms between PR99 and PR04. However, the illustration also shows how the median cost increased somewhat from PR04 to PR09.

**Figure 1.3 – England & Wales companies’ high, low and median standard costs – new service reservoir**



- 1.9.13 While such 10-year comparisons of unit costs are useful, it is important to be mindful that there are a number of underlying reasons why unit costs may decrease rather than being solely due to efficiencies (including methodological reasons). Changes in standard cost definitions, the application of Ofwat's guidance, the engineering judgments used etc. may all vary between price controls.
- 1.9.14 Non-infrastructure costs for sewerage in particular have a small number of companies populating the cost lines due to the specialist nature of the cost definitions. Also, the fact that there are only 10 companies responsible for sewerage in England and Wales also limits the return of data for these lines.
- 1.9.15 Ofwat in their PR09 final determination set a -0.4% per annum frontier shift assumption for the five years until PR14. This was a small minimum productivity assumption from Ofwat, but works out to be around -2% over the whole price control period.
- 1.9.16 It is also the case that in their PR14 business plan submissions to Ofwat, the following companies are reporting significant savings, for example:
- Anglian Water - efficiencies made in delivering capital schemes in AMP5 have resulted in the investment plans for AMP6 costing £150m less than would otherwise have been the case. According to the company, the solutions reflect innovations during AMP5 period.
  - United Utilities - performance in delivering capital programme has improved significantly from 2011. The company state that this has resulted in £200m of efficiency savings being reinvested into projects to further improve service to customers or benefit the environment.
  - Severn Trent – despite the PR09 Final Determination including capex efficiency savings of £114m (4.4%) for 2010 to 2015, Severn Trent Water are reporting that they are on track to deliver these and deliver additional investment as a result.
  - South West – In their PR14 business plan the company are reporting a 5.0% capital expenditure efficiency percentage for the 2010 to 2015 period in their benchmarked cost assumptions.
  - Yorkshire Water – during 2005 to 2015 the company continued to make savings against elements of the business plan. On a like-for-like basis, compared to their efficient cost estimates allowed at PR09, the company state they have reduced capital costs by £198m or a factor of 10%.<sup>13</sup>
- 1.9.17 Information published by firms that work within the water and sewerage industry also tends to verify further capital works efficiencies have been evidenced since PR09. Consultants Turner & Townsend for example state the following which corroborates the received industry wisdom that even the most efficient regulated

---

<sup>13</sup> These are headline figures as reported within each respective company's business plan for PR14 and the UR has been unable to see the underlying analysis.



companies can make productivity improvements from one regulatory period to the next:

*“...the pressure to increase capital efficiency will continue, despite Ofwat acknowledging a typical 70 percent improvement since privatisation. Many water companies have made large improvements in unit costs since the PR09 cost base submission, which identified significant differences in the relative capital efficiency of companies.*

*Our experience is that companies at the lower end of the capital efficiency ‘league table’ have made significant performance improvements – but so have the frontier companies.”<sup>14</sup>*

- 1.9.18 In Thames Water’s recent PR14 business plan submission, the company used the PR09 cost base to assess how their relative efficiency has changed since the last price control. From their submission it appears that in estimating their relative position, the company has made a *“5 per cent efficiency improvement in the median position”* since PR09. We can infer that this 5 per cent adjustment accounts for the industry’s continuous improvement in capital unit costs since 2009.
- 1.9.19 Having taken all this evidence into account, the UR at draft determination believed that if it were to assume PR09 data was stationary in real terms (COP1 adjusted) this would not reflect the technical and innovative productivity progress made in the water and sewerage industry since Ofwat’s last price control. For the draft determination the UR deemed a -5% reduction in the England and Wales benchmark to be a reasonable but robust base assumption for PC15.
- 1.9.20 NI Water, in their response to the draft determination agreed with our contention that a -5% saving was a reasonable assumption, but stated that the evidence available would suggest this is the *maximum* achievement made by the water companies during PR09.
- 1.9.21 In their own cost base analysis contained within their consultation response, NI Water and Jacobs used a -5% benchmark adjustment for their base approach (the same as the UR’s Option A), and also used a conservative 0% adjustment in their Option G (i.e. that benchmark costs remained unchanged in real terms).
- 1.9.22 The company also said in their consultation response, that “the application of a 10% reduction to the PR09 figures is not supported by evidence. The historical trends between PR04 and PR09 would also suggest increasing figures, especially for non-infrastructure.”
- 1.9.23 New information from HM Treasury and Ofwat since our draft determination has provided greater clarity on the performance of the water and sewerage industry during PR09 period. Figures reported in HM Treasury’s Infrastructure Cost Review (July 2014) suggest that water and sewerage companies delivered 15% to 17% (£3.3bn to £3.7bn) capex efficiency savings out of Ofwat’s £21.8bn final

---

<sup>14</sup> [http://www.turnerandtownsend.com/maximising-capital-effici/Maximising\\_capital\\_efficiency\\_-\\_FINAL\\_36nLo.pdf.file](http://www.turnerandtownsend.com/maximising-capital-effici/Maximising_capital_efficiency_-_FINAL_36nLo.pdf.file)

determination assumption (using RPI indexation).<sup>15</sup> This was additional to the efficiencies assumed in the final determination allowance itself (a -1.6% capital efficiency challenge from Ofwat's calculation of baselines).

- 1.9.24 However, we would caution that as this related to performance relative to RPI we have to be careful as to draw such stark conclusions for our cost base model. This is because RPI during the period mostly exhibited moderate year-on-year increases in the index, whereas COPI was relatively flat in comparison - therefore savings relative to COPI would be much smaller. In their wholesale draft determination documentation (August 2014), Ofwat have stated that the industry has slightly underperformed on capital expenditure against the baseline position by £243.4 million on water and £70.6 million on wastewater. Ofwat have said that when this is considered against the company business plan submissions (the bids – which were typically more than Ofwat had assessed) then it can be seen that the industry has outperformed its own projections by £670m on water and £1,134.8m on wastewater.
- 1.9.25 Ofwat have also stated that a higher level of performance has been maintained by some companies at the frontier of the sector over the period with many companies outperforming the cost baseline. However, Ofwat have also stated that there have been a number of companies that are below their baseline and have incurred penalties for underperformance.<sup>16</sup>
- 1.9.26 Given that the evidence indicates a mixed performance across the water and sewerage sector during PR09, the UR will keep the -5% benchmark adjustment for the final determination in recognition that the more efficient companies have made improvements over the period. As was the case in the draft determination, this will apply to our cost base Scenarios A and C.
- 1.9.27 In light of NI Water's consultation response and other additional information made available, our Scenario B has changed from a -10% benchmark adjustment assumption to a -2% assumption, which we view as a *minimum* adjustment for upper quartile costs.

## 1.10. Cost base workings

- 1.10.1 For the most part, the general process for calculating NI Water's relative efficiency using the cost base mirrors the established Ofwat methodology as detailed in their PR09 Feedback Report. The entire process for assessing NI Water against England and Wales' cost base consists of three steps:
- a. Establish the scope for efficiency.
  - b. Calculate weights attributable to each standard cost using company forecasts.
  - c. Apply the weights to the scope for efficiency in order to generate targets.

---

<sup>15</sup> [www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/330380/PU1684 - Infrastructure cost review.pdf](http://www.gov.uk/government/uploads/system/uploads/attachment_data/file/330380/PU1684_-_Infrastructure_cost_review.pdf)

<sup>16</sup> [www.ofwat.gov.uk/pricereview/pr14/wholesale/prs\\_web140404pr14wholesalecostasses](http://www.ofwat.gov.uk/pricereview/pr14/wholesale/prs_web140404pr14wholesalecostasses)

## Establishing the scope for efficiency

1.10.2 The UR has followed the established Ofwat process in terms of estimating the efficiency scope across each standard cost. This process is shown in the hypothetical example in the table below:

**Table 1.2 – Calculating the adjustment for each standard cost**

A	B	C	D	E	F	G	H	I
Standard cost submitted (Grassland Mains 100mm)	RPA	Adjusted standard cost $A/(1+B)$	Chosen Benchmark	Gap $(C - D)/D$	Catch-up Rate	Catch-up Expected $(C - D) \times F$	New Revised Cost $(C - G)$	Efficiency $(G / C) \times 100$
£51.6/m	-6.2%	£55.0/m	£50.0/m	10.0%	75%	£3.75/m	£51.25/m	6.8%

1.10.3 Although there is a 10% gap between the submitted standard cost and the benchmark, this does not translate into a 7.5% efficiency target (assuming 75% catch-up). Rather, the resulting efficiency figure in column I is 6.8%, as this is the amount the £55.0/m in column C needs to reduce by to close 75% of the gap.

## Establishing the weighting adjustment

1.10.4 When the scope for efficiency of each standard cost has been arrived at, the percentages are weighted to reflect the anticipated expenditure within the price control period. This is an important step in the procedure since NI Water's level of efficiency depends on activity and needs to be reflected in our assessment of scope for efficiency.

1.10.5 To calculate the weighting adjustments we follow the Ofwat approach. The percentage of investment attributable to each standard cost will be determined by three factors:

- Forecast investment by project type and location
- Proportion of stock
- Expenditure in sub-category as a percentage of total category (i.e. water infrastructure, sewerage non-infrastructure etc)

1.10.6 Taking 100mm mains laying in a grassland location (excluding directional drilling) as a hypothetical example, the formula reads:

*Forecast investment (%) x Proportion of stock (%) x Sub-category investment (%)*

$$10\% \times 25\% \times 90\% = 2.25\%$$

1.10.7 The illustrative workings above indicate that 10% of the water infrastructure spend for PC15 relates to grassland mains laying. Using the proportion of stock data, this is then further broken down into respective size bands, with 25% of water main stock relating to 100mm pipes. The final disaggregation concerns

whether the weightings need to be broken down further – the above example takes into consideration the split between pipes and meters, with 90% of PC15 spend in the hypothetical example relating to pipes. The overall result is an allocation of 2.25% weighting to the 100mm mains grassland (water infrastructure) standard cost.

- 1.10.8 The company provided stock information based on its asset inventory, all of which relates to its water and sewer main. For non-infrastructure, the UR has assumed an even split of stock proportions.
- 1.10.9 Once the workings in Table 1.2 and paragraph 1.10.7 have been determined for all standards costs (with up to 78 standard cost comparisons), these percentages are aggregated for each service area – namely, water infrastructure, water non-infrastructure, sewerage infrastructure and sewerage non-infrastructure. The required cost reduction figures for each service area are then weighted by the proportion of capital spend in each service area to arrive at an overall final efficiency percentage to be applied.

### **NI Water and Jacobs' alternative modelling**

- 1.10.10 NI Water and Jacobs, in their consultation response undertook two alternative cost base analyses (NI Water's Options E & F), namely where they removed a significant number of lines from the cost base that they regarded as capital maintenance rather than enhancement lines.
- 1.10.11 As NI Water typically performed better in the comparison of the remaining 'enhancement only' lines, this has the effect of lowering the catch-up target by 5.2 percentage points for the company's Option E and 4.3 percentage points for NI Water's Option F.
- 1.10.12 While the UR has noted the NI Water and Jacobs approach, we do not feel it would be appropriate in the final determination to limit the coverage of the cost base to quite a narrow selection of cost lines. The cost base approach adopted by the UR gives a wide sample of capital works (65 out of a possible 78) with which to compare NI Water's relative performance against and we would be wary of being overly definitive and restrictive in this regard. In practical terms, the distinction between maintenance and enhancement is not an absolute one and the UR would point out that some of the removed lines by Jacobs are not necessarily untypical activity within an enhancement project.
- 1.10.13 While NI Water and Jacobs' Options E and F are useful alternative information for the UR as it makes its final determination, it should be noted that the company has not adopted the associated catch-up targets for these two analyses in their revised enhancement efficiency catch-up proposals.

## **1.11. Continuing efficiency**

- 1.11.1 As the cost base analysis only establishes the scope for catch-up with benchmark costs within year one of PC15, it is also necessary to apply a continuing efficiency percentage to NI Water's capital costs to account for year-on-year industry improvement.

- 1.11.2 Annex O to the PC15 final determination states a 0.6% per annum productivity assumption to be appropriate for all capital costs, including enhancement spend for each of the six years of PC15.
- 1.11.3 Cumulatively, this 0.6% per annum assumption leads to a 3.5% efficiency in capital enhancement by the end of the price control. Due to the profile, over the six-year PC15 capital enhancement programme the frontier shift assumption has an average 1.8% to 1.9% overall impact.

## 2.0 Results of Cost Base Analysis

- 2.1.1 The UR has fully considered all the potential assumptions and inputs that feed into the PC15 cost base analysis. It should be noted however, that each input for the standard cost analysis should not be considered in isolation and that the various assumptions should form a holistic logical approach to assessing NI Water's capital costs.

### 2.1. Summary of assumptions used

- 2.1.1 A summary of the PC15 approach to the cost base can be seen in Table 2.1 below. A 'tick' in each column means that for each respective modelling approach, the assumption has followed the Base approach in Method A.
- 2.1.2 Any deviations in approach from the baseline method A are outlined in red text. For example, Method C follows the exact same approach as Method A but differs in that it takes an asymmetrical approach to efficient costs.

**Table 2.1 – Approach to PC15 cost base**

Cost Base Issue	Method A – Base Approach	Method B – Asymmetric Approach (-2%)	Method C – Asymmetric Approach (-5%)
<i>E&amp;W Data Utilised</i>	PR09 Ofwat Published Data	✓	✓
<i>Choice of Benchmark</i>	Upper Quartile (25 <sup>th</sup> percentile)	✓	✓
<i>E&amp;W Benchmark Adjustment</i>	-5%	-2%	✓
<i>NI Water company Data Utilised</i>	PC15 Business Plan Data	✓	✓
<i>NI Water Regional Price Adjustment</i>	-6.2% (CEPA)	✓	✓
<i>Rate of Catch-Up</i>	75%	✓	✓
<i>Length of Catch-Up</i>	1 Year	✓	✓
<i>Symmetrical Adjustments</i>	Yes	No	No
<i>Special Factors</i>	None Submitted	✓	✓

- 2.1.3 In assessing the methodology for calculating the cost base percentages, it is clear that a similar approach has been undertaken by the UR as was undertaken in PC10.

## 2.2. Results of cost base analysis

- 2.2.1 Overall, NI Water submitted 65 standards costs which were reflective of their PC15 business plan capital programme. In comparing these standard costs with the 21 companies in England and Wales and weighting them we can see that NI Water has made substantial progress in improving their relative capital performance since PC10.
- 2.2.2 The results of our cost base analysis are outlined below. The PC10 cost base results as published in the PC10 final determination have also been included for comparison. It should be noted that there are some small differences in the data and assumptions used between the two price controls however.

**Table 2.2 – Results of PC15 cost base – efficiency challenge**

Service Area	Efficiency Challenge at PC10	PC15 Approach Method		
		A	B (revised from draft determination)	C
		Base Approach (-5%)	Asymmetric Approach (-2%)	Asymmetric Approach (-5%)
Water Infrastructure	14.5%	7.7%	6.3%	8.2%
Water Non-Infrastructure	11.2%	16.8%	15.8%	17.5%
Sewerage Infrastructure	12.9%	-14.6%	1.8%	1.8%
Sewerage Non-Infrastructure	11.4%	9.9%	7.9%	9.9%
<b>Weighted Average</b>	<b>12.5%</b>	<b>5.4%</b>	<b>7.6%</b>	<b>9.1%</b>

- 2.2.4 Under **Method A**, our base case approach, the total scope for catch-up at PC15 is assessed to be 7.2%; however this is reduced to 5.4% when a 75% catch-up rate is applied. The notable minus efficiency figure for sewerage infrastructure (-14.6%) in Method A shows that NI Water are substantially more efficient than the upper quartile benchmark costs in England and Wales in this area.
- 2.2.5 For **Method B**, which assumes a -2%% reduction in unit costs from PR09, shows that while NI Water has made commendable improvement in the cost of its capital works, there is still a 7.6% cost reduction required to close 75% of the gap to the upper quartile when you take the Ofwat PR04 approach of treating efficiencies asymmetrically.
- 2.2.6 While Method A illustrates how NI Water has become noticeably efficient on the sewerage infrastructure service area, Method B's results show there is still some



expectation for further cost reductions in water costs and sewerage non-infrastructure.

- 2.2.7 **Method C** is a mix between Method A and B as it adopts Method A's -5% continuing efficiency assumption but adopts Method B's asymmetrical approach to efficiency. Although challenging for NI Water, this approach is quite a bold but highly reasonable methodological approach.
- 2.2.8 The above results from our three approaches illustrate that an appropriate PC15 enhancement efficiency catch-up target for NI Water lies between a 5.4% to 9.1% range. At our draft determination we adopted a 9.1% catch-up target for the six-year price control.
- 2.2.9 However, due to new information from the company and from Ofwat since the draft determination, and in recognition of the uncertainties of the cost base approach, the UR will apply a 7.0% efficiency target on NI Water's capital enhancement spend.
- 2.2.10 In setting our target we also have taken account of the scope for procurement efficiencies as estimated by the Review of NIW Capital Procurement Strategies and Efficiency Comparisons, which was 10% – see Annex N for further information. Our target has also been informed by the UR's re-pricing analysis of a small sample of schemes included in NI Water's PC15 business plan. This work suggested that NI Water's schemes were 12% higher than our cost consultant's database costs, which we used as an additional sense check.
- 2.2.11 Whilst we triangulate on a 7.0% target it should be noted that this allows a fair degree of latitude as it represents closing 75% of the gap to the upper quartile in the first year of PC15 - as opposed to 100% catch-up to the frontier cost for example.

## 2.3. Impact on capital enhancement

- 2.3.1 The UR will apply the 7.0% catch-up efficiency figure to the capital enhancement programme (pre-efficiency) in the first year.
- 2.3.2 Since our PC15 cost base analysis and attendant Regional Price Adjustment is based on a snapshot of economic and procurement conditions we apply both catch-up and continuing efficiencies, to account for movement in the frontier, to NI Water's capital enhancement programme. The UR will therefore also apply a 0.6% per annum continuing efficiency target during the duration of the six years of PC15.
- 2.3.3 In NI Water's draft determination consultation response the company stated catch-up efficiency of 7.0% was achievable, but gradually profiled their efficiencies to reach 7.0% in year five of the price control, from 2.0% in year one.
- 2.3.4 Overall, over the six years of PC15, NI Water state they can achieve a maximum average catch-up of 5.4% over the six-year PC15.<sup>17</sup> The company also stated

---

<sup>17</sup> NI Water/Jacobs cost base analysis estimated catch-up range of 1.1% to 5.4%, depending on approach.

that in the same manner as the UR has adopted, productivity growth of 0.6% per annum would then also be added to these percentages to take account of the on-going productivity gains expected of an efficient water company.

2.3.5 We do not believe profiling efficiencies is appropriate for the following reasons:

- (i) Savings associated with procurement contracts for new capital works and materials etc can be realisable in first year of a price control;
- (ii) The company have had advanced notice of expectation of capital efficiency for PC15;
- (iii) NI Water's business plan costs were based on 2012-13 and 2013-14 years and we can assume that NI Water will have improved its capex delivery somewhat since then;
- (iv) At PR04 Ofwat expected 75% catch-up in year 1 for enhancement spend (although this excluded 'early start' schemes);
- (v) The company could manage the delivery of capital projects and efficiencies each year over the duration of the PC15 price control to achieve the monetary target for additional outputs.

2.3.6 The table below shows the actual profile of efficiencies applied year-on-year over each of the six years of PC15.

**Table 2.3 – Utility Regulator's capital enhancement efficiency targets for PC15**

	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21
Catch-up Reduction – Annual Profile (%)	7.0%	-	-	-	-	-
Catch-up Reduction – Cumulative Profile (%)	7.0%	7.0%	7.0%	7.0%	7.0%	7.0%
Productivity Assumption – Annual Profile (%)	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%
Productivity Assumption– Cumulative Profile (%)	0.6%	1.2%	1.8%	2.4%	3.0%	3.5%
<b>Final Determination Cumulative Capital Enhancement Efficiency Profile (%)</b>	<b>7.6%</b>	<b>8.1%</b>	<b>8.7%</b>	<b>9.2%</b>	<b>9.8%</b>	<b>10.3%</b>

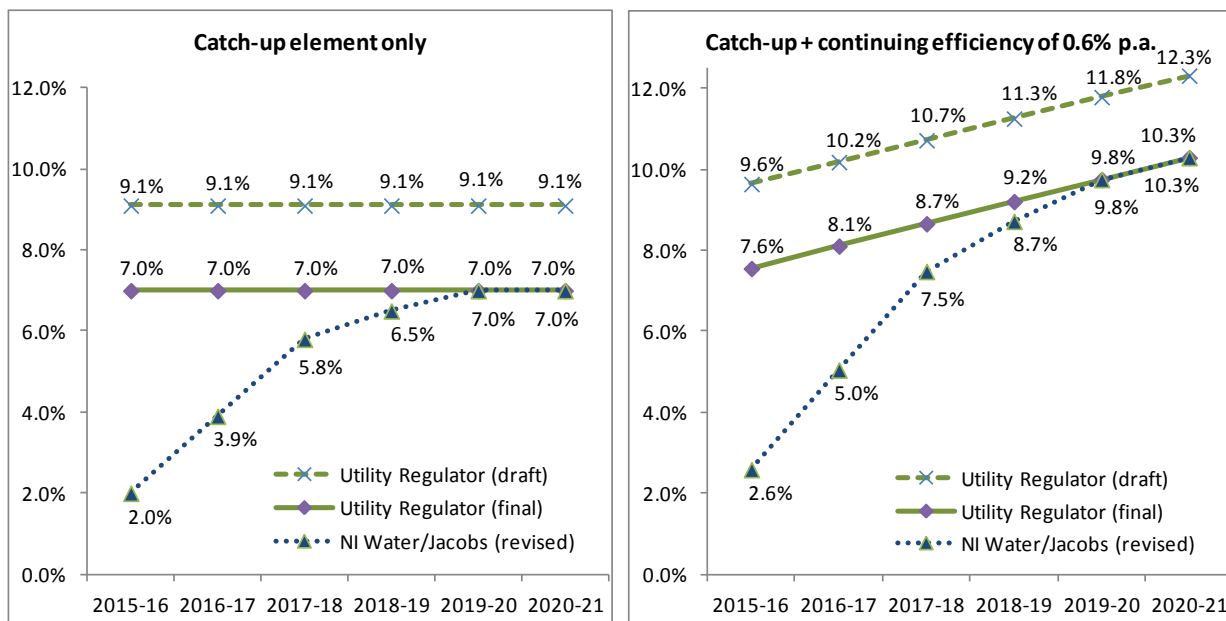
2.3.7 This identifies an additional £23.5m of enhancement efficiencies over the six-year price control over and above NI Water's post efficiency figures in their PC15 business plan. This works out on average across PC15 to be around 8.9% of the pre-efficiency enhancement expenditure programme.

2.3.8 With NI Water substantially increasing their proposed enhancement efficiencies in their response to our draft determination (to 5.4% catch-up and 0.6% per annum continuing efficiency) from what was in their business plan, our final determination figures are approximately only £5.8m above the monetary impact of NI Water's revised proposals. In order for consumers to benefit fully from the expected efficiencies, these savings are expected to be retained within the company for the PC15 period. The UR will therefore expect £23.5m worth of

additional capital projects to be delivered for the original post efficiency amount which NI Water proposed in their PC15 business plan. These projects will make a positive difference to the service experienced by NI Water's consumers.

- 2.3.9 An illustrative comparison of the profiles of the UR's and NI Water's enhancement efficiency is shown below.

**Figure 2.1 – Comparison of enhancement efficiency profiles for PC15**



- 2.3.10 By way of some inter-company comparison, Welsh Water, in their business plan for PR14 stated that they are targeting £98m of capital savings over the five years to 2020 – around 6% of their total capex.

- 2.3.11 Severn Trent are forecasting to deliver £238m of savings, which equates to around 7% of their capex; South West Water are reporting a 5.5% capex efficiency for the 2015-20 period; while Northumbrian are assuming a 6% capital efficiency across their programme for 2015-20.<sup>18</sup>

- 2.3.12 With a capital enhancement budget of £1,089m, Scottish Water set a £151m (12%) enhancement efficiency target for the 2015-21 period. According to Water Industry Commission for Scotland (WICS) the cost of the enhancement programme will be influenced by the extent to which Scottish Water can continue to improve the efficiency of its planning and delivery mechanisms. Scottish Water has proposed an overall average capital efficiency target of around 16% in its plan (for total capex).<sup>19</sup>

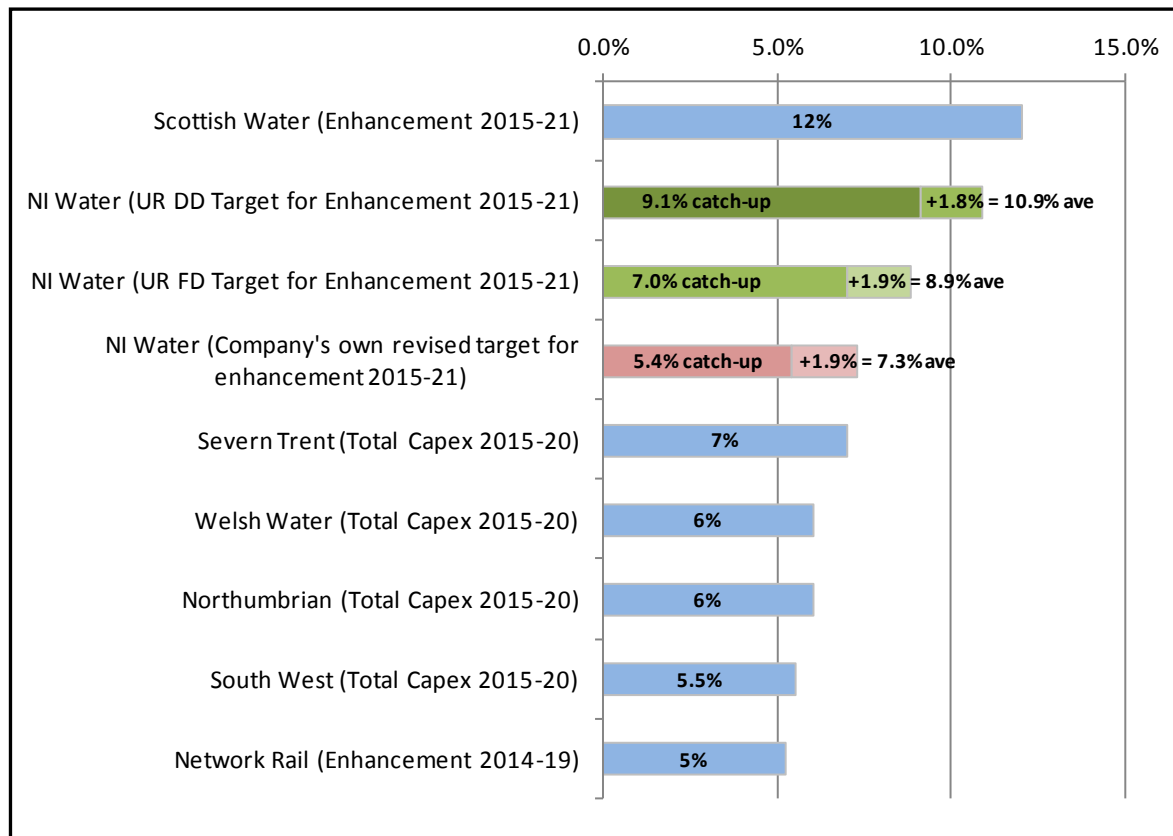
<sup>18</sup> These are headline figures as reported within each respective company's business plan for PR14 and the UR has been unable to see the underlying analysis.

<sup>19</sup> As taken from WICS's customer information note 21. This may have been superseded by WICS's final determination.

[www.watercommission.co.uk/UserFiles/Documents/customer%20note%2021\\_220113.pdf](http://www.watercommission.co.uk/UserFiles/Documents/customer%20note%2021_220113.pdf)

- 2.3.13 We are informed that Network Rail were not set a total enhancement efficiency target as such by the Office of Rail Regulation (ORR) for CP5, but under the Enhancement Costs Adjustment Mechanism (ECAM) projects are examined in a project-by-project basis. Network Rail themselves set a 12% efficiency target for enhancement for the 2014-19 period, but as this was profiled we estimate that this would be the equivalent to an average of around 5% for the CP5 period.

**Figure 2.2 – Comparison of average capital efficiencies<sup>20</sup>**



- 2.3.14 While these figures provides context for NI Water's efficiency targets, each target is company-specific. All the different companies compared would have different levels of scope to achieve efficiencies depending on their stage of maturity and their circumstances.

- 2.3.15 It should also be noted that the figures quoted regarding other companies are business plan figures. Ofwat in their determination may set some of these companies a specific totex allowance which may necessitate greater capex efficiencies (depending on the scope for improvement within each of the various revenue building blocks).

<sup>20</sup> The +1.8% and +1.9% figures in the graph refer to the average impact of the 0.6% continuing efficiency element over the six years. We are assuming NI Water's revised proposed efficiency profile translates into a 5.4% average catch-up over the six years of PC15.

# Appendix A – PR09 Definitions of Confidence Grades

Criteria	Score				
	1	2	3	4	5
<b>1. Scope</b>	Company has no previous experience of this type of activity.	Company has had some experience of delivering similar projects, but not within last 8 years.	Company has carried out similar projects but in significantly different size bands.	Company has experience in similar projects, within similar size bands to the definition.  Company has standard solution/s for this type of activity which has been assessed as providing the least WLC solution.	Company has considerable experience in similar projects and similar size bands to the definition.  Company has standard solutions for this type of activity and a process for updating them. It has been assessed as providing the least WLC solution.
<b>2. Cost</b>	Cost data is from non-company sources. Used industry parametric data (e.g. TR61).	Significant use of non-company sources, costs from dissimilar projects or costs from projects completed more than 8 years in the past.	Company has reasonable company specific data. Some source data may be from a non-company source (e.g. contractors' estimates with limited or no company specific input).	Standard cost represents activity where reliable company specific cost data is available (few data points).	Standard cost represents activity where reliable company specific cost data is available (reasonable number of data points).
<b>3. Risk</b>	A generic contingency is included – no basis of value.	A generic contingency is included – based on generic risk register.	Risk register produced qualitatively (risks identified and scored).  Or  Tender to outturn ratio applied / outturn estimated based on a small sample (or old data set) of projects.	Risk register produced and quantified risk assessment modelled.  Or  Tender to outturn ratio applied / outturn estimated based on a reasonable sample of similar (and recently completed) projects.	Risk register produced and quantified risk assessment modelled.  Or  Tender to outturn ratio applied / outturn estimated based on a significant sample of similar (and recently completed) projects.
<b>4. Compliance with standard cost definition</b>	Adjustments have not been made as required in the specification.  Company is not able to disaggregate costs to allow adjustments / exclusions to be made.	Company is less confident that all adjustments for direct costs have been made as specified in the guidance. Indirect and overhead costs have been derived but from a small sample of similar projects.  Cost data is only available at a site / system level (e.g. cost of 30ML/d treatment works) making it difficult to derive the adjustments / exclusions.	Company is less confident that all adjustments for direct costs have been made as specified in the guidance. Indirect costs and overheads are based on a small sample of similar projects.  Cost data is captured at process unit / system level (e.g. rapid gravity filters) with high level breakdown of indirect costs, risk allowances and overheads. Adjustments and exclusions can be made on a representative basis.	Company is reasonably confident that all adjustments for direct costs have been made as specified in the guidance. Indirect costs and overheads are based on a reasonable sample of similar projects.  Cost data is captured at sub-process level (e.g. backwash pumps). Indirect costs are broken down and risk allowances are based on specific risk log. The required adjustments / exclusions can be made on a representative basis.	All adjustments for direct costs have been made as specified in the guidance and are based on a robust historic data. Indirect costs and overheads are based on a significant sample of similar projects.  Cost data is fully disaggregated and sufficiently detailed to allow all adjustments and exclusions to be calculated with high confidence.

# Appendix B – PR09 Standard Cost Specifications

## Water Infrastructure

### Mains Laying

#### General specification for mains laying:

New water mains laid in normal site conditions at a depth of cover of 900mm to the crown of the pipe. No adverse complications. Pipe material is based on companies' own practices. Costs include all fixtures and fittings, ancillary works and reinstatement. Diameters relate to the nominal internal bore of the pipe.

#### General specification for mains laying by directional drilling:

Soil type is normal and neither rocky, waterlogged nor sandy. Pipe material is based on companies' own practices. Costs include all fixtures and fittings and reception pits are 3m<sup>2</sup>. Diameters relate to the nominal internal bore of the pipe.

Grassland	Mains laid in urban or rural verges, new development sites or open field normally used for grazing. Excludes the cost of traffic management and temporary fencing.
Rural or suburban highway	Mains laid in secondary or minor roads and housing estates. Type 3 or 4 reinstatement and non-traffic sensitive in accordance with the New Roads and Street Works Act 1991.
Urban highway	Mains laid in cities and town centre trunk roads. Type 2 reinstatement and traffic sensitive in accordance with

### Mains rehabilitation

#### General Specification:

Existing water mains rehabilitated using particular techniques at a depth of cover to the main of 900 mm to the crown of the pipe. All fixtures and fittings, ancillary works and reinstatement is included.

Relining	Encrustation removed and main lined internally by applying a surface-applied internal coating. Typically used for relining cast iron mains.
Pipe insertion	Encrustation removed and a smaller structural pipe inserted into the existing main.

### Communication pipes

#### General specification:

New communication pipes installed in a new development site. Lengths of pipes are 3m for the short side and 7m for the long side. Renewal of pipes relates to replacement by open cut or moling technique in a suburban location. Both assume a depth of cover of 750mm to the crown of the pipe.

New – long side	New 7m length communication pipes, involving a road crossing.
New – short side	New 3m length communication pipes.
Renew – long side	Renewal of 7m length communication pipes, involving a road crossing.
Renew – Short side	Renewal of 3m length communication pipes.

Household meters	
<b>General specification:</b> Installation of new and renewal of existing meters. Manually read household meters are installed.	
New internal meter	New internal meter, including survey but excluding abortive house visits.
New external meter with boundary box provided	New external meter into an existing boundary box provided and installed by the developer.
New external meter including boundary box	New external meter including boundary box, unsealed type located in the public footpath outside the property. Assume the footpath has a tarmac surface.
Renewal of internal meter	Renewal of existing manually read internal meter. Includes survey but excludes abortive house visits.
Renewal of external meter with boundary box provided	Renewal of external meter, boundary box located in the public footpath outside the property, suitable to accept new meter.
Renewal of external meter including boundary box	Renewal of external meter, including renewal of boundary box, unsealed type, located in the public footpath outside property. Excludes costs for demolition or removal of existing boundary box.

## Water Non-infrastructure

Water treatment works	
New medium-size treatment works	Output 30 MI/d (30,000m <sup>3</sup> of treated water a day), lowland river source with existing bank-side storage reservoir, no nitrate problem.
Replacement filtration system at medium-size treatment works	Replacement filtration system, output 20 MI/d, at a lowland river source, no sludge storage or treatment required.
New abstraction borehole and small treatment works	Output 5 MI/d of treated water, simple disinfection only with no contact tank. Pumping head (static and friction) is 45m.
Refurbishing plumbosolvency control plant to small borehole treatment works	Refurbishment of plumbosolvency control plant, output 8 MI/d, simple disinfection only.
Altering medium-size treatment works for cryptosporidium protection	Alterations to fit an approved barrier process at lowland river source treatment works with existing bank-side storage reservoir, output 30 MI/d, no nitrate problem.
Installing nitrate removal at small borehole treatment works	New nitrate removal plant, output 10 MI/d, at existing borehole treatment works with simple disinfection only, no contact tank.
Installing cryptosporidium protection at small borehole works	Alterations to fit an approved barrier process to borehole works, output 2.5 MI/d, simple disinfection only.
Refurbishing rapid gravity filters at medium-size treatment works	Refurbishment of existing rapid gravity filtration plant, output 20 MI/d. Works cannot be taken off-line.
Replacing disinfection plant	Replacement of existing sodium hypochlorite disinfection plant, output 12 MI/d. Plant can be taken off-line



<b>Water storage</b>	
New service reservoir	4 MI (4,000m <sup>3</sup> ) capacity, two compartments, good ground conditions, including all necessary pipe work and telemetry but no treatment.
Refurbishing small service reservoir	1 MI (1,000m <sup>3</sup> ) capacity, two compartments, concrete construction, structurally sound but roof cracking and side walls seeping water, causing coliform failures.

<b>Water pumping stations</b>	
Replacement variable speed pumps	Output 6-9 MI/d, one duty, one standby, pumping head (static and friction) is 45m-60 m, shaft driven, situated in a dry well, including all associated control equipment, good access.
New fixed-speed pump set	Output 10 MI/d, pumping head (static and friction) is 75m, into existing high-lift station, additional cabling and telemetry equipment required, existing switchgear and transformer are adequate, good access.
Replacement motor control centre for an existing large variable speed pumping station	Two new duty or standby compartments with inverters each rated at 45kW, existing transformer and electricity company incomer are adequate, good access.

## Sewerage Infrastructure

<b>Sewer Laying</b>	
New sewers laid in normal site conditions at a depth of cover of 2m to the crown of the pipe. No adverse complications. Pipe material is based on the company's own practice. Costs include a sewer junction and cap at 10m intervals and 50m intervals between manholes. Costs are based on open-trench pipe laying, with all other assumptions consistent with the relevant design and construction guidelines in 'Sewers for adoption' (6th edition). Diameters relate to the nominal internal bore of the pipe.	
Grassland	Sewers laid in urban or rural verges, new development sites or open field normally used for grazing. Excludes the cost of traffic management and temporary fencing.
Rural or suburban highway	Sewers laid in secondary or minor roads and housing estates. Type 3 or 4 reinstatement and non-traffic sensitive in accordance with the New Roads and Street Works Act 1991.
Urban highway	Sewers laid in cities and town centre trunk roads. Type 2 reinstatement and traffic sensitive in accordance with the New Roads and Street Works Act 1991.

<b>Sewer Laying</b>	
A flexible lining is inserted into the sewer through existing manholes, under pressure of water and then cured by circulating hot water. Adequate water supply is available on site. Depth of cover to sewer is 2m. Sewer junction and cap at 10m intervals. Diameters relate to the nominal internal bore of the pipe.	

## Sewerage Non-infrastructure

Sewer structures	
<b>General specification:</b> Well-drained site available in public park adjacent to sewer.	
Medium-size storage tank to a combined sewer overflow	750m <sup>3</sup> storage capacity, single tank, pumping return to sewer required, sewer 500mm diameter, all telemetry included.
Large storage tank to a combined sewer overflow	3,000m <sup>3</sup> storage capacity, single tank, pumping return to sewer required, sewer 500mm diameter, all telemetry included.
Combined sewer overflow chamber with powered screen	Off-line on an existing 600mm trunk sewer, powered 6 mm self-cleaning screen installed in weir, control panel and instrumentation included, no odour control.

Sewage pumping stations	
Replacement pumps and motors for an existing medium-size dry well pumping station	One duty, one standby, total capacity 30kW, vertical spindle integral units, each pump 150 l/s at 8m pumping head, new control and telemetry equipment and cabling, existing switchgear and transformer are adequate, good access.
Replacement submersible pumps for an existing small pumping station	One duty, one standby, total capacity 12kW, installed via guide rails, each pump 45 l/s at 8m head, new control and telemetry equipment and cabling, existing switchgear and transformer are adequate, good access.
Upsizing of small existing wet well in-line pumping station	Replacement fixed speed submersible pumps (one duty, one standby) via guide rails, total capacity 30kW, in an existing wet well pumping station, current capacity 12kW, each pump 150 l/s at 8m head, new control and telemetry equipment and cabling, existing switchgear and transformer are adequate, good access.
Replacement motor control centre for an existing large fixed speed pumping station	Two new duty or stand-by compartments with soft starters each rated at 45kW, existing transformer and electricity company incomer are adequate, good access

<b>Sewage treatment works</b>	
First-time rural sewage treatment works	New treatment works serving a population equivalent of 200, treating up to 6 DWF (dry weather flow) = 210m <sup>3</sup> per day, design capacity = 12 kg of BOD <sub>5</sub> /day, no sludge tanks required. Include all necessary pipework, buildings and telemetry, control equipment
Installing denitrification at an existing large secondary treatment works	Installing nitrate removal at an existing secondary treatment works using percolating filters serving a population equivalent of 40,000, treating up to 3 DWF = 30,000m <sup>3</sup> per day, design capacity = 2,400kg of BOD <sub>5</sub> /day. Include all necessary pipework, buildings and control equipment.
Additional nutrient removal at existing medium-size secondary treatment works	Additional treatment stage at an existing secondary treatment works using percolating filters serving a population equivalent of 4,000, treating up to 3 DWF = 3,000m <sup>3</sup> per day, design capacity = 240kg of BOD <sub>5</sub> /day. Include all necessary pipework, buildings and control equipment.
Additional ammonia removal at existing small secondary treatment works	Additional treatment stage for ammonia removal at an existing secondary treatment works using percolating filters, serving a population equivalent of 2,000, treating up to 3 DWF = 1,200m <sup>3</sup> per day, design capacity = 120kg of BOD <sub>5</sub> /day. Include all necessary pipework, buildings and control equipment.
Replacement UV disinfection at existing medium-size treatment works	Replacement UV disinfection plant at an existing treatment works serving a population equivalent of 5,000, treating up to 3 DWF = 4,500m <sup>3</sup> per day. Include all necessary control equipment.
Replacement inlet screens	Replacement fine screens at an existing inlet works, duty and standby channels and one must remain open during construction. Include new local control equipment and interface with site control.

<b>Sludge treatment and disposal</b>	
Extension to existing sludge treatment facility	Extending existing anaerobic sludge treatment facility from 2,000 to 5,000 tonnes of dried solids a year. Domestic catchment.
Refurbishment of belt sludge thickeners	Replacement belt sludge thickeners at existing sewage treatment works serving population equivalent of 50,000. Include duty and standby.

## Appendix C – Historic Movement in Standard Costs

In the following pages the UR has illustrated the changes in standard costs within Ofwat's PR99, PR04 and PR09 cost base company data.

Each graph shows the range (minimum, maximum and median) of standard cost submissions for a wide variety of standard costs from the water and sewerage companies in England and Wales over three price controls. It should be noted that while the definitions and specifications for infrastructure standard costs have remained similar from PR99 to PR09, non-infrastructure standard costs selected by Ofwat for comparison have not remained as constant - therefore there are less non-infrastructure graphs shown in our analysis.

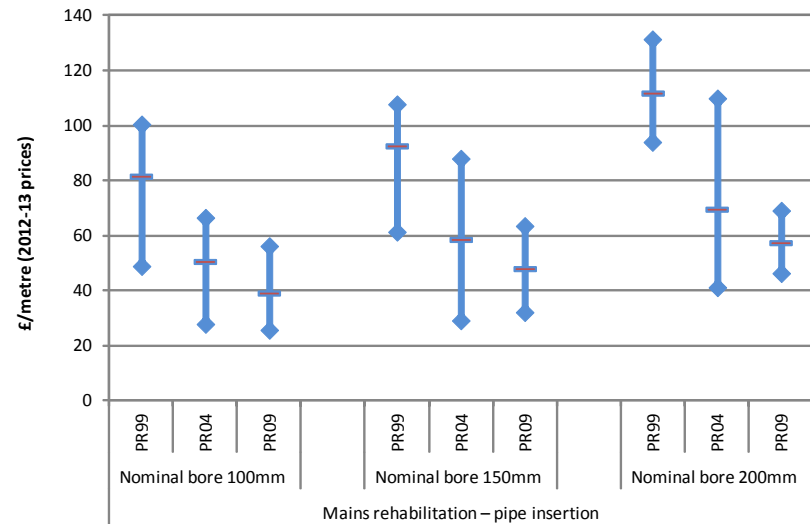
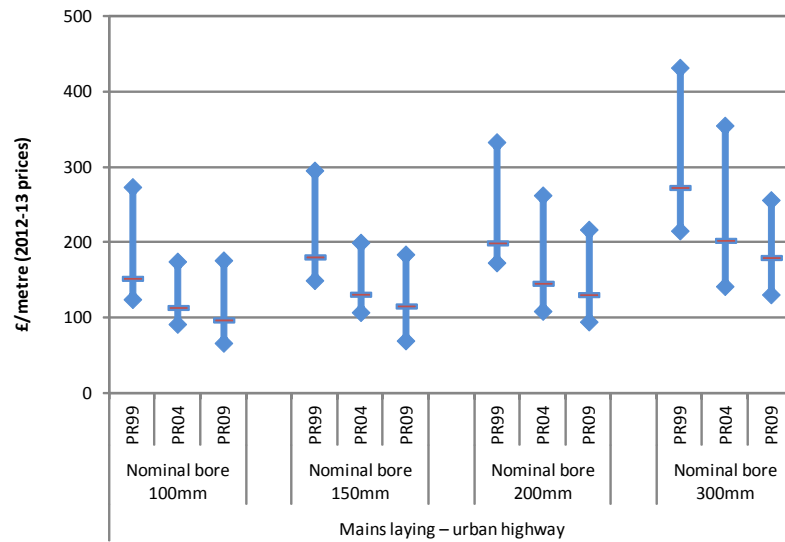
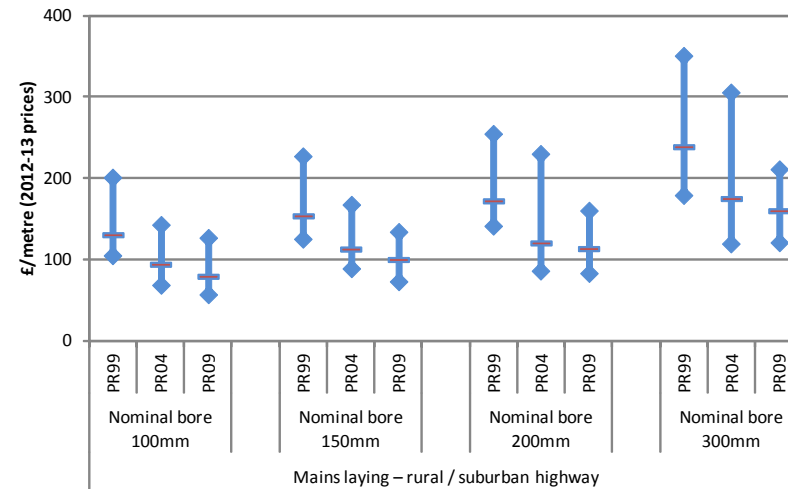
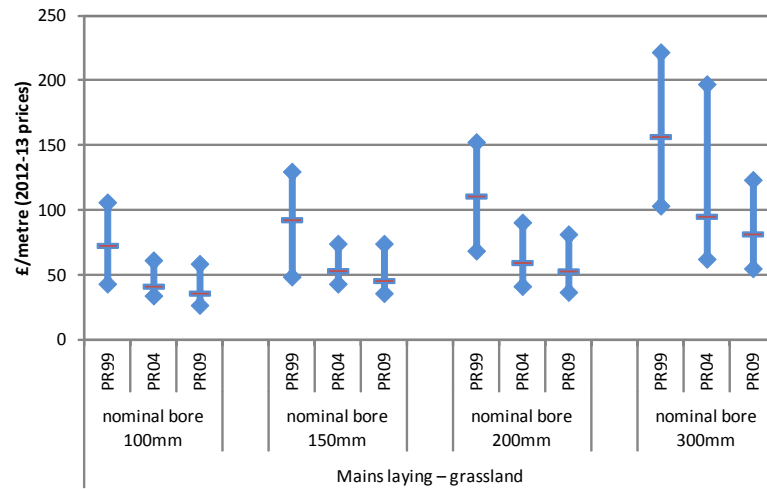
To account for changes in inflation between these time periods, the standard costs from each price control have been transformed into a constant 2012-13 price base using COPI.

While the data provides a useful long-term account of how unit costs have changed within the cost base since PR99, the reader should be mindful that there are a number of reasons (including methodological reasons) why costs may decrease or increase, other than the cause being solely efficiency related. For example:

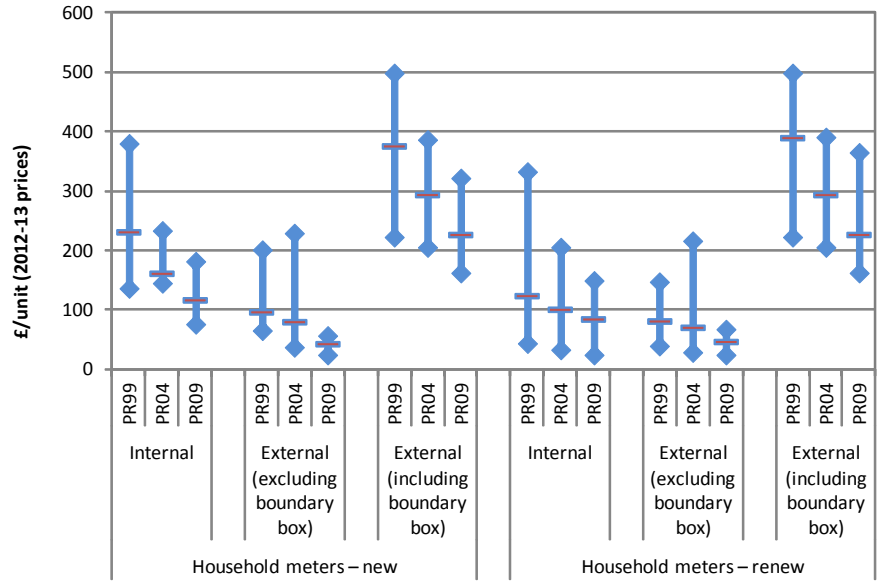
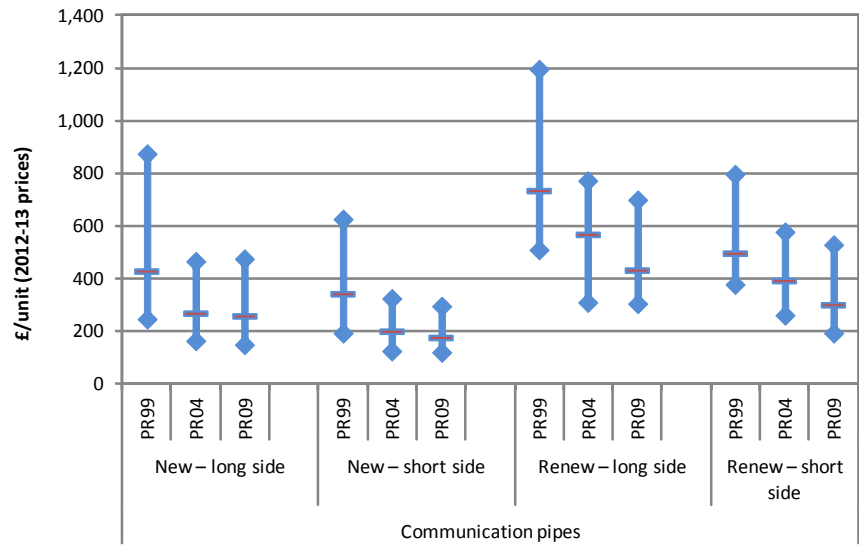
- a. There may have been changes in standard cost definitions between price controls, so comparisons may not be on an exactly 'like-for-like' basis.
- b. Companies may have applied the Ofwat cost base guidance more strictly in later price controls as they better understood the specifications. For example, earlier cost base estimates may have included unrelated costs within the standard cost estimates, with companies 'stripping' these out in later price control cost base submissions.
- c. The number of returned costs within each standard cost category varies by how routine the activity is. Some non-infrastructure cost categories therefore have a small sample of company unit rates, with few companies submitting data.
- d. In some cases Ofwat have excluded outlier company data from standard cost categories. The approach to this may vary between price controls.
- e. All cost base submissions are subject to engineering judgments as to the quality of the data and the associated margins of error.
- f. Other factors such as landfill taxes may also account for some of the differences between the price controls.

Those standard cost specifications which have seen some notable definitional changes since PR99 but are deemed to be still relatively comparable are denoted with an asterisk (\*) on the x-axis of the associated graph. Those standard costs which we believe have not seen much change since PR99 are shown without an asterisk (mostly the case on infrastructure costs). Any standard costs specifications which we believe have changed significantly since PR99 have not been included for comparison in our analysis.

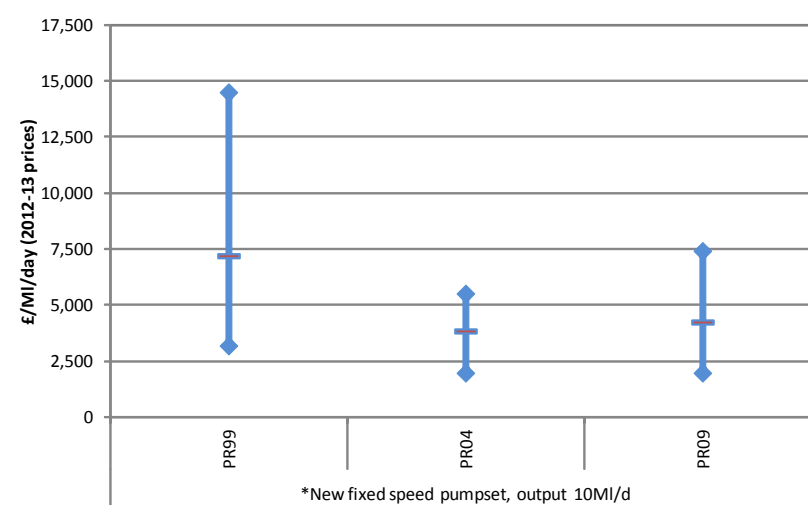
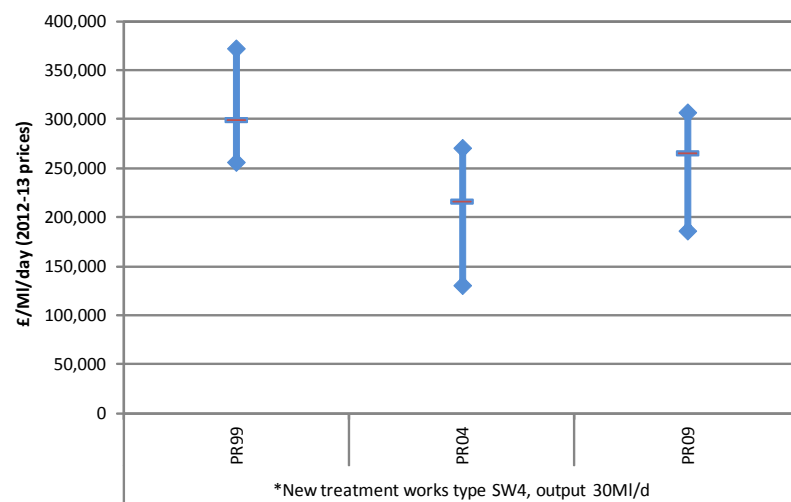
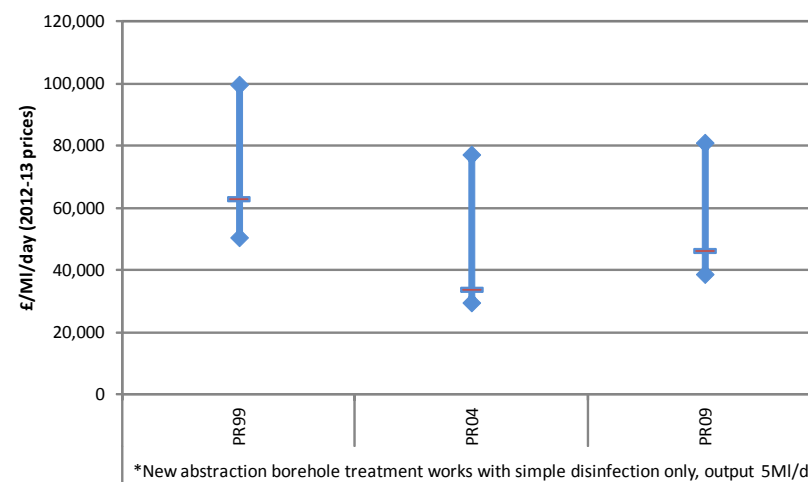
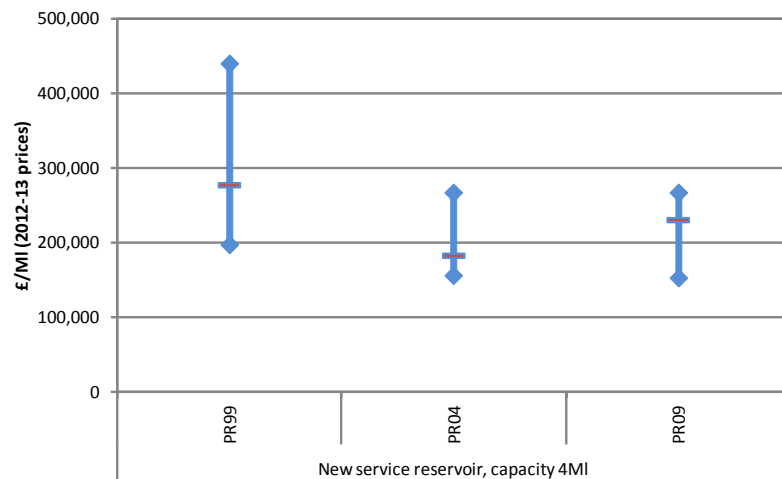
**Water Infrastructure Standard Costs – PR99 to PR09**



UTILITY REGULATOR WATER

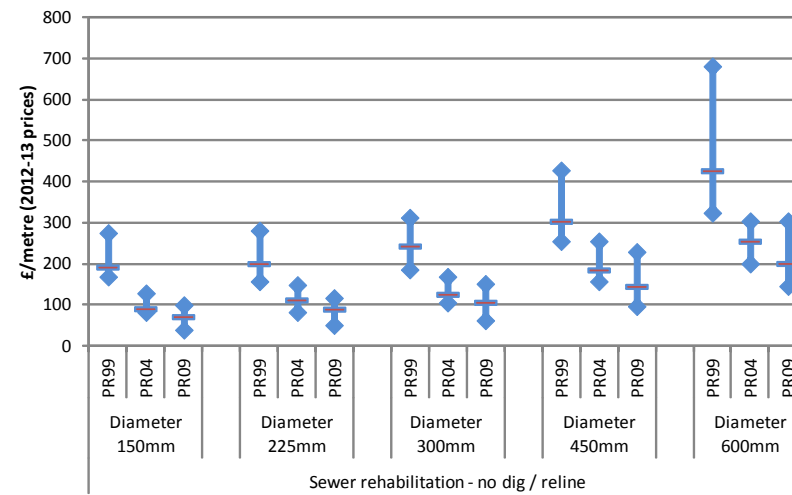
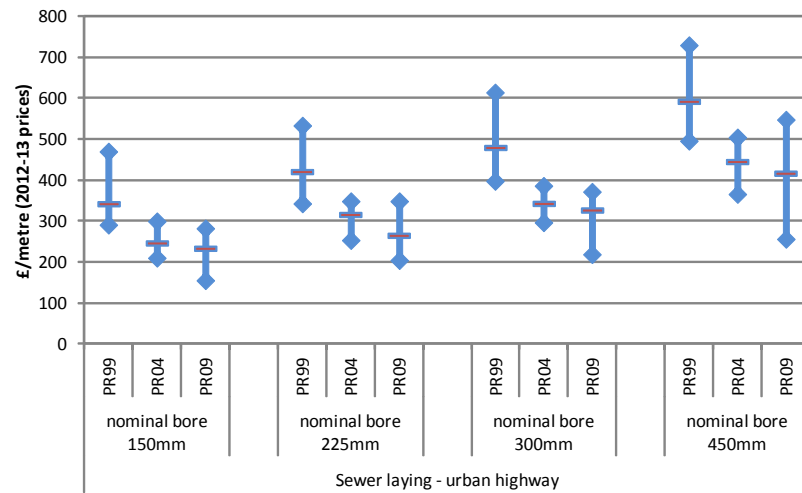
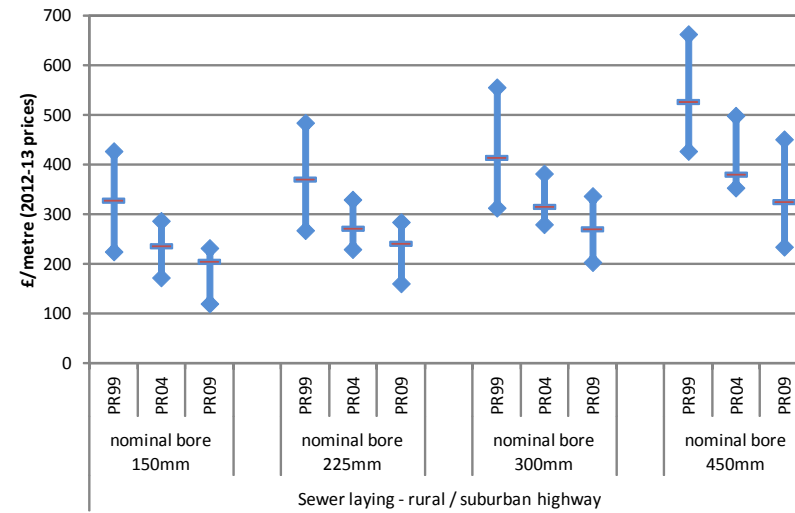
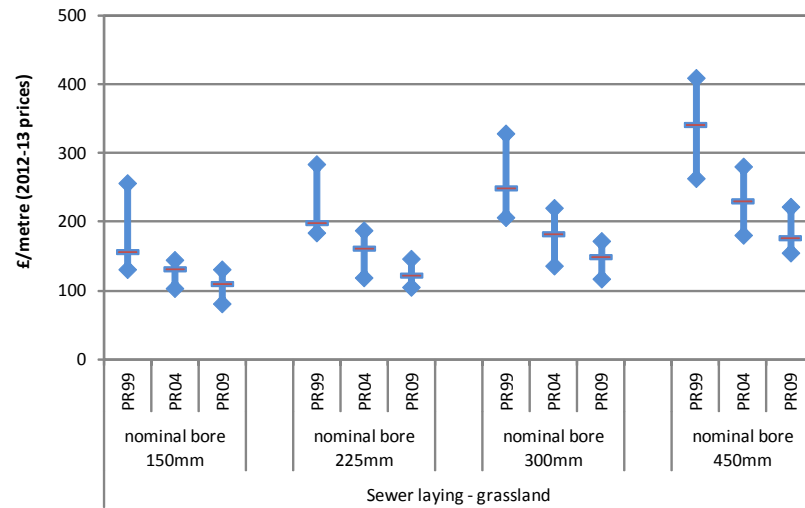


**Water Non-Infrastructure Standard Costs – PR99 to PR09**

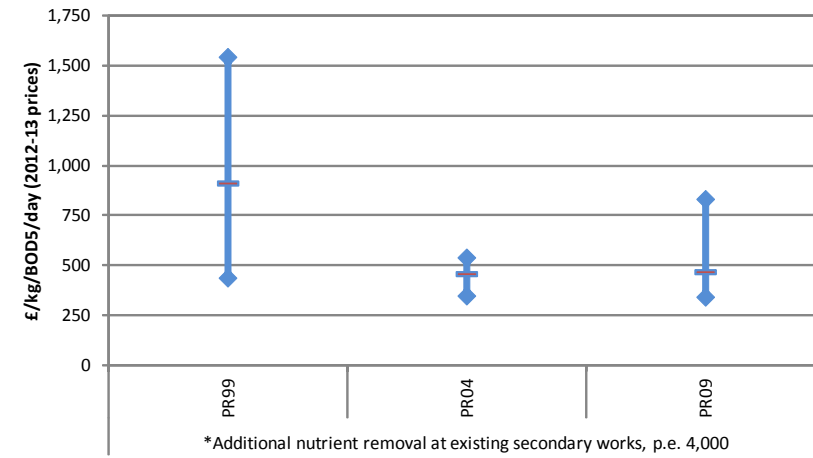
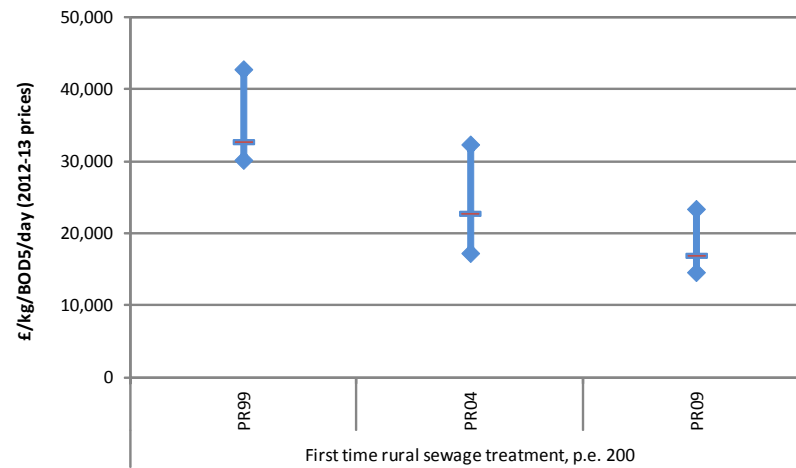
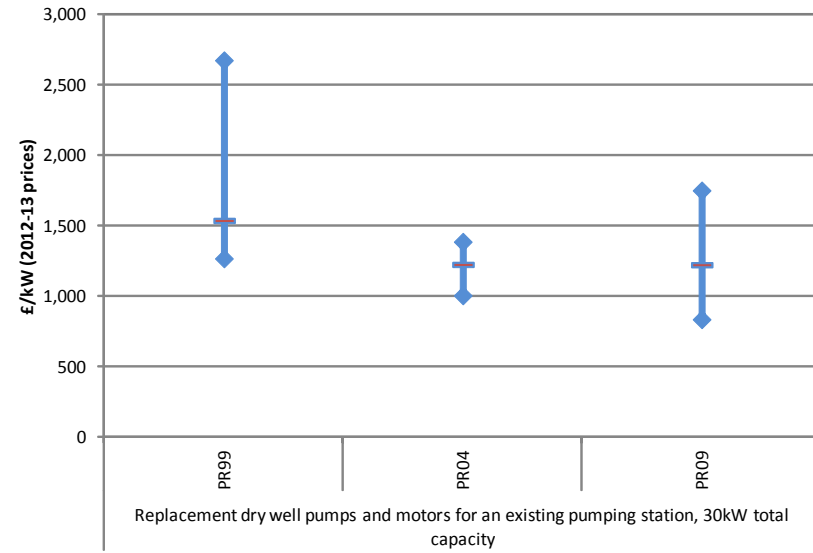
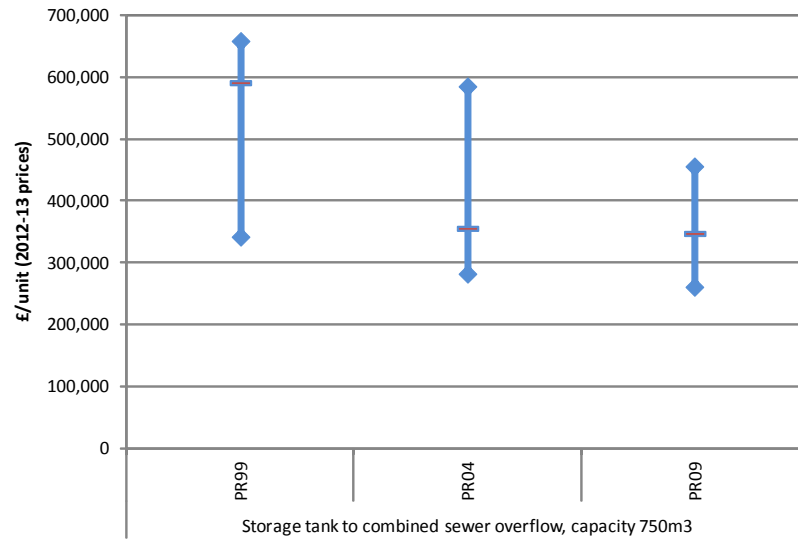




**Sewerage Infrastructure Standard Costs – PR99 to PR09**

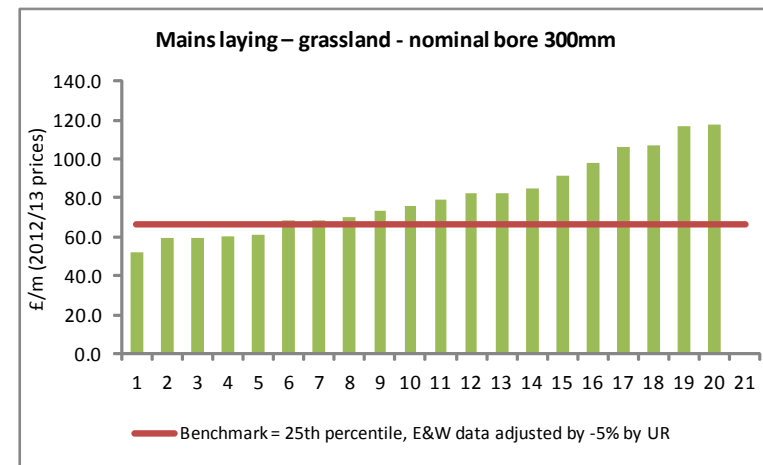
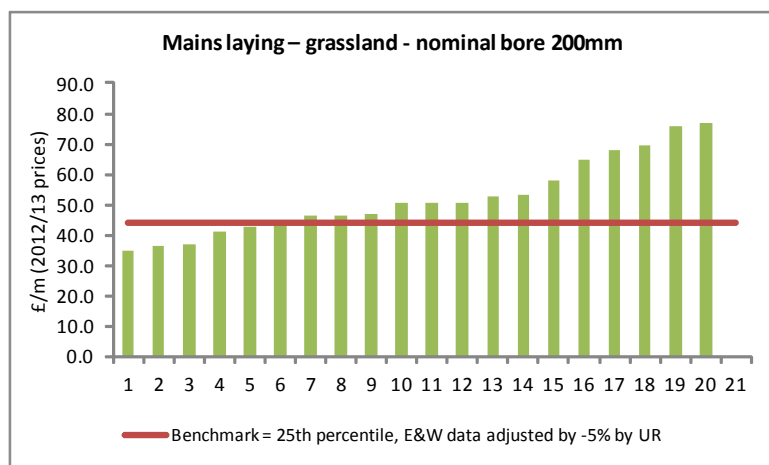
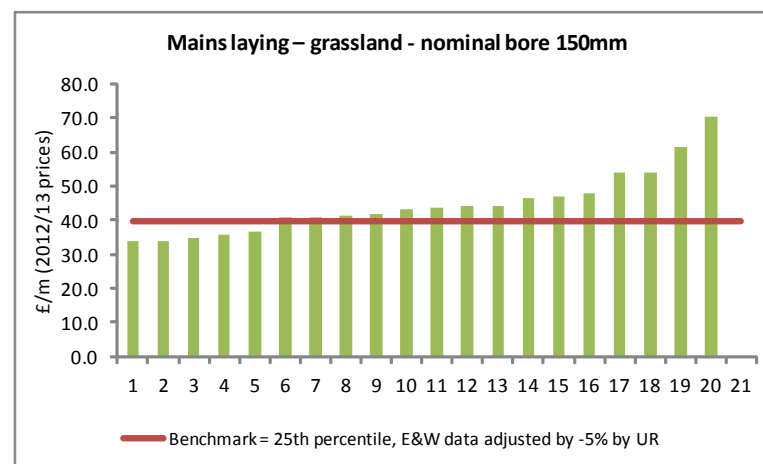
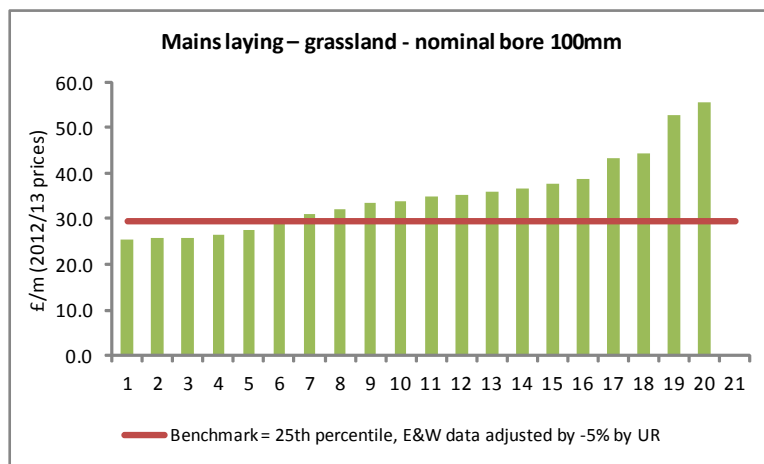


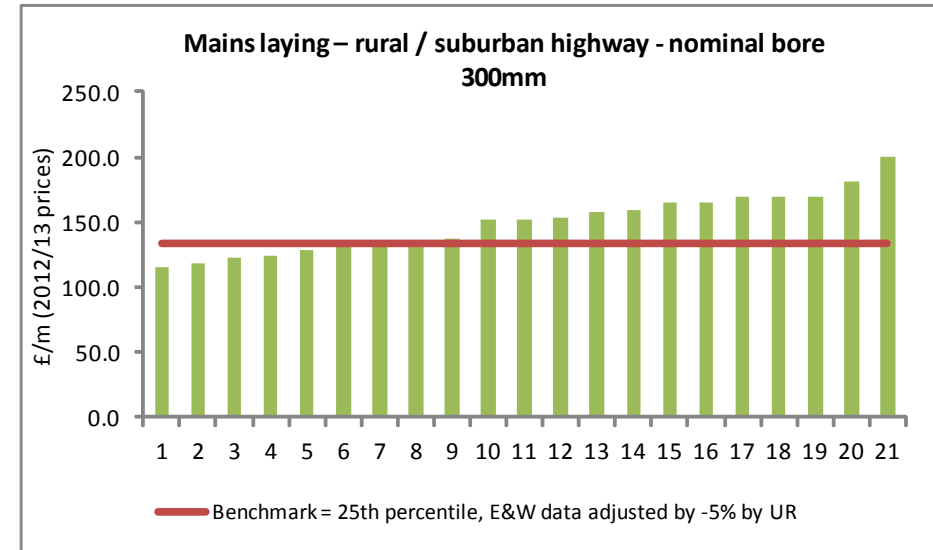
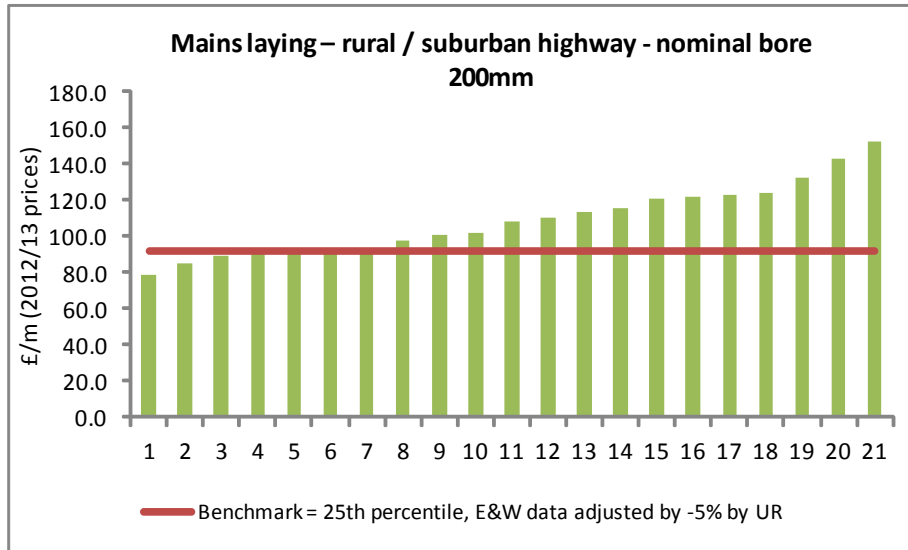
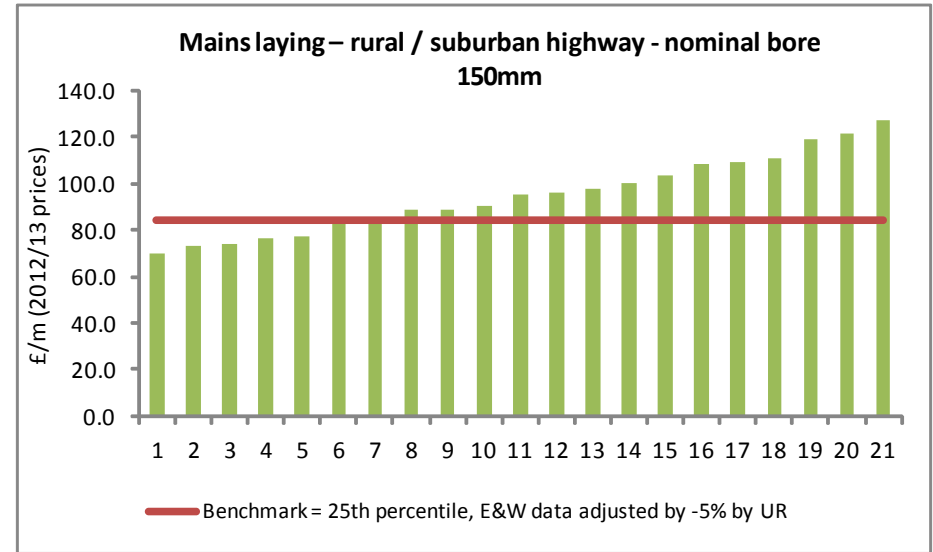
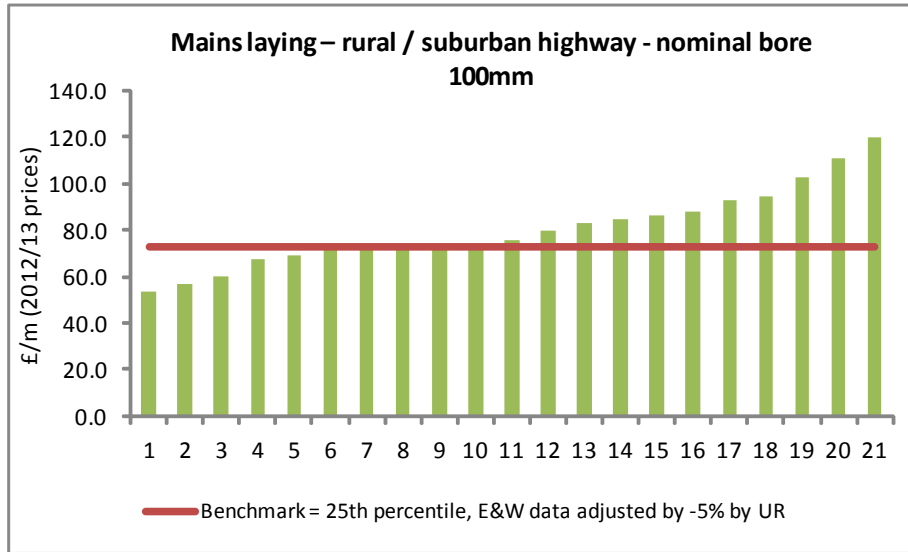
**Sewerage Non-Infrastructure Standard Costs – PR99 to PR09**

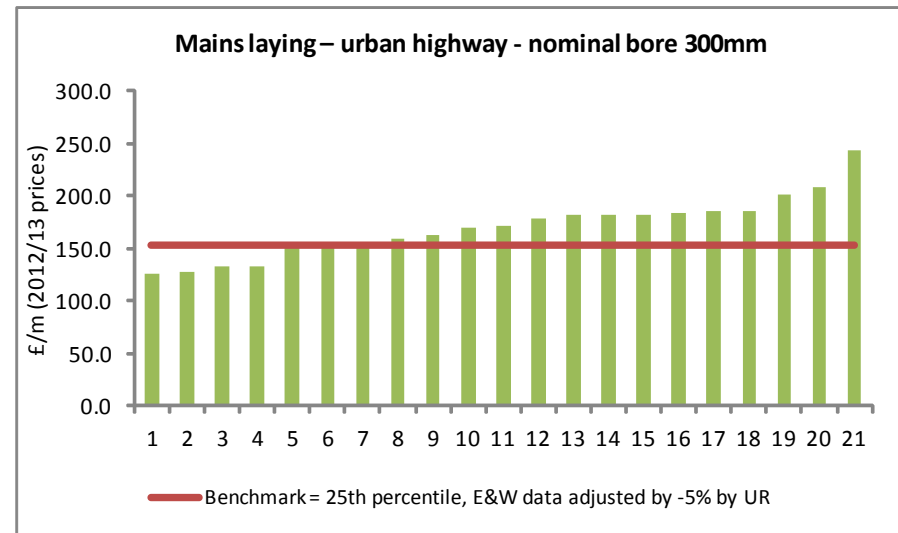
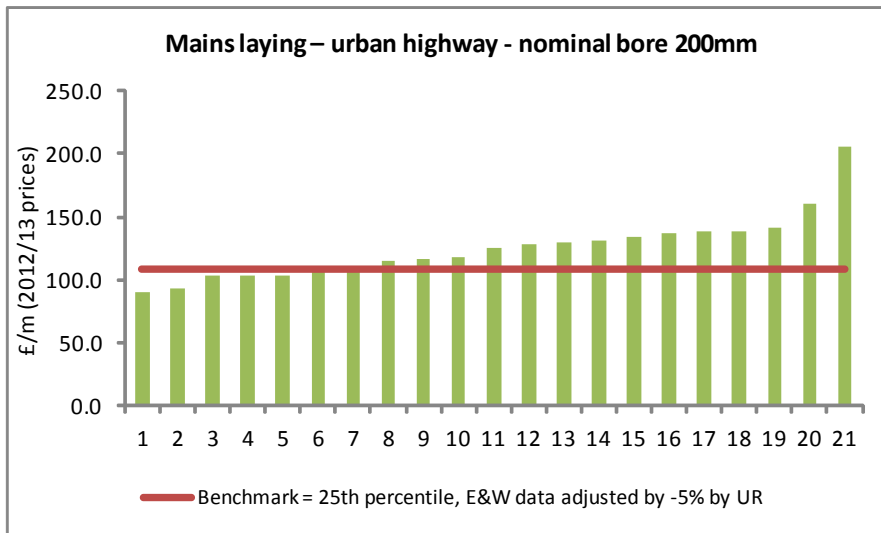
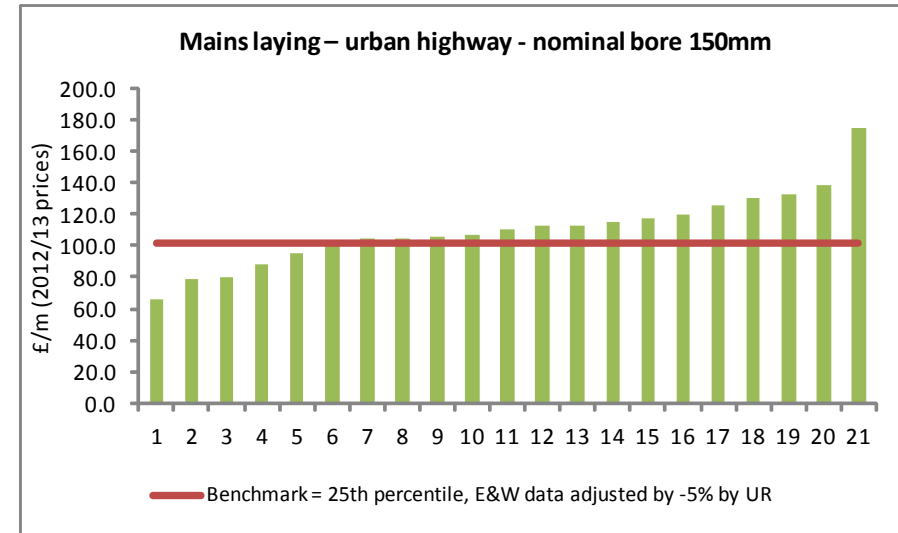
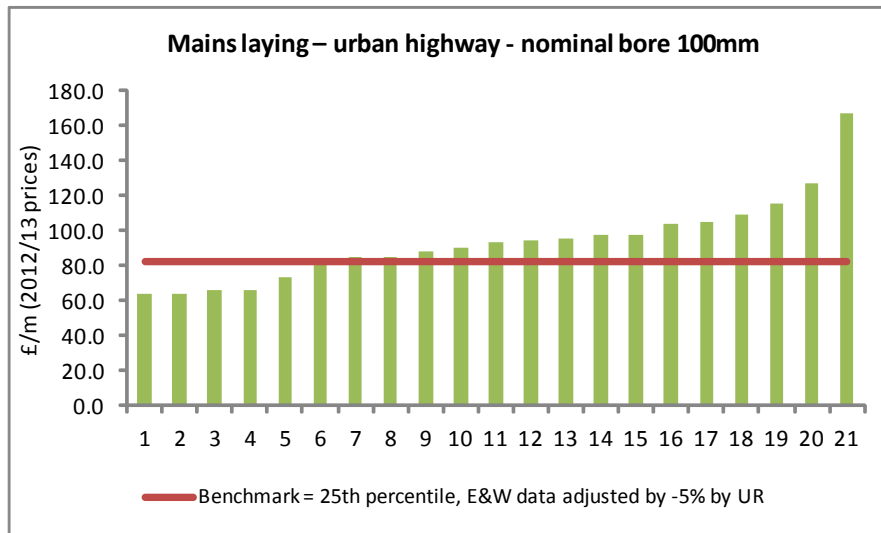


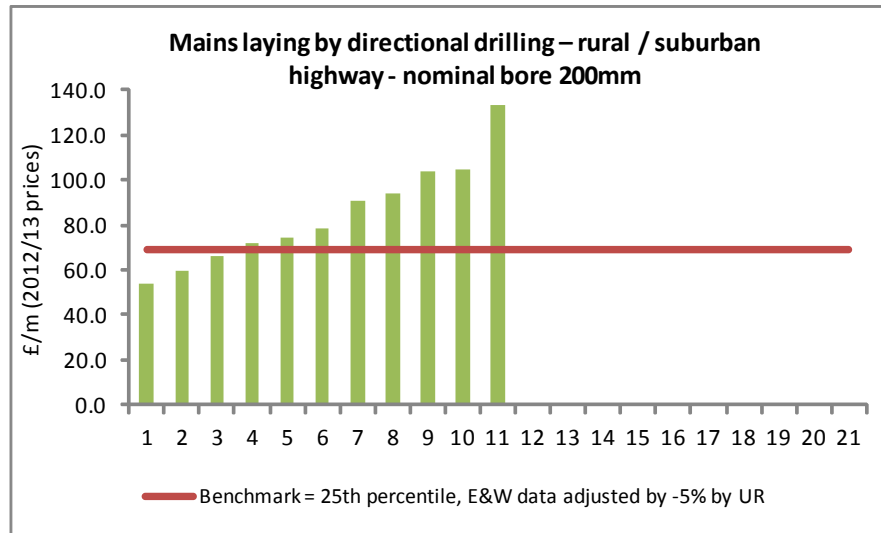
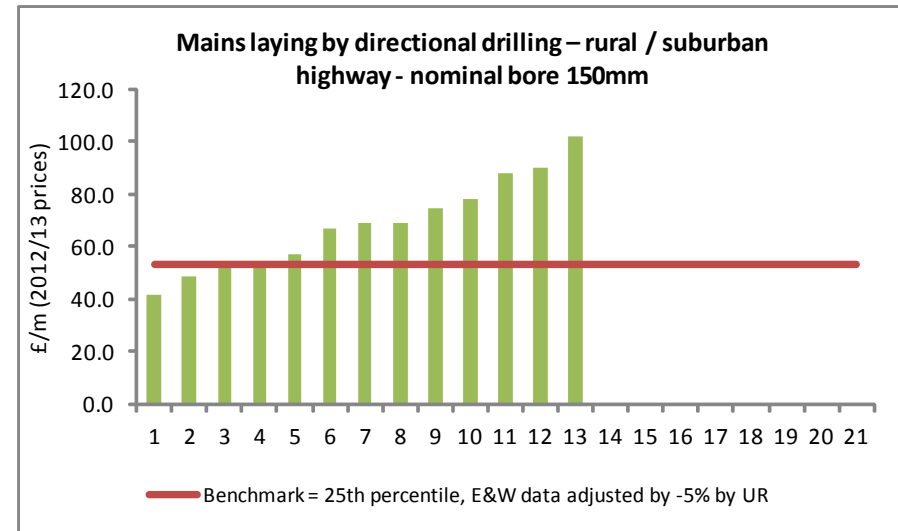
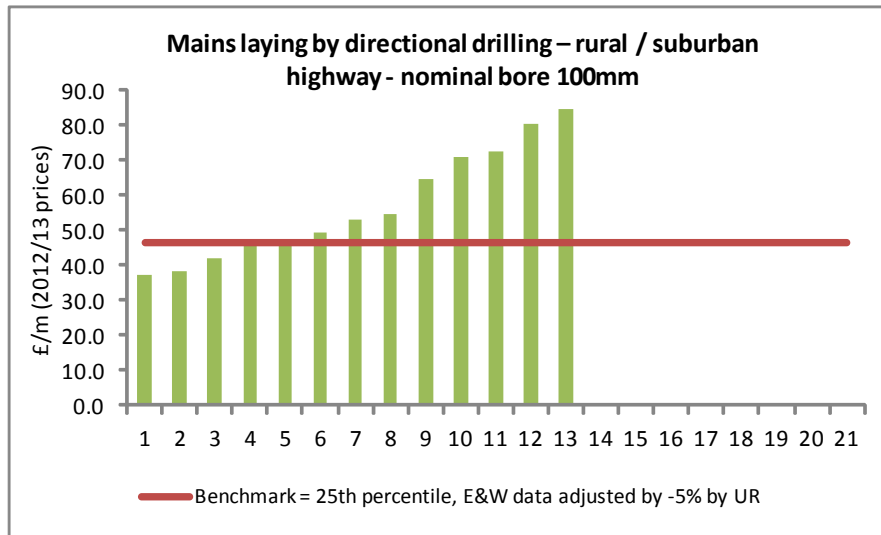
# Appendix D – PR09 Standard Costs – Adjusted by Utility Regulator for Frontier Shift Assumption (-5%)

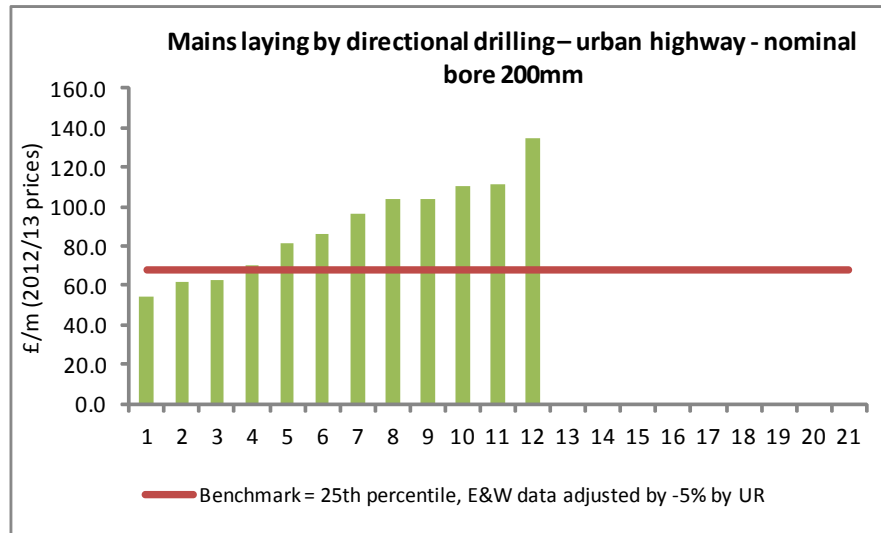
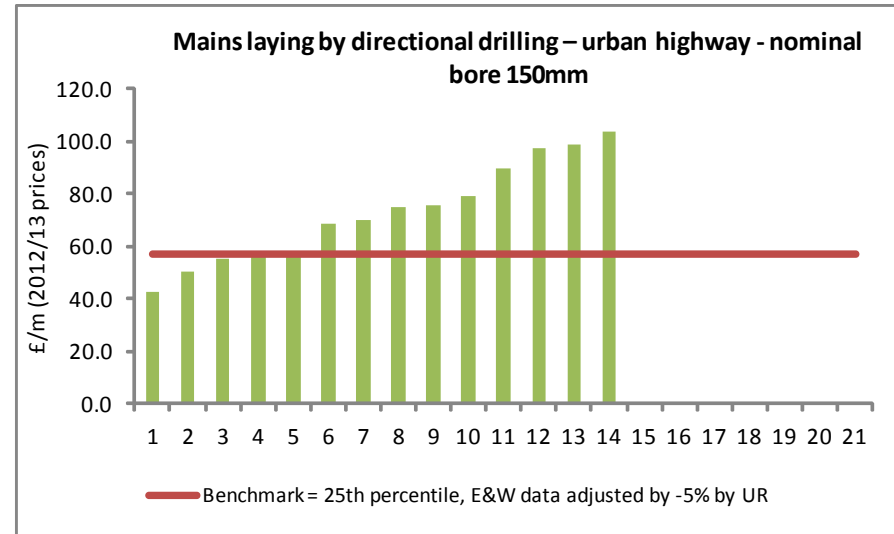
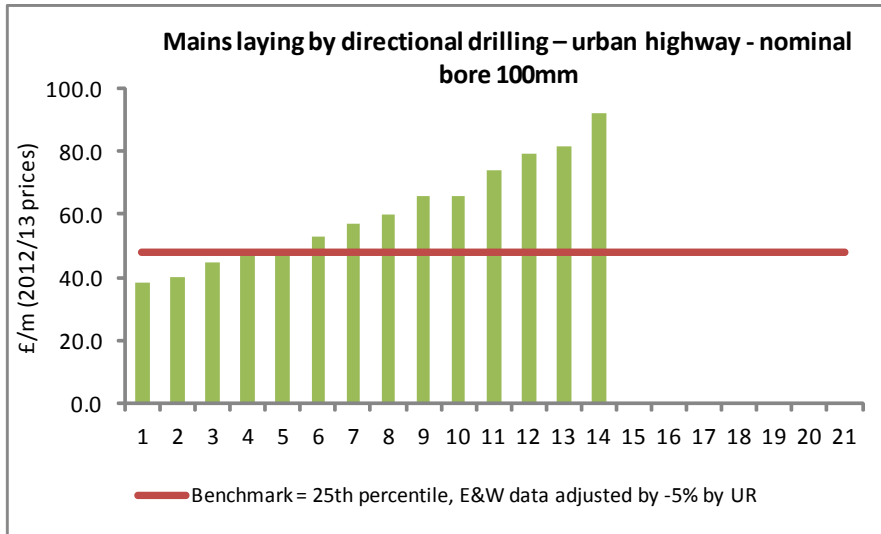
## Water Infrastructure





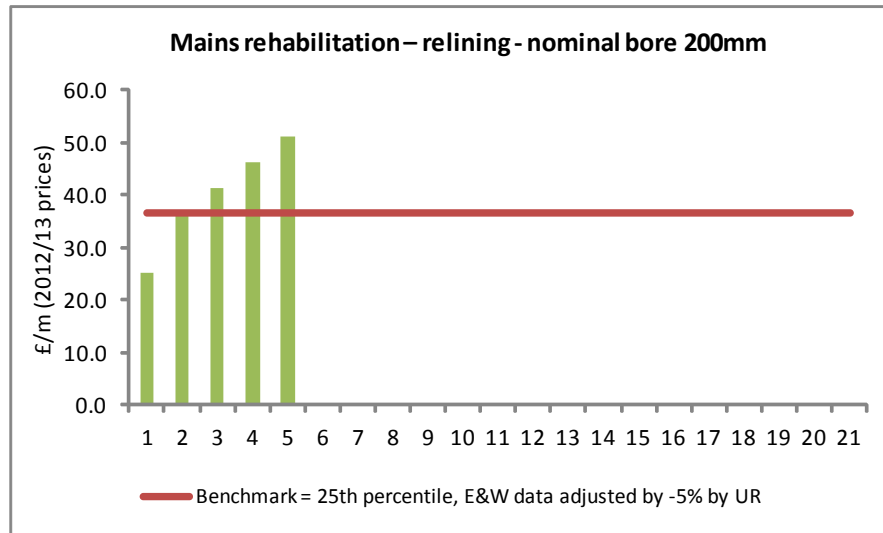
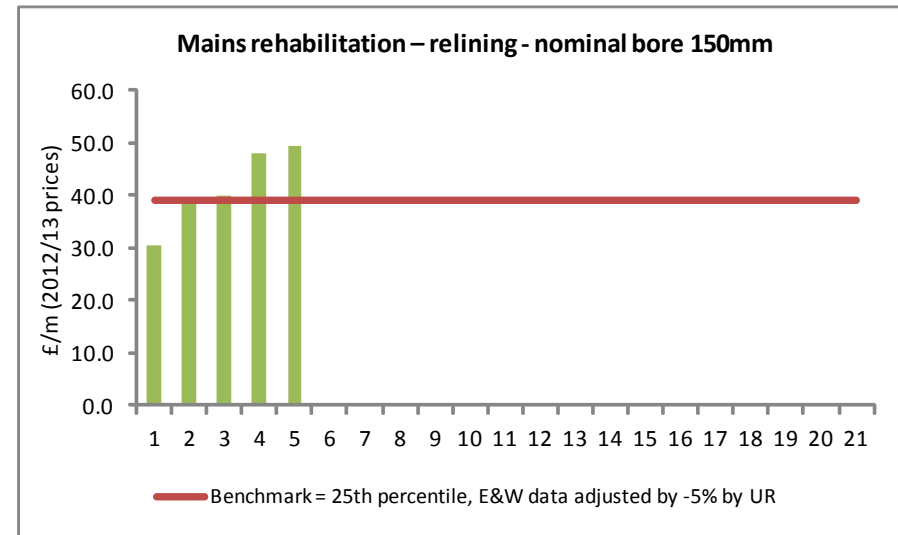
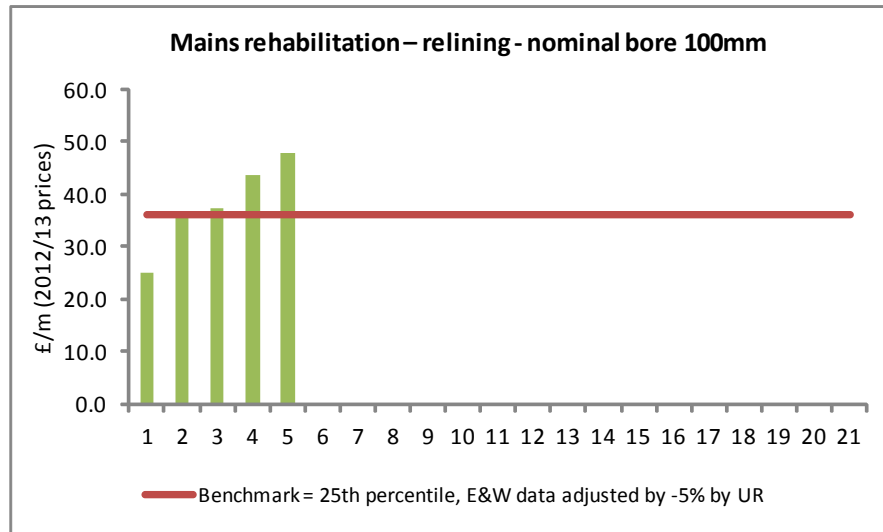


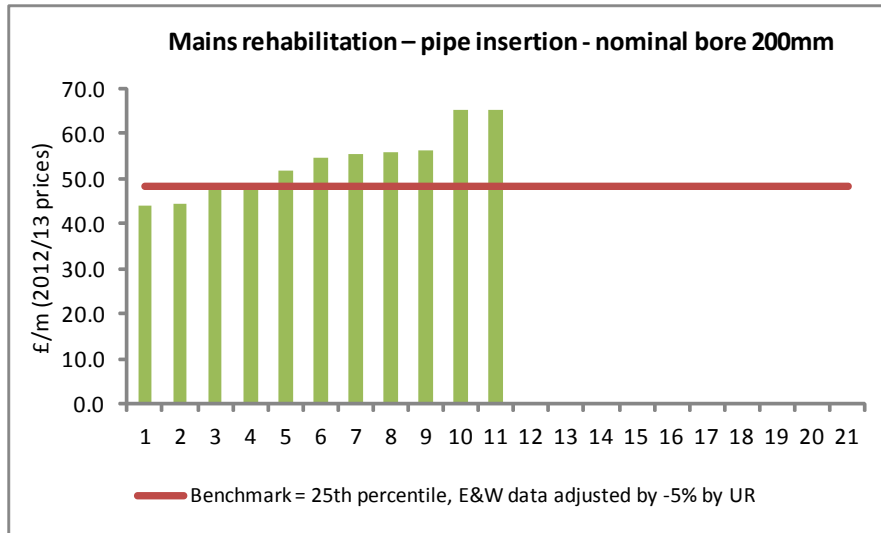
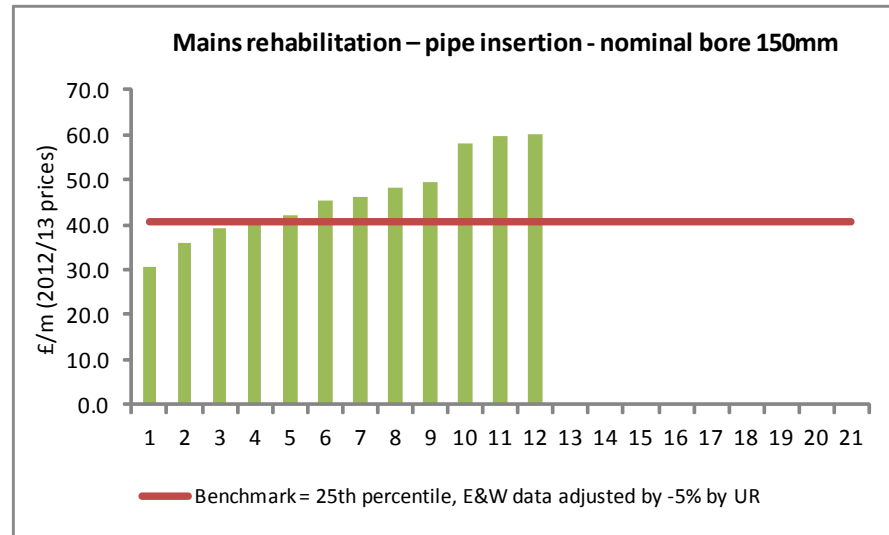
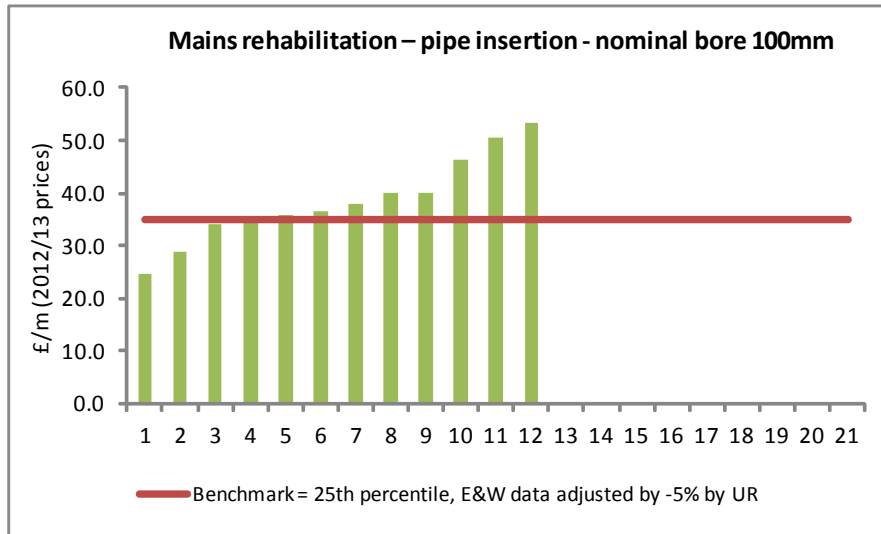




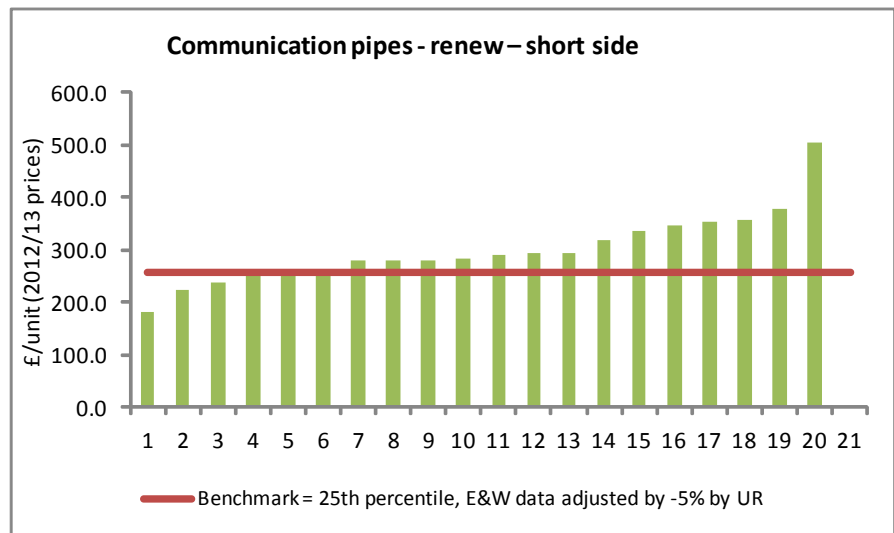
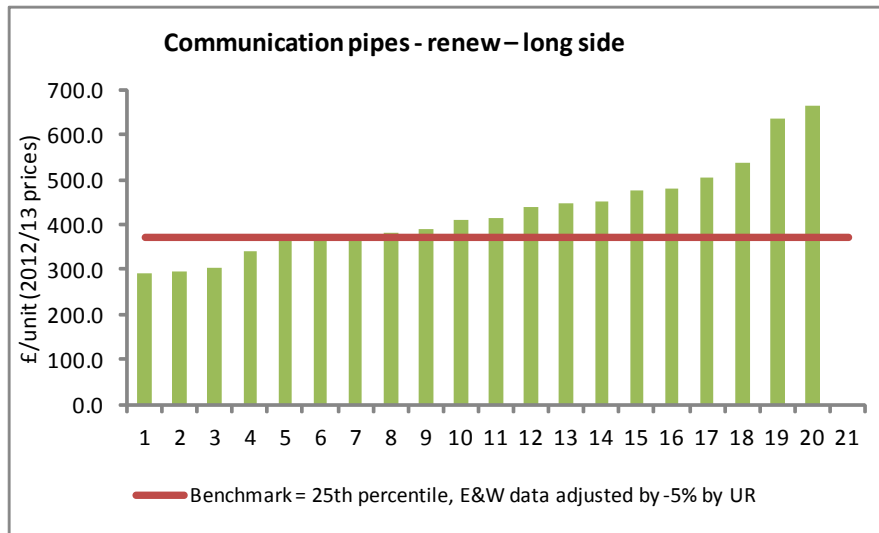
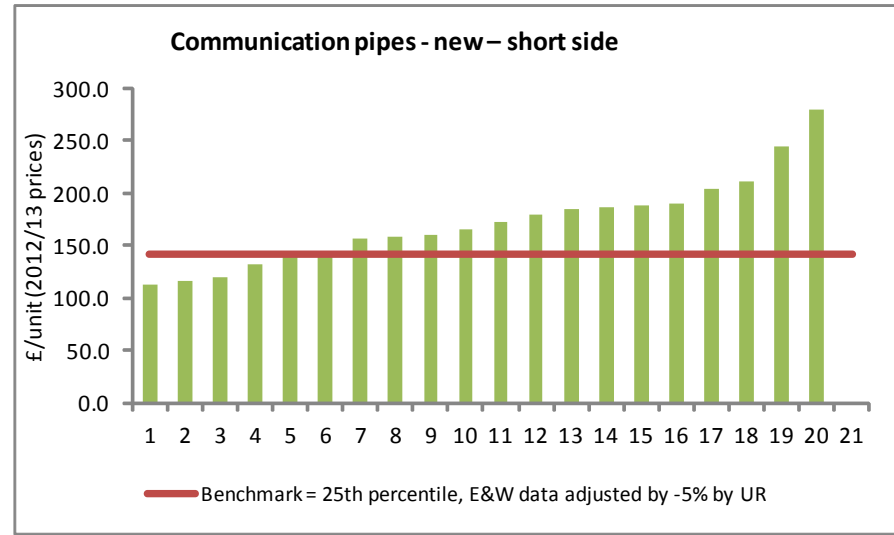
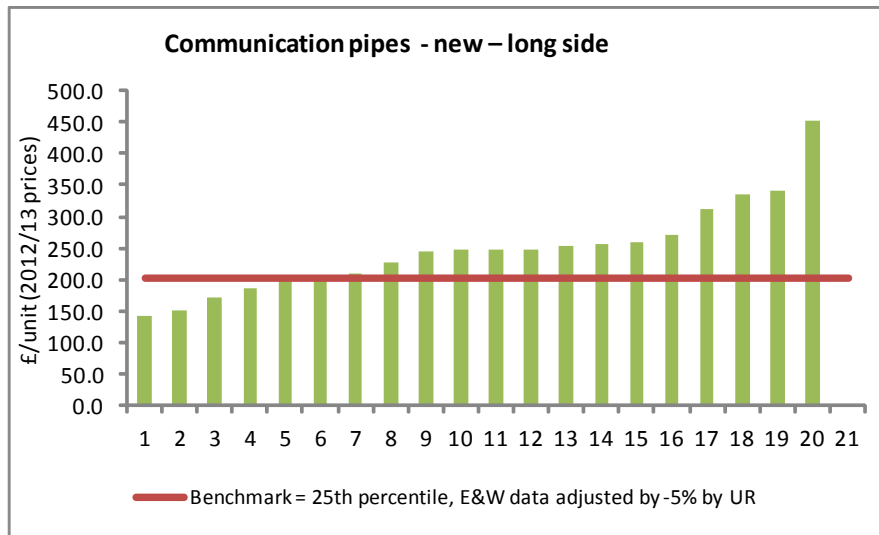


## UTILITY REGULATOR WATER

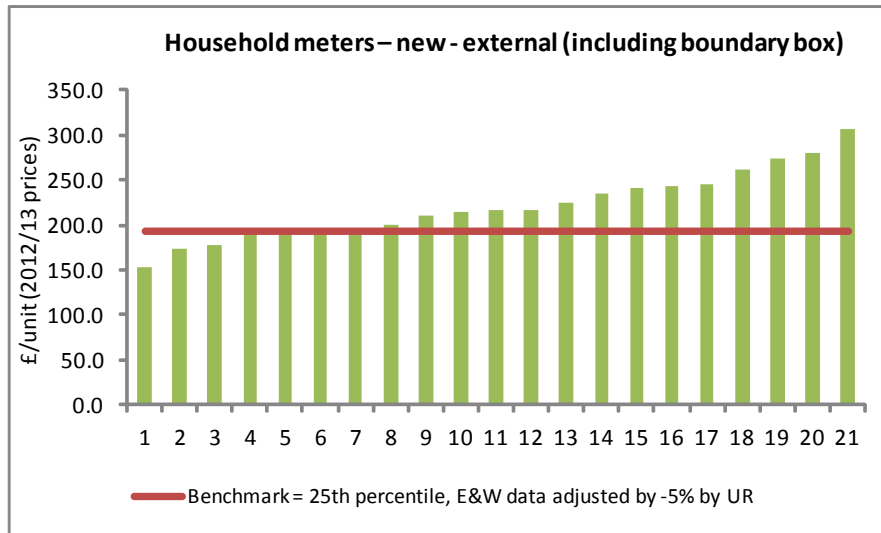
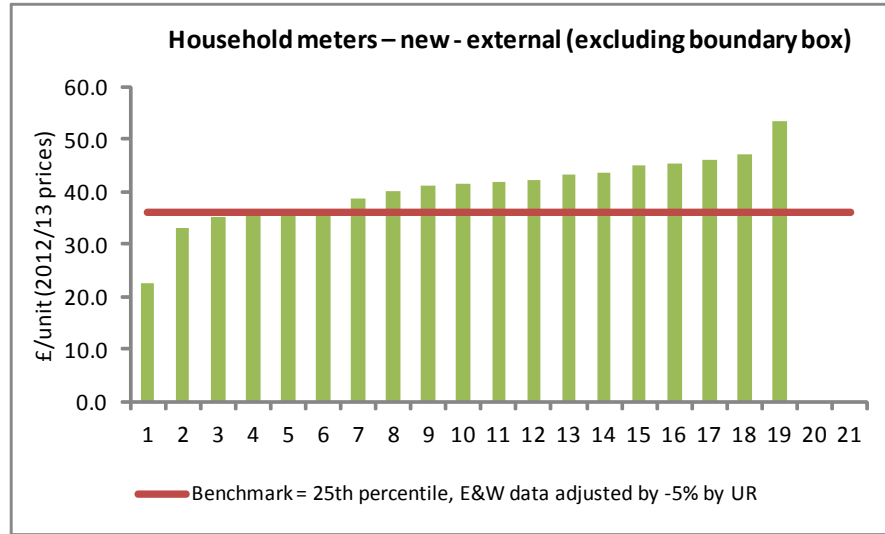
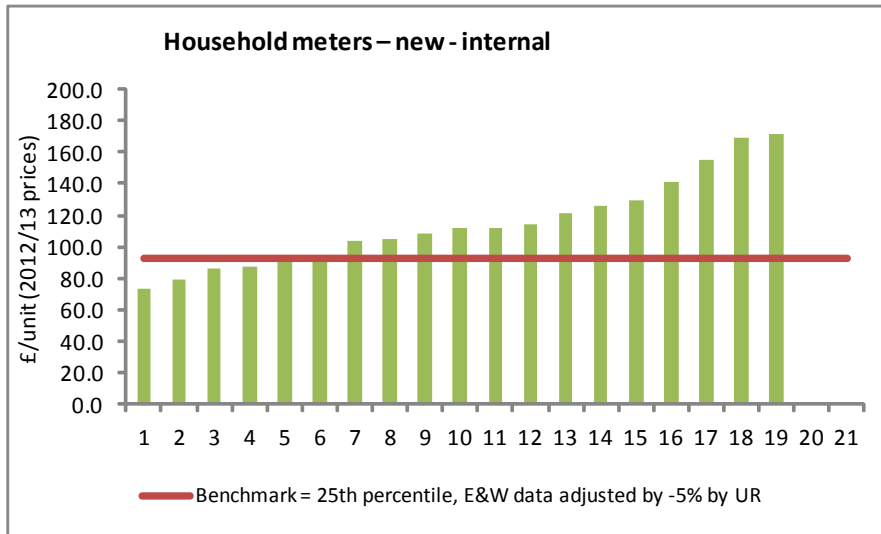




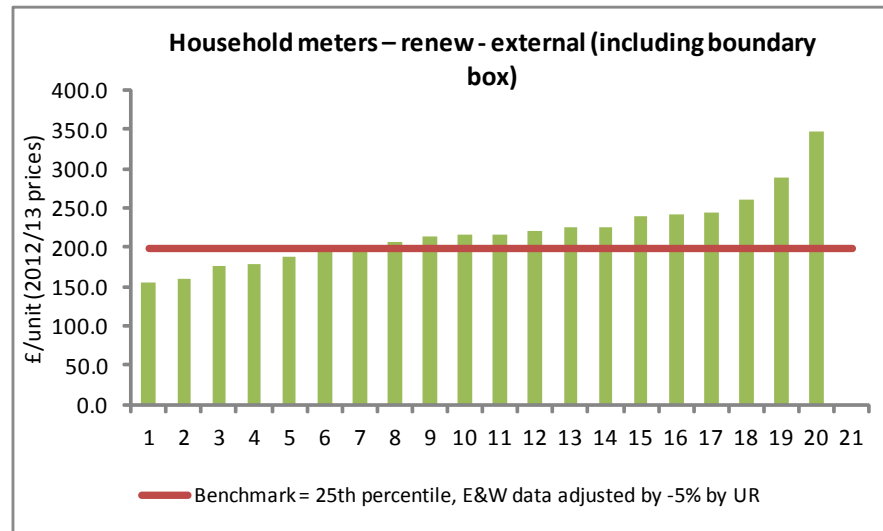
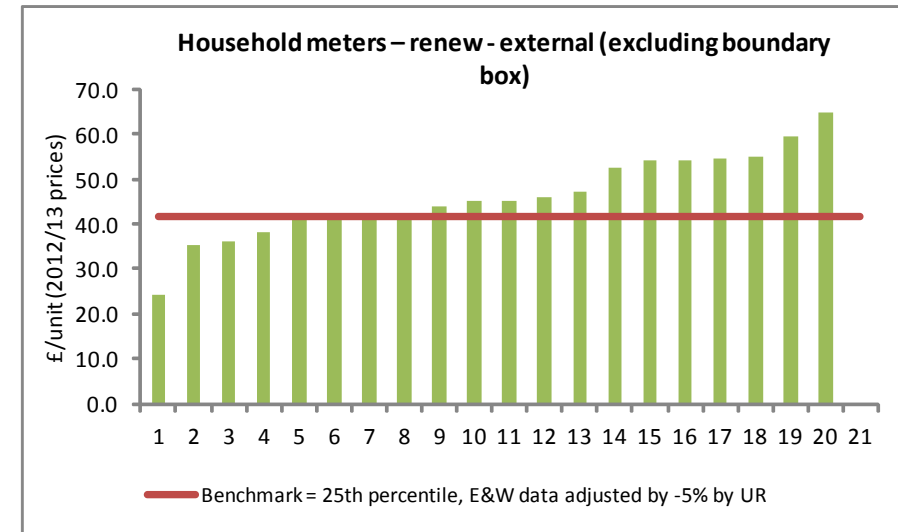
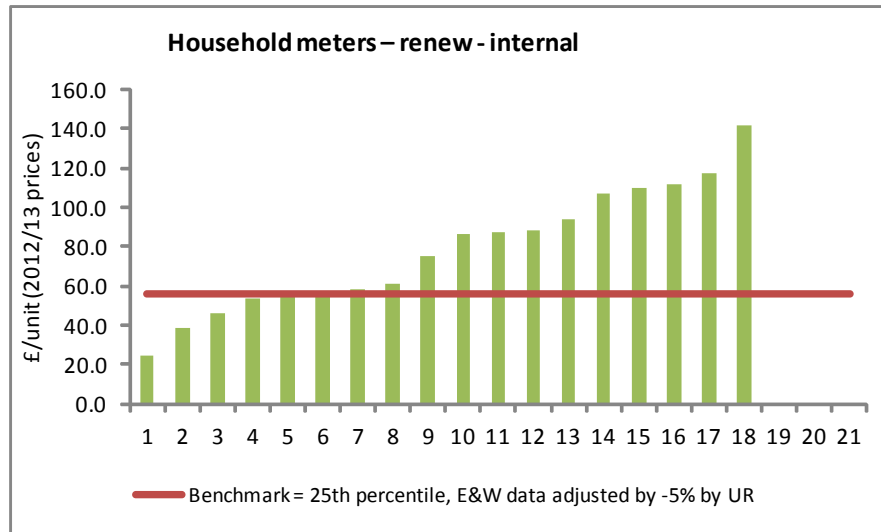
# UTILITY REGULATOR WATER



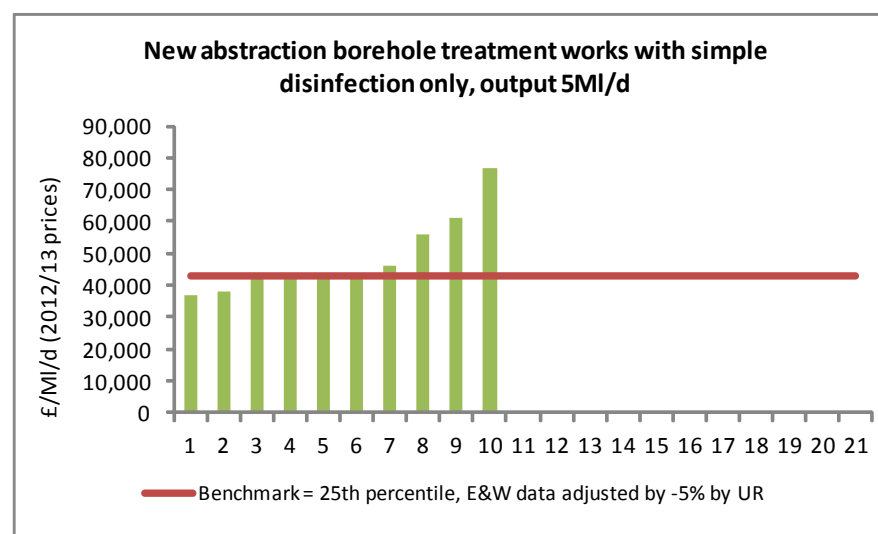
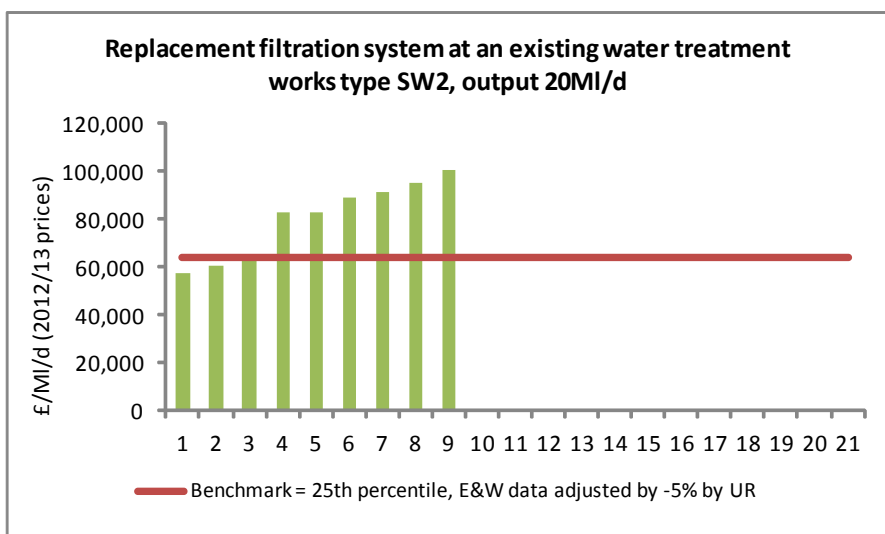
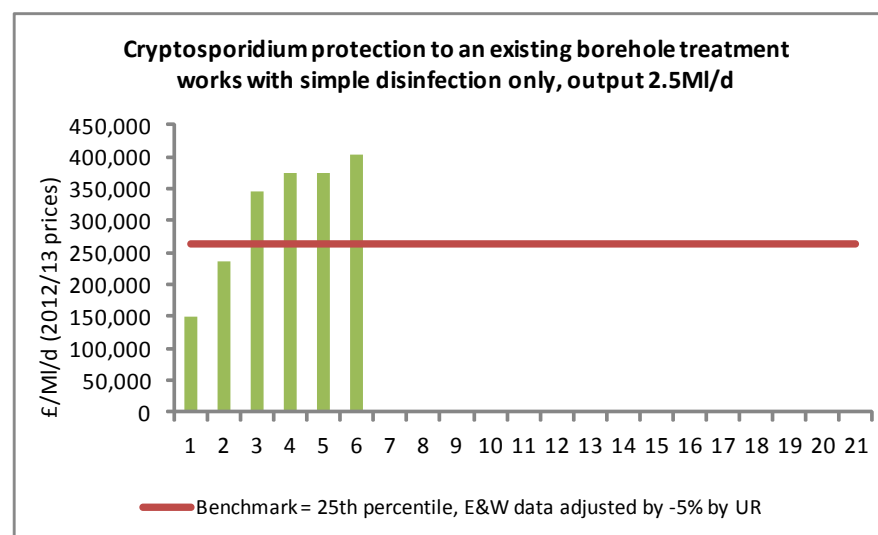
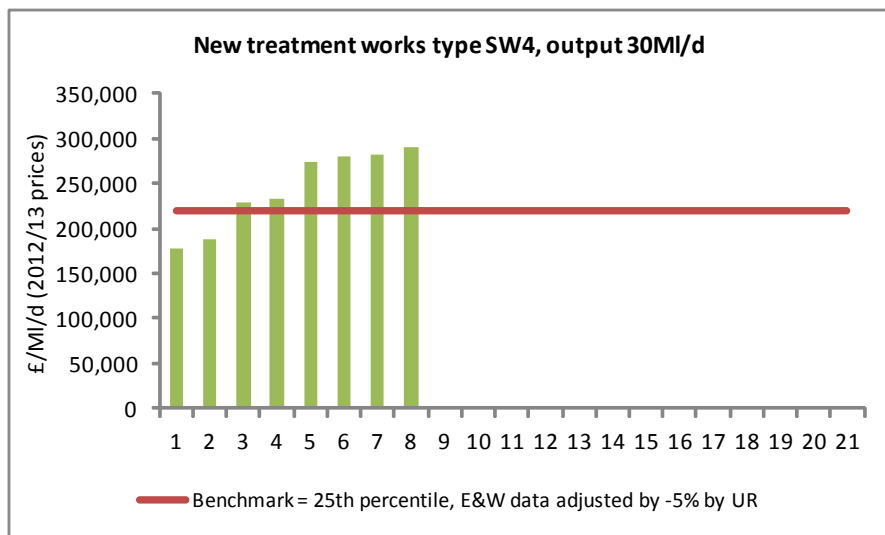
## UTILITY REGULATOR WATER



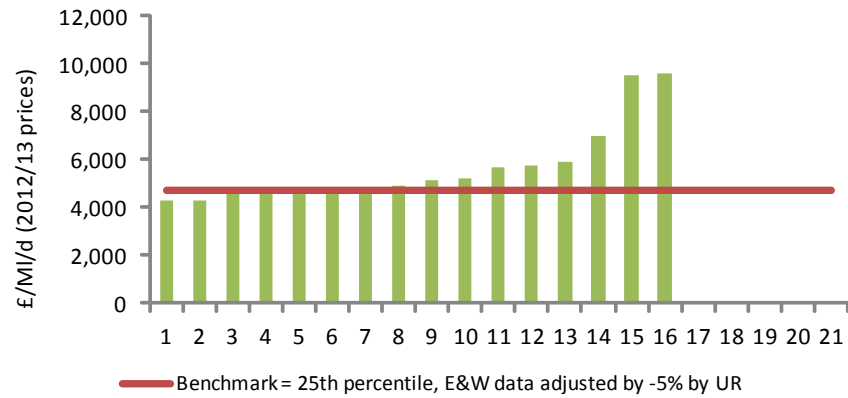
## UTILITY REGULATOR WATER



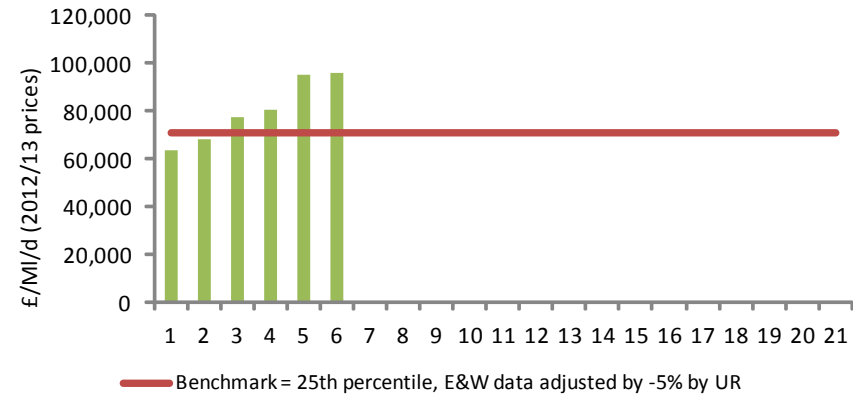
## Water Non-Infrastructure



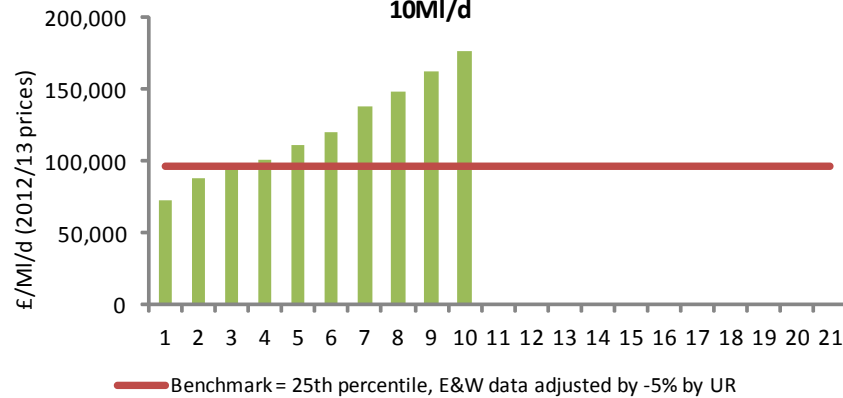
**Refurbishment of plumbosolvency control plant, output 8MI/d**



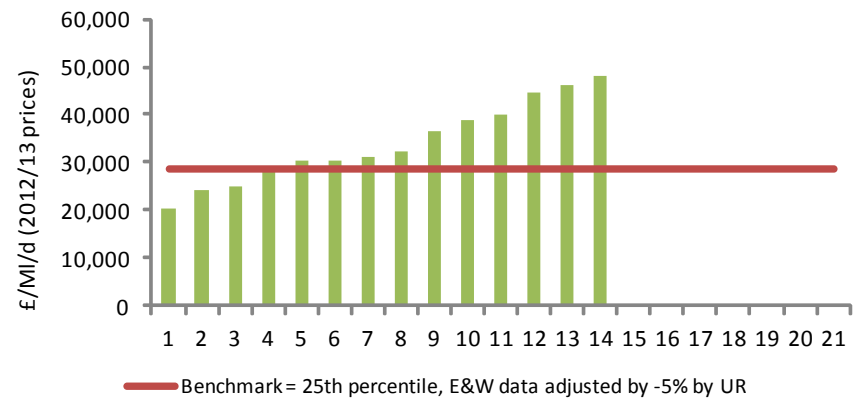
**Alterations to water treatment works type SW2, output 30MI/d**



**Installation of a nitrate removal plant at a borehole treatment works with simple disinfection only, output 10MI/d**

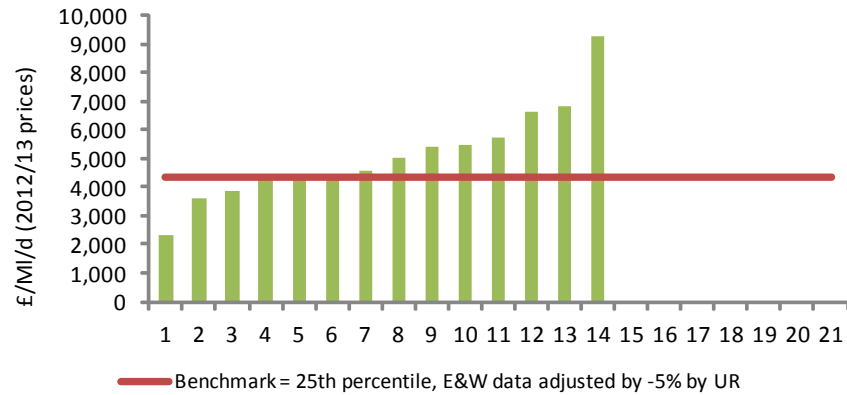


**Refurbishment of rapid gravity filters, output 20MI/d**

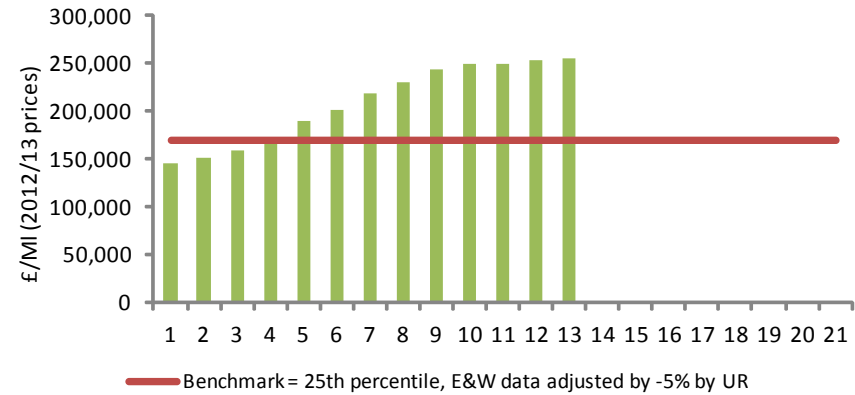




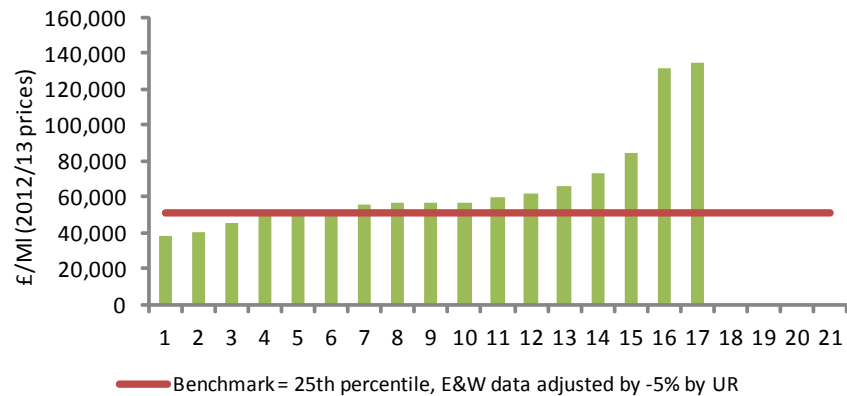
**Replacement of disinfection plant, output 12MI/d**



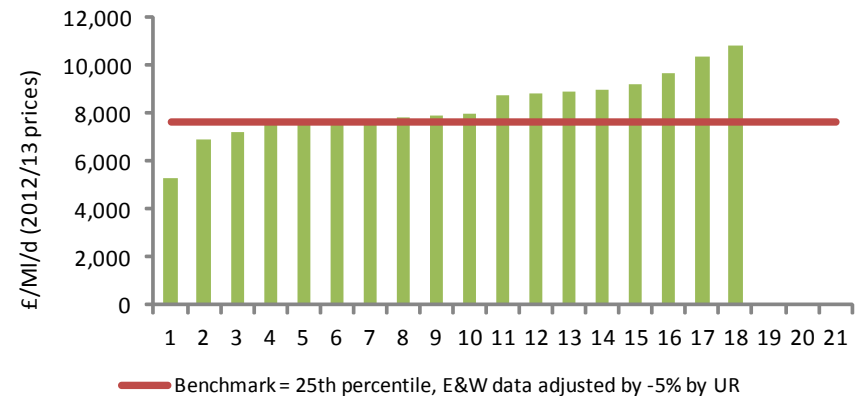
**New service reservoir, capacity 4MI**



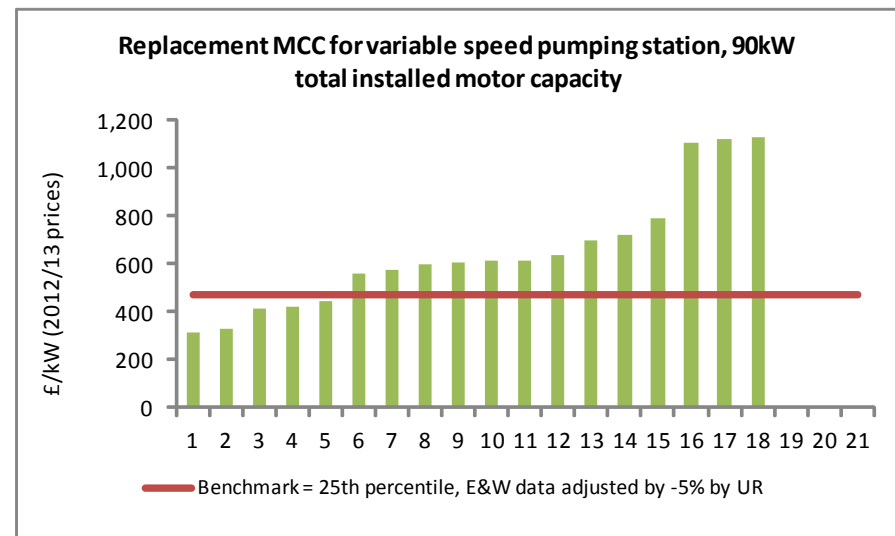
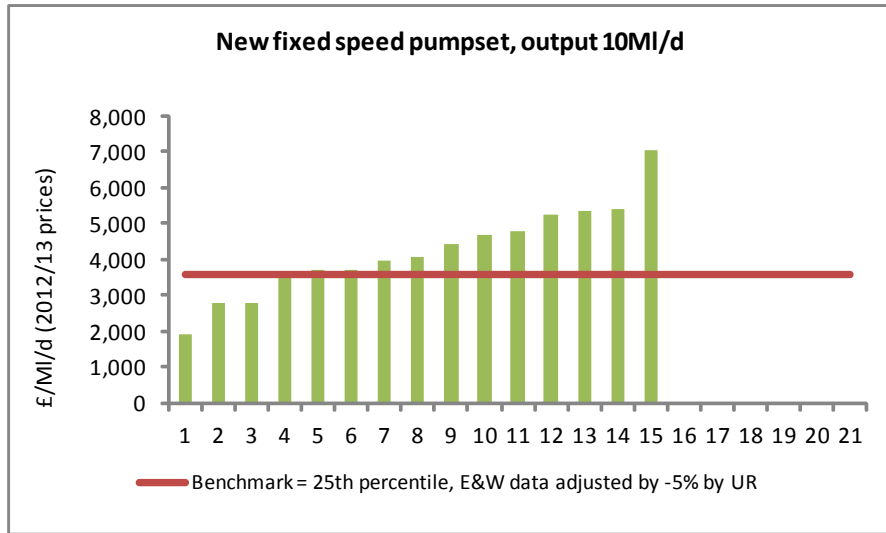
**Refurbishment of service reservoir, capacity 1MI**



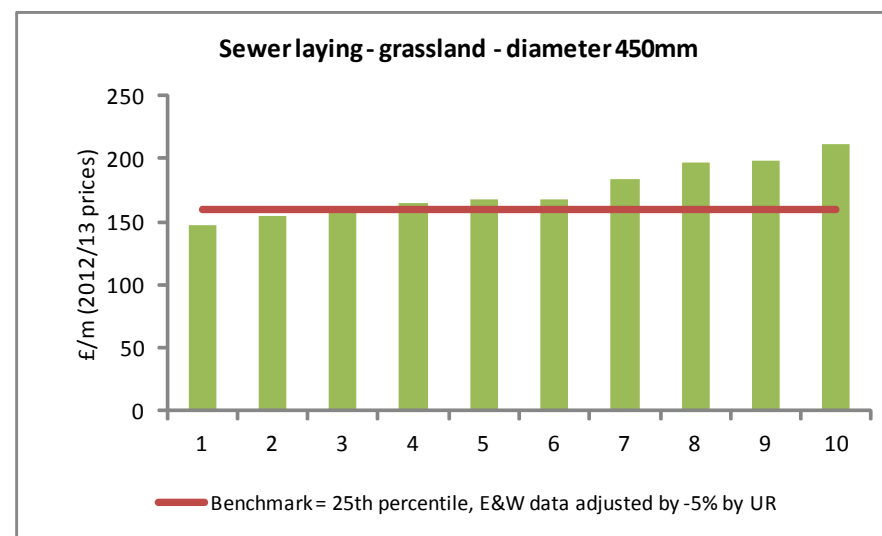
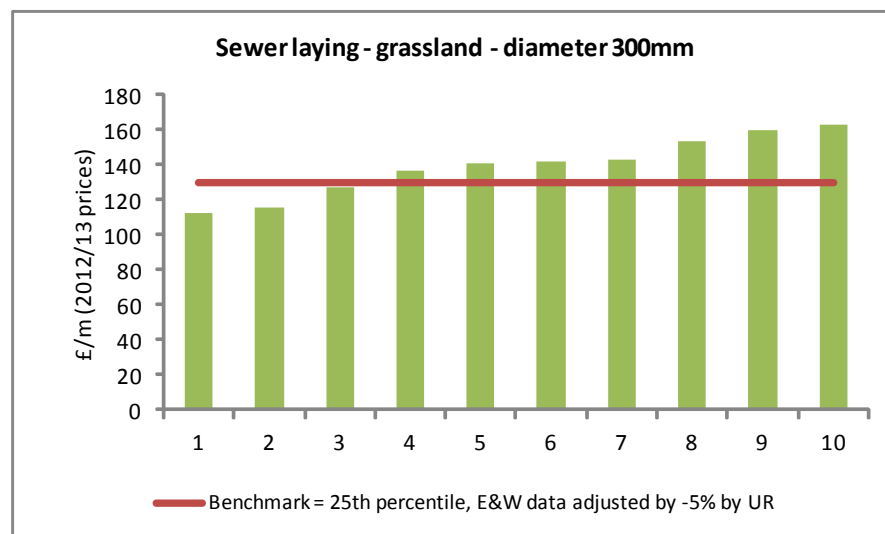
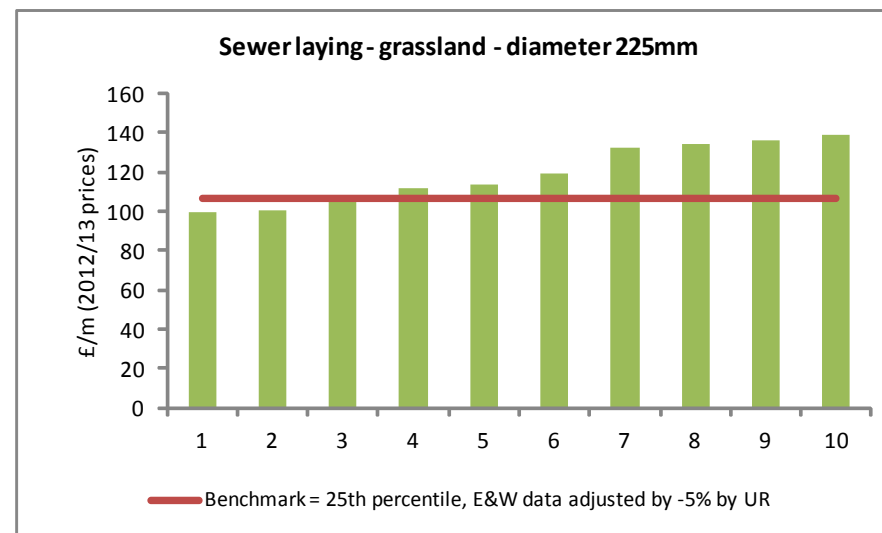
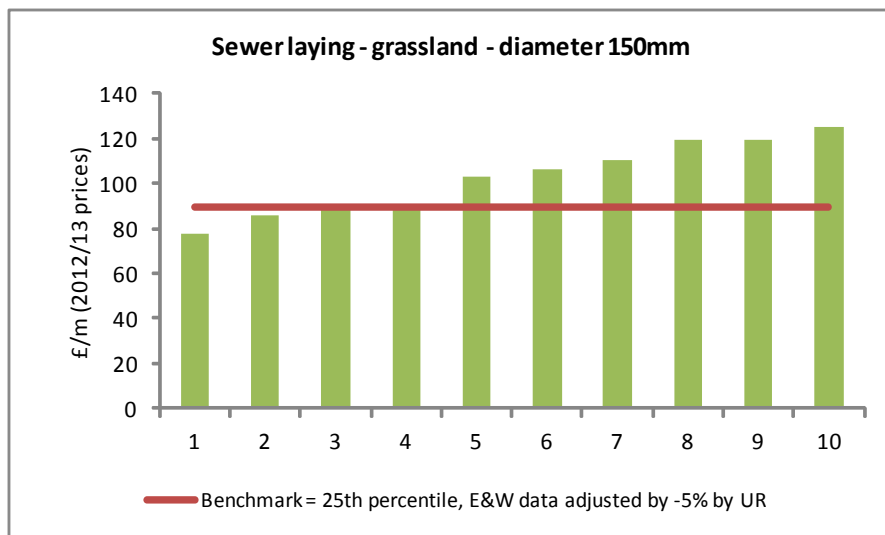
**Replacement of variable speed pumps, output 6 to 9MI/d**



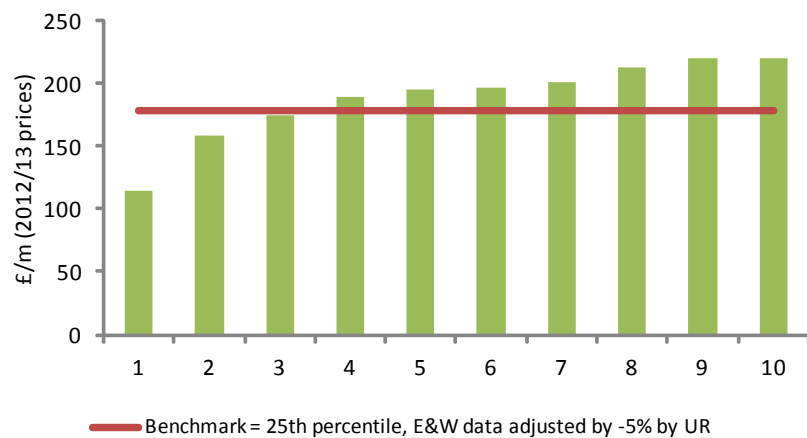
## UTILITY REGULATOR WATER



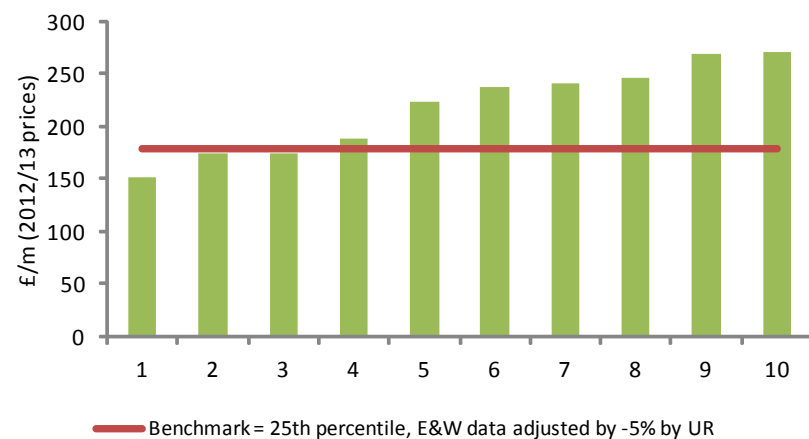
## Sewerage Infrastructure



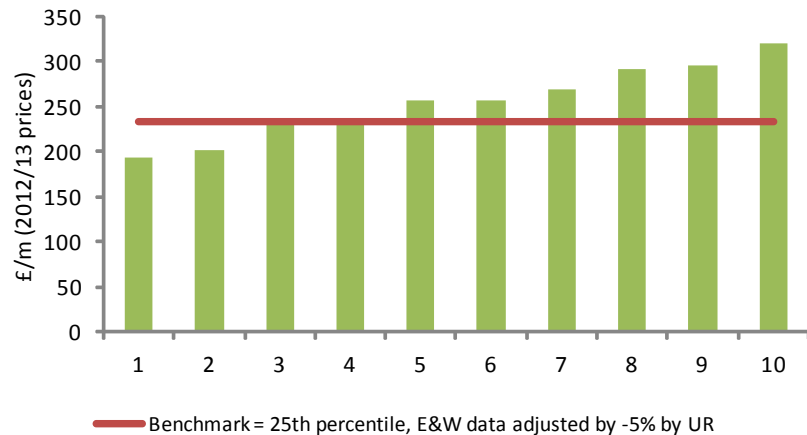
**Sewer laying - rural / suburban highway - diameter 150mm**



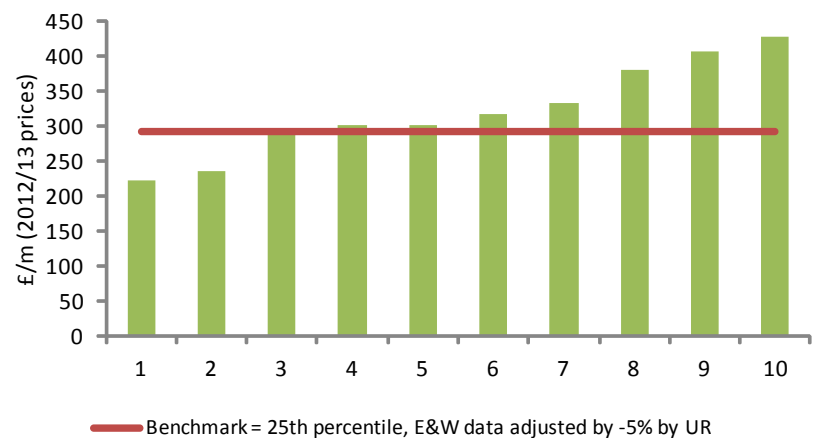
**Sewer laying - rural / suburban highway - diameter 225mm**



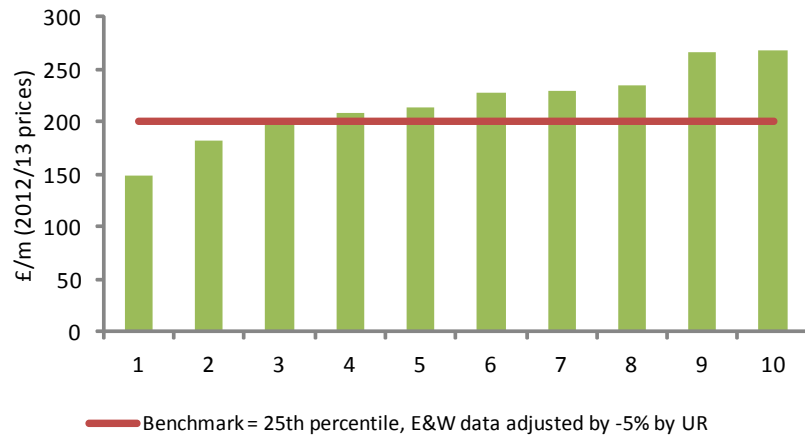
**Sewer laying - rural / suburban highway - diameter 300mm**



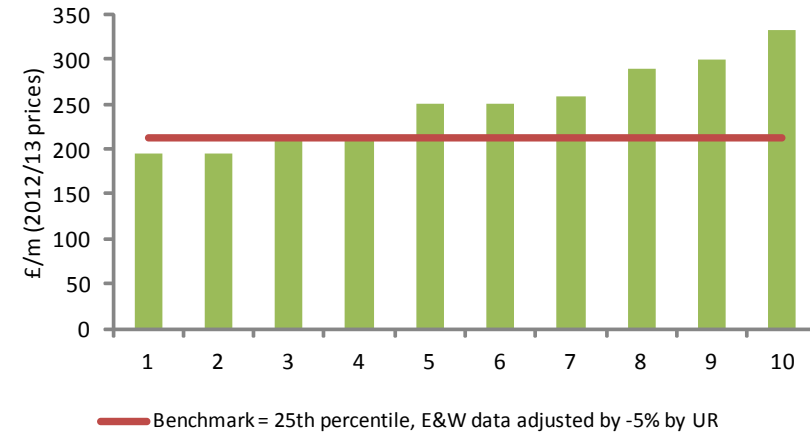
**Sewer laying - rural / suburban highway - diameter 450mm**



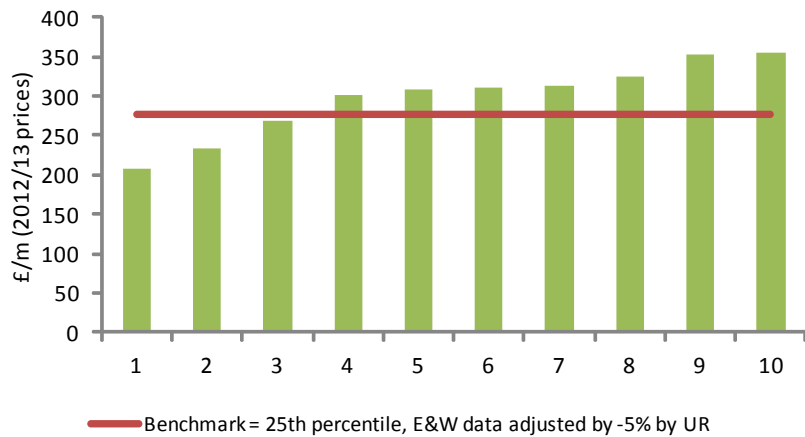
**Sewer laying - urban highway - diameter 150mm**



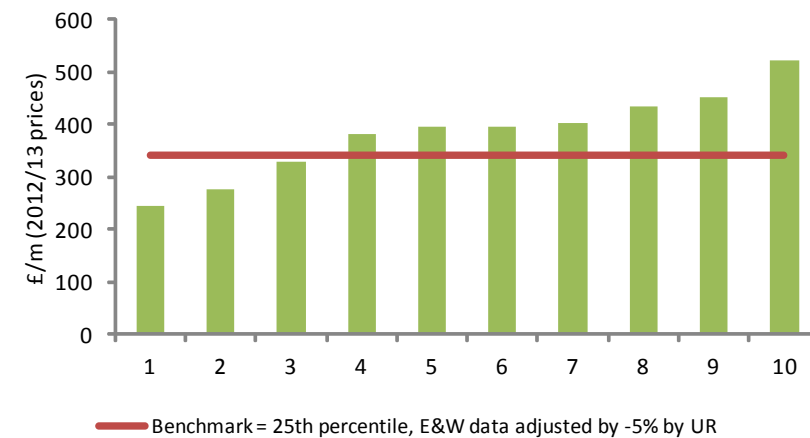
**Sewer laying - urban highway - diameter 225mm**



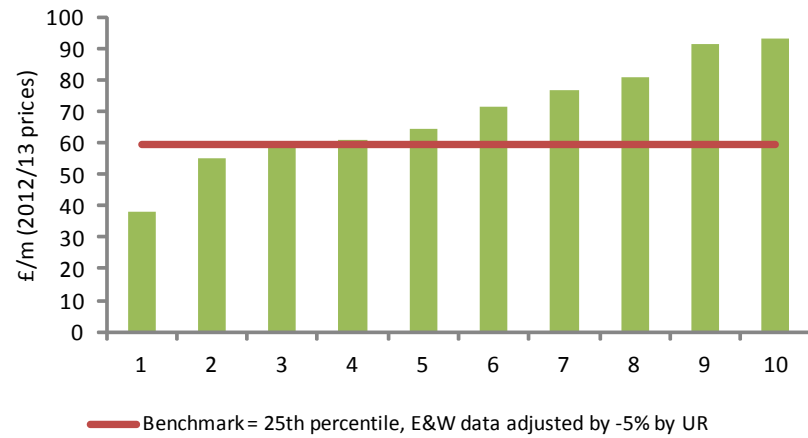
**Sewer laying - urban highway - diameter 300mm**



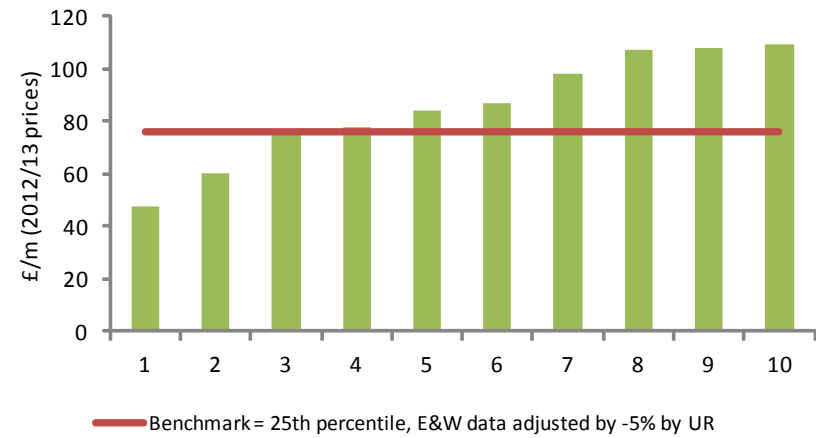
**Sewer laying - urban highway - diameter 450mm**



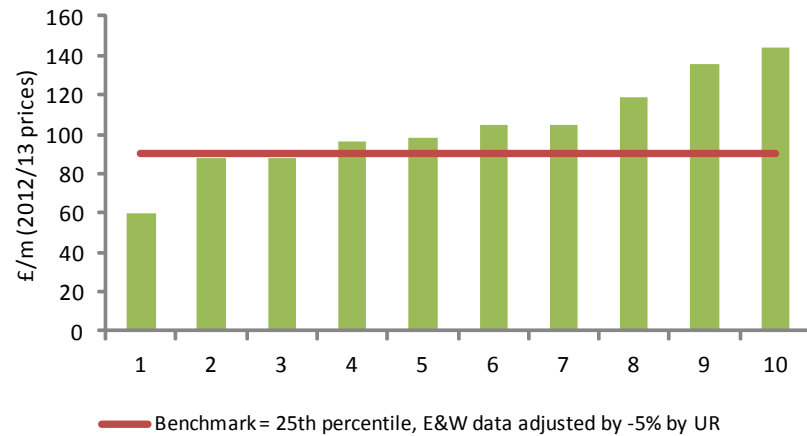
**Sewer rehabilitation - no dig / reline - diameter 150mm**



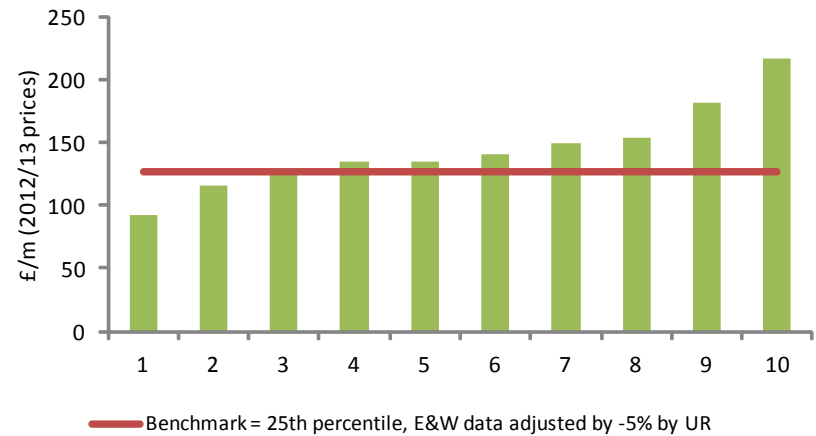
**Sewer rehabilitation - no dig / reline - diameter 225mm**

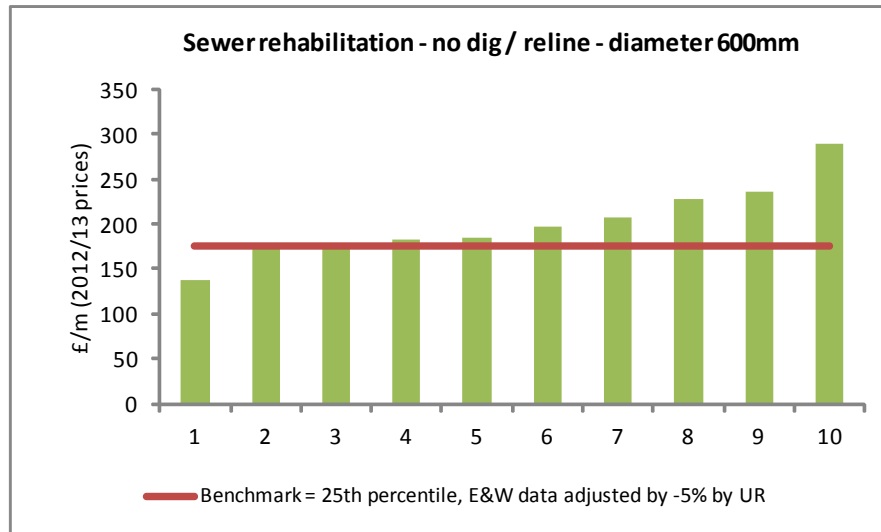


**Sewer rehabilitation - no dig / reline - diameter 300mm**



**Sewer rehabilitation - no dig / reline - diameter 450mm**





## Sewerage Non-Infrastructure

