

December 2019

PR19 final determinations

**United Utilities – Cost efficiency additional
information appendix**

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Combination of exogenous factors impacting surface water runoff cost adjustment claim

1 Our draft determination

In its September 2018 business plan United Utilities included a claim for an additional £87.7 million to maintain and operate the larger sewers that are needed to collect and convey the higher volumes of surface water runoff resulting from higher rainfall in its region. The company pointed out it is subject to the second highest level of runoff in the UK (at 729mm per year, 28% higher than average), behind Welsh Water. It also claims to have exceptionally low soil permeability and reasonably high urban density which compounds the impact of runoff on its sewers. United Utilities contends that these factors are not captured by our econometric models.

United Utilities claimed it is an outlier for runoff volumes, providing both econometric and engineering evidence to support its rationale. However, the evidence provided was not sufficient to demonstrate that higher runoff actually results in a greater volume entering the sewerage system or indeed in higher wastewater costs.

We noted that the areas with the highest rainfall in United Utilities region are not urban – notably the Lake District – and that these areas are mostly naturally drained by rivers. We also noted that at 66%, the proportion of flow arriving at wastewater treatment works in the region that was surface water or infiltration (as opposed to foul sewage or trade effluent) was close to the industry average. Furthermore, the most recent asset data available to us indicated that while it had the highest proportion of sewers above 321mm in diameter, it had a far below average proportion in the largest size bands (ie above 626mm diameter).

In the course of reviewing the claim, we tested a runoff variable combining the degree of urbanisation and rainfall. While this variable was found to be significant in our econometric models, it was highly collinear with our scale driver, length of sewer. We drew the conclusion that a large portion of the claim was already captured by an implicit allowance within our base allowance.

For the above reasons we considered that United Utilities had not adequately demonstrated a need for a cost adjustment to our modelled allowance.

2 Stakeholder representations

United Utilities provides a comprehensive response to our draft determination decision in its 'Update to claim: Combination of exogenous factors impacting surface water runoff', (document reference D003a). The company addresses the feedback received and expresses its confidence that the need for an adjustment is justified from both an econometric and engineering perspective and that there are 'regional operating circumstances with significant impact on costs' which support the need for a cost adjustment claim. The company reaffirms the value of the claim at £87 million.

The company provides Met Office data which shows that average annual rainfall within the major urban conurbations in the region (Greater Manchester etc) is significantly higher than average. Ranked by rainfall, 17 out of the top 26 cities in England and Wales fall within United Utilities' operating area.

United Utilities also highlights an error in the asset inventory data it submitted at PR14 and on which Ofwat had relied when concluding that the company had 'a far below average proportion of pipes of above 626mm diameter'. Corrected data reveals a sewer size profile very much more in line with the asset inventory data provided at the previous price review, PR09.

United Utilities also identifies anomalies in data submitted in companies' most recent Annual Performance Reports (APRs) that it assumes Ofwat had used to conclude that 'United Utilities Water's proportion of surface water received at treatment works is in line with the average (66% vs. 62%)'. United Utilities' analysis of this data indicates a much lower industry average (44%) suggesting it has higher volumes of surface water than other companies typically have to manage.

3 Our assessment and reasons

As the need for a company to adequately invest in the operation and maintenance of its sewerage infrastructure is a given, our analysis focuses on the second of our deep dive 'gates', namely establishing whether there is a need to make an adjustment to our modelled allowance. Our analysis considered the following questions:

- Do the sewers in United Utilities' area capture greater volumes of surface water runoff?
- Do greater volumes of surface water runoff mean the sewers have to be larger?
- Does United Utilities have larger underground assets than other companies?

- Does United Utilities spend more on operating and maintaining its underground assets than other companies?

3.1 Surface water runoff volumes

United Utilities provides good evidence that although the very wettest parts of the region are largely unsewered, e.g. the Lake District, by and large the towns and cities also experience higher rainfall totals than those elsewhere in the country. As noted above, ranked by rainfall, 17 out of the top 26 cities in England and Wales are in the North West. We accept that higher volumes of surface water runoff enter the sewers in the North West both in absolute terms and on a per household basis, compared with most other regions.

3.2 Link between surface water runoff and size of sewers

Owing to the relief provided by combined sewer overflows (CSOs), we are not persuaded that higher surface water runoff necessarily means that larger assets are needed to manage the resulting flows. It is also the case that even when flows are not sufficiently high to cause spills from CSOs, sewers in a wetter region will convey higher volumes of wastewater than the same sized sewers in a drier region, simply because there are fewer dry days. In consequence, the sewers will run fuller more of the time. Put another way, higher volumes of wastewater can be handled in wetter regions without necessarily having to increase the size of the pipes.

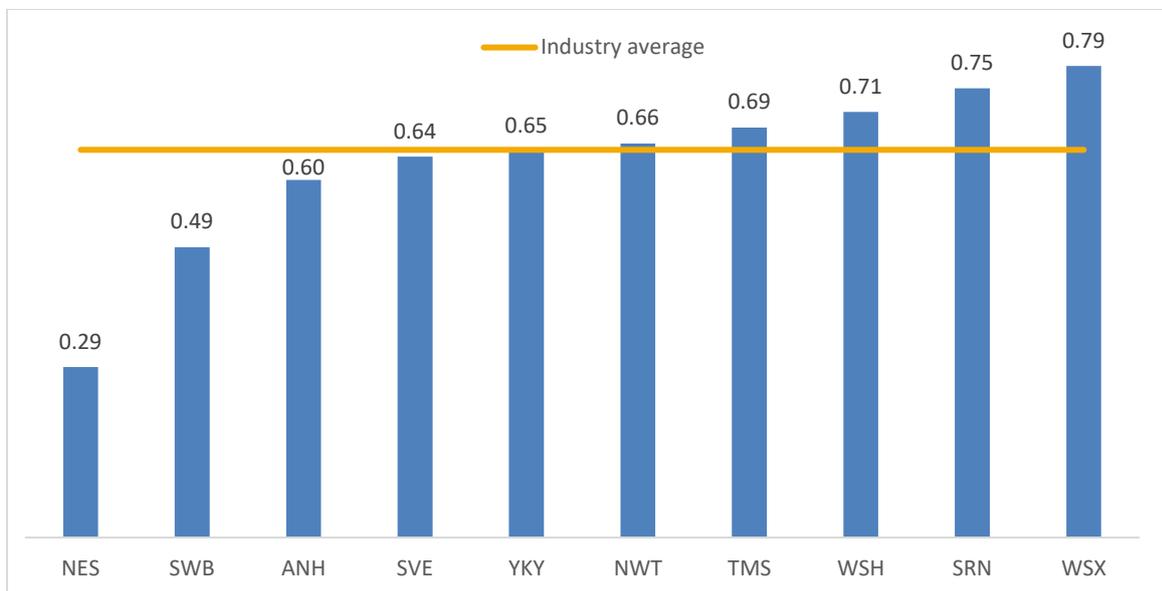
Though we do not have data on how much collected wastewater leaves the sewerage system before it reaches the treatment works an indication of the significance of CSOs may be gleaned by the composition of the influent wastewater arriving for treatment.

The composition of the wastewater arriving at the treatment works is a good indicator of the extent to which the overflows on a company's sewerage network spill excess stormwater thereby enabling sewers downstream of the overflow to be smaller than they would otherwise need to be. Because overflows are designed to spill wastewater only during times of peak flow, i.e., during storms, the greater the proportion of surface water runoff in the flow being treated at STWs, the greater the volume of surface water runoff being retained within the system and the less that leaves the system via overflows. All other things being equal, with United Utilities handling well above average surface water runoff volumes, the expectation is that the proportion of surface water in the flow being treated at STWs will also be above average.

However, data from the PR19 business plans indicate that though this proportion varies widely across companies, at 66% United Utilities is very close to the industry average of 65% (see figure 1). This strongly suggests that although United Utilities has the second highest volume of surface water entering its sewers this must be balanced by a higher than average proportion being lost from the system via overflows. This in turn may be expected to have a greater moderating impact on the size of the combined sewers in its network.

It is worth pointing out that this analysis does not rely on the data submitted in companies' APRs, which we would agree with United Utilities appears to be calculated on an inconsistent basis, and instead uses business plan data.

Figure 1: Proportion of surface water in flow treated at STWs



Note: The proportion of surface water (and infiltration) in the flow transported to and treated at STWs was calculated from the following business plan data items:

CPMS2015 Volume of wastewater receiving treatment at sewage treatment works

CPMS2012 Volume trade effluent

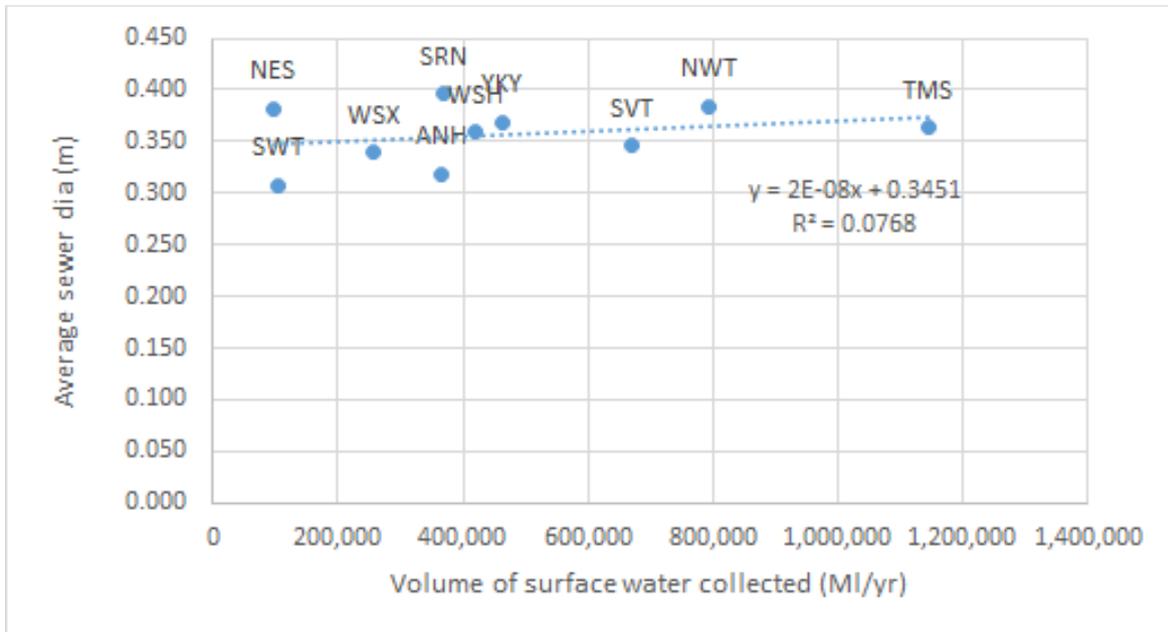
APP2041 Per capita consumption

BN2590 Population - Total

together with an assumption that 95% of domestic consumption is returned to sewer

Using the same source data as we used in figure 1 to calculate flows and past asset inventory asset data to calculate average sewer sizes, we also sought to establish whether there was any correlation between the average sewer size in a region and the volume of surface water being treated at sewage treatment works. As can be seen in figure 2 the very low coefficient of determination (R^2 value) indicates that the two variables are poorly correlated. In other words, the average diameter of a company's sewers was found to be insensitive to the volumes of surface water runoff it transported to the treatment works.

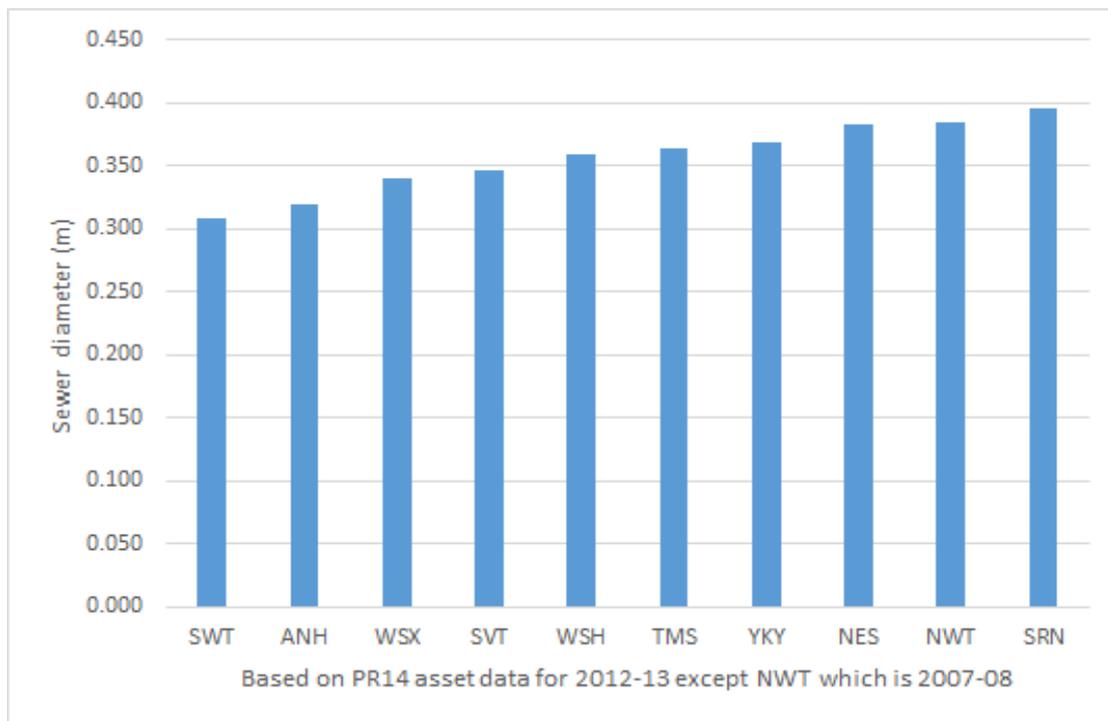
Figure 2: Average sewer diameter v. surface water volume treated at STWs



3.3 Does United Utilities have larger underground assets?

Irrespective of the theory outlined above, our analysis considers whether there is evidence to suggest that United Utilities' underground assets are larger compared to other companies. Even allowing for errors in the most recent (i.e., PR14) asset inventory data reported (that United Utilities brought to our attention in its representation on the draft determination), Figures 3 and 4 show, respectively, that in terms of the average sewer diameter or average installed capacity of in-line network sewage pumping stations, United Utilities does not have to maintain sewerage infrastructure assets that are larger than other companies.

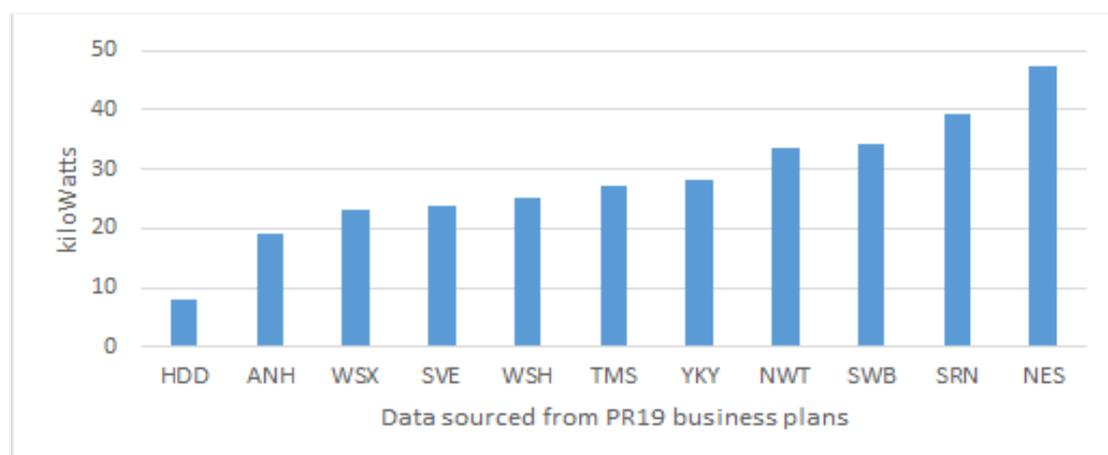
Figure 3: Average diameter of legacy public sewers



*Based on PR14 asset data for 2012-13 except NWT which is 2007-08. Excludes ex-private sewers transferred in 2011.

**The analysis underlying Figure 3 necessarily makes some assumptions regarding the distribution of pipe diameters within each sewer size band as reported by companies in past asset inventory submissions. However, sensitivity analysis shows that the results are not particularly sensitive to the assumptions made.

Figure 4: Average installed capacity of in-line network sewage pumping stations (2017-18)



3.4 Does United Utilities spend more on its sewage collection assets than other companies?

It is far from clear that on a per kilometre basis United Utilities spends unusually high amounts on operating or maintaining its underground assets. In fact, as can be seen in figures 5 and 6, PR19 business plan data indicates that in the last two years United Utilities' unit costs have been at or just below the industry average.

Figure 5: Botex allocated to 'Sewage collection' per km of sewer (2017-18)



Figure 6: Botex allocated to 'Sewage collection' per km of sewer (2018-19)



4 Our final decision

The evidence we have considered and the analysis we have undertaken, summarised in section 3, casts significant doubt on whether:

- higher rainfall necessarily leads to larger underground assets; and
- United Utilities has larger underground assets than other companies or incurs higher expenditure in their operation and maintenance.

We conclude that the evidence that our econometric models do not adequately capture factors affecting its base costs in providing a wastewater service is not sufficiently convincing.

For final determinations, we maintain our decision not to make any allowance for United Utilities' claim for additional base costs.

Ofwat (The Water Services Regulation Authority) is a non-ministerial government department. We regulate the water sector in England and Wales.

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