

December 2014

Setting price controls for 2015-20
**Final price control determination notice:
policy chapter A3 – wholesale water and wastewater
costs and revenues**



OFWAT

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Overview

The cost of delivering wholesale water and wastewater services is a major driver of customer bills, comprising about 90% of the value chain. We expect these costs to total about £40 billion of the period of the new price controls.

This document sets out our approach to assessing wholesale costs in setting final determinations for the five years from 1 April 2015 and summarises the results of our review of representations received following publication of the draft determinations.

Our final determinations

Consistent with [‘Setting price controls for 2015-20: final methodology and expectations for companies’ business plans’](#) (our ‘final methodology statement’), published in July 2013, we have used a total expenditure (totex) approach to assess allowed costs at this price review in order to:

- incentivise efficiency and encourage companies to develop innovative and low-cost solutions to meeting the needs of their customers; and
- address concerns about a bias towards capital over operational solutions and expenditures.

For most companies our assessment of totex is broadly consistent with their revised business plan forecasts. However, for Bristol Water very significant differences remain – despite it being given extra time and opportunities during the PR14 process to both reconsider its business plan and make representations on our benchmarking models and submit special cost factor claims. It has revised business plan forecasts of totex significantly above our assessment of the efficient level of its costs and it will need to both reconsider the scope of its capital programme and seek out further efficiencies, or its shareholders will need to fund a proportion of these costs.

The following figures summarise the evolution of the differences between company forecasts and our risk-based review (RBR), draft determination and final determination estimates of the efficient levels of wholesale totex (which we call cost thresholds and form the basis for our cost allowances). These include the impact of the caps we imposed at the draft and final determinations on the cost thresholds of companies with relatively low forecasts of totex. As explained in more detail below these are designed to protect customers by ensuring that they share in the benefits of these relatively low totex forecasts. For Severn Trent Water (wastewater) and

Thames Water (water) we have capped our cost thresholds and allowances at 5% above their business plan forecasts.

Figure A3.1 Differences between the water cost thresholds and business plan forecasts of totex

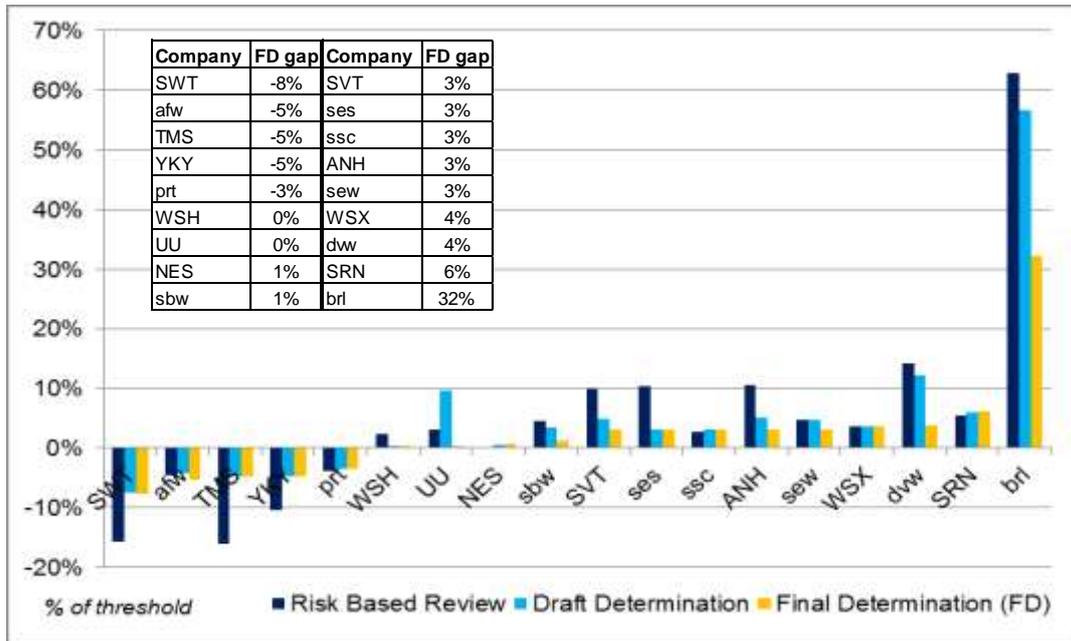
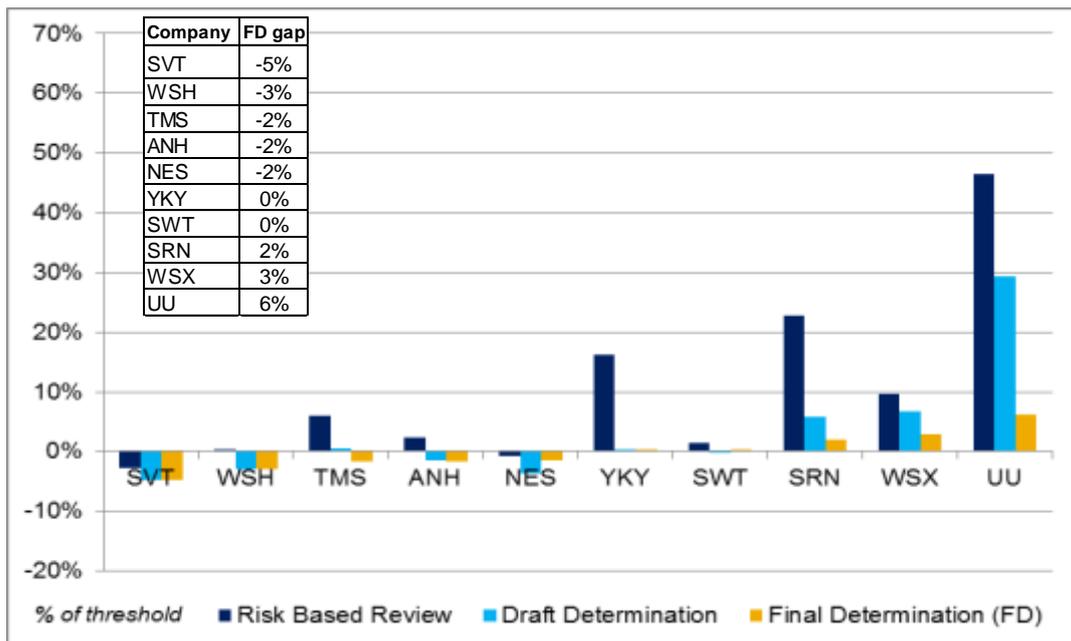


Figure A3.2 Differences between wastewater cost thresholds and business plan forecasts of totex



We are allowing £40.4 billion of expenditure for wholesale totex across the 18 water and wastewater companies for 2015-20. This number represents about a 1% reduction from that proposed in the companies' business plans in December 2013 of £40.9 billion. The differences between the cost thresholds and individual company plans (summarised in the charts above) tend to be greater than the changes to the overall position, reflecting the importance of rewarding efficiency and not allowing for inefficient costs, in relation to individual wholesale price controls. The wholesale cost allowances are also subject to menu choices and cost sharing incentives, as discussed below.

Our approach

The wholesale services part of the value chain is at present exposed to very limited amounts of competition. In order to ensure that the costs that companies put forward in their business plans are efficient and to incentivise efficiency in the longer term we use comparative benchmarking. As part of the PR14 process we have developed a number of benchmarking models to assist our understanding of efficient costs. These models have been the starting point of our understanding and companies have had the opportunity to provide us with high quality evidence to demonstrate that their costs are efficient, even if they appear relatively high compared to the results of our modelling. Most companies have been able to show there were factors not properly captured by our modelling and where appropriate we have made special allowances for these costs. Consistent with the above our approach to wholesale costs and revenues has the following key features.

- **An upper quartile efficiency challenge** – we have derived cost allowances on the basis of comparative efficiency, using benchmarking models and applying an upper quartile efficiency challenge on all companies' wholesale costs, to both incentivise efficiency and share the benefits of these efficiencies with customers over the short and longer term.
- **Setting cost thresholds** – because benchmarking models cannot capture all the factors driving costs we have considered company representations on any special cost factors not captured by our modelling. The modelling allowances (excluding the Thames Tideway Tunnel that is dealt with separately) for costs come to a total of £34.6 billion over the five years of the new price control, policy items (such as business rates and pension deficit recovery costs) are £3.6 billion and allowances arising from special cost factor claims (after adjustments for upper quartile efficiency) are £2.2 billion (or £2.7 billion excluding the impact of capping adjustments). About half of the companies

have revised business plan totex forecasts that are either at or below the benchmark levels derived from our modelling and overall assessment of totex.

- **Considering special cost factor claims** – as noted above a key part of our approach to assessing wholesale costs has been the consideration of special cost factor claims and we have received representations from a range of stakeholders on these matters. Whether a special cost factor claim has been allowed or disallowed does not determine whether the company should proceed or not with the underlying programme of work. It only indicates whether we considered it appropriate to adjust the results of cost modelling for the special cost claim. We have assessed a number of special cost factor claims where the underlying programme of work appears reasonable, but it reflects activities that we consider have already been allowed for in our modelling. In these circumstances, while we will not have made an adjustment to our cost threshold (because we consider that the costs are captured in our modelling and so implicitly allowed for in our cost thresholds), we would expect the company to proceed with the underlying activities. Further, while representations from stakeholders on the merits of individual schemes have been useful, such representations have not necessarily determined whether we have adjusted our cost thresholds in order to take account of these schemes. In particular:
 - as noted above, we may deem activities as already funded by cost modelling; and
 - where this is not the case, and we have assessed the special cost claim in detail, we would usually expect it to be supported by robust evidence, including in relation to cost-benefit analysis.

- **There remain companies where forecasts of revised totex exceed the cost threshold:**
 - For one remaining company (Bristol Water), our cost threshold remains very significantly below the company's revised business plan forecasts of totex. It will need to seek out a wide range of further efficiencies to try and meet the cost threshold (including reviewing the scope of its proposed investment programmes) or its shareholders will need to fund a proportion of the extra costs. It is notable that Bristol Water has not taken the opportunities provided by the price control process to substantially revisit and change the scope and costings associated with its December 2013 business plan, as has been the case with a number of other companies. Further details of our assessment of Bristol Water's wholesale costs are set out in the company-specific appendix on Bristol Water published alongside this document.

- Other companies with forecasts of revised business plan totex above the cost threshold will also need to seek out further efficiencies, but on a more modest scale.
- **Cost thresholds that are significantly higher than business plan forecasts** – we have sought to ensure that the modelling is as robust as practicable through a process of engagement with companies. However, we are concerned that information asymmetries could lead to customer detriment if we placed too much reliance on our models when these imply higher costs than the companies' forecasts. If Ofwat's modelling underestimated costs, companies may be expected to seek to correct any issues with the modelling. However, the position is likely to be different if Ofwat overestimates a company's costs, in which case companies may not actively seek to correct any difficulties or weaknesses with our models. In these circumstances there is a risk that some of the difference between the final determination cost threshold and the company's business plan is due to the models over-estimating the required totex. So where business plan forecasts of costs are significantly below cost thresholds, we have intervened to ensure that customers will benefit from an appropriate share of these efficiencies. Consistent with draft determinations our 'capping solution' (which constrains the level of the cost threshold) seeks to strike a balance between maintaining incentives for efficiency and ensuring that consumers pay no more than is reasonably necessary for the services they receive.
 - For the enhanced companies (South West Water and Affinity Water), following the RBR we had relatively high confidence in the business plans and associated forecasts of cost drivers, including that these forecasts were aligned with appropriate delivery commitments to customers. On this basis we have used these forecasts of cost drivers (rather than the standardised Jacobs/Ofwat projections used for other companies) in our calculations of modelled cost allowances, which reduces the level of allowed totex.
 - For the relevant non-enhanced companies (Thames Water – wholesale water, and Severn Trent Water – wholesale wastewater), we have capped the difference between company projections and our assessment at 5% above the company's totex forecast, so reducing the level of the cost threshold and allowed totex.
- **Increased flexibility for companies** – to help deliver the best results for customers in terms of overall efficiency we have given companies greater flexibility than in the past as follows.

- Companies can propose the proportion of totex that should be recovered on a ‘pay as you go’ (PAYG) basis, rather than being added to the regulatory capital value (RCV), to help manage bill profiles, affordability and financeability issues over time. We have checked that companies have used this flexibility in a sensible way and intervened where appropriate as discussed in ‘[Policy chapter A8 – financeability and affordability](#)’.
 - Companies can use cost sharing incentives that have been extended from capital expenditure to totex, creating more balanced incentives and providing greater scope to share the benefits of efficiencies with customers. Where companies need to spend more to meet statutory requirements or to deliver services to customers then these extra costs will also be shared between companies and customers.
 - Companies can make menu choices in relation to totex that will determine their allowed revenue and totex cost sharing rate, and, provide wider incentives for accurate and realistic forecasting.
- **Obligations on companies** – it is for companies to deliver on all their statutory obligations, maintain their assets in such a way as to provide sustainable serviceability where required, and provide a good level of service to their current and future customers (including delivering the outcomes that they have promised to their customers which are part of these final determinations). If a company views the package of measures in its final determination, including the total allowed revenue, uncertainty mechanisms and protections within the appointee licence as insufficient to discharge these important obligations, then it should seek a reference to the Competition and Markets Authority (CMA), which will look again at all elements of its price controls.
 - **Expectations for future price control reviews** – companies should not expect future price control allowances to fund them for the consequences of any shortcomings in their approach to serviceability or any other aspect of their regulated activities over the period 2015-20, or for any material errors or omissions from their PR14 business plans.
 - **Reconciliation of the incentive arrangements** –we will publish guidance shortly on how we will make the financial adjustments for the cost sharing, outcome delivery and other PR14 price control incentives at the next price control review.

Key changes since draft determinations

For those companies with business plan forecasts of totex below or broadly consistent with our efficiency benchmarking models then it has been clear since the publication of our RBR in April 2014 that our approach to cost assessment is broadly consistent with their business plans. These companies, including the enhanced companies of South West Water and Affinity Water, and others such as Dŵr Cymru and Northumbrian Water, have been able to get on with implementing their future plans.

Other companies, with substantial gaps between business plan forecasts and totex thresholds at the RBR have not had this certainty. In general, these companies have continued to make representations on special cost factor claims and some of these companies have also taken the opportunity to reconsider their business plans.

For 5 out of the 28 wholesale price controls there have been significant changes between draft and final determinations in the gaps between cost thresholds and revised business plan forecasts of totex. These changes reflect both changes in business plan forecasts of totex and changes in the cost thresholds resulting from the consideration of special cost factor claims. Those companies with larger changes (that is, those companies with gaps between the cost threshold and business plan that have reduced by more than five percentage points) include:

- United Utilities (water) – an addition to the cost threshold to reflect those costs of the Thirlmere link (which is designed to facilitate compliance with the Habitats Directive and Environment Agency requirements) to be incurred in the PR14 price control period;
- Dee Valley (water) – an increase in the company's totex allowance to reflect the much better evidence provided by the company on the exceptional costs associated with rebuilding and refurbishing a number of service reservoirs;
- Bristol Water (water) – an increase in the company's allowance for enhancement spending to take account of the relatively low enhancement allowance deriving from one of the totex models, and an increase in its allowance for base spending for water treatment complexity. However, Bristol Water's revised business plan totex forecasts remain very significantly above the final determination cost threshold;
- Thames Water (wastewater) – an increase in the company's totex allowance for Counters Creek (after a significant downward adjustment to the company's estimate of costs to reflect the relative immaturity of these estimates). The Counters Creek programme is designed to reduce the incidence of sewer flooding in west London. Thames Water has also made significant changes in

relation to the Thames Tideway Tunnel (TTT) programme. As explained in section A3.1.1 below, matters relating to TTT are addressed in the company-specific appendix on Thames Water; and

- United Utilities (wastewater) – the company has worked particularly hard to close the gap between its original business plan and our wastewater cost threshold, revising its business plan forecasts of totex and providing better information on its enhancement programme. The gap has closed because of reductions in totex made by the company in its representations on our draft determinations and allowances within our final determination cost threshold for its revised National Environment Programme phase 5 (NEP5) schemes. We have also made additions to the allowances for defined benefit pension deficit recovery costs (relating only to the period of PR14 price control and not compensating for any lower allowance made for 2010 to 2015, to correct for a company error in relation to the accounting treatment of certain pension costs at the 2009 price review). Finally, there have been adjustments for certain elements of base spending relating to wastewater capacity and sludge disposal costs.

A3.1. Introduction

In this policy chapter, we set out and explain the approach we have used for allowed wholesale water and wastewater costs and revenues in setting the wholesale price controls for the five years from 1 April 2015. These revenues provide the funding for companies to deliver on the outcomes that matter to customers both today and tomorrow and to allow companies to meet their statutory obligations. We also summarise the results of our review of companies' business plans and how we have responded to the issues raised by representations to our draft determinations.

This introduction:

- sets out the structure of this policy chapter;
- describes the development and refinement of our approach to setting wholesale price controls; and
- summarises the way we have calculated allowed price control wholesale revenues.

A3.1.1 Document structure and context

In sections A3.1.2 and A3.1.3 below, we describe the development and refinement of our approach to wholesale totex assessment and summarise how we have calculated wholesale water and wastewater price control revenues for the period 2015-20.

The remainder of this policy chapter is then structured as follows.

- Section A3.2 explains how we have estimated wholesale total expenditure (totex) thresholds and specifies the totex menus.
- Section A3.3 describes the estimates we have used for wholesale connection charges and third party revenue in order to set the wholesale price controls.

Within each section, we outline:

- our proposed policy position as set out in our draft determinations;
- the key issues raised by the representations received to our draft determinations; and
- our final position.

Consistent with the final policy position set out in this chapter, our company-specific decisions on the wholesale water price controls, and where applicable, the wholesale wastewater price controls, for each company are set out in the relevant company-specific appendices.

Further detailed information on our assessment of relevant wholesale costs for each company is provided in the company-specific [wholesale cost feeder models](#) published alongside our final determinations.

We explain how we have arrived at the outcomes we are requiring from companies in the period from 2015 to 2020 in '[Policy chapter A2 – outcomes](#)' (the 'outcomes policy chapter'). The allowed expenditures discussed in this chapter are to fund the outcome performance commitments and delivery incentives (determined using the approach set out in the outcomes policy chapter and detailed in the company specific appendices) and the wider statutory obligations on companies.

At the 2009 price review (PR09) we included a number of incentive mechanisms designed to encourage companies to improve and deliver services more efficiently and to manage uncertainty. Consistent with the approach set out in the PR09 proposals and confirmed in our final methodology statement we have made adjustments at PR14 to 2015-20 revenues to take account of company performance in the period from 2010 to 2015. We address these issues in '[Policy chapter A4 – reconciling 2010-15 performance](#)' (the 'reconciling 2010-15 performance policy chapter').

We discuss our methodology for establishing the return on the RCV and the corporation tax allowances that form part of the allowed revenues in the wholesale water and wastewater controls in '[Policy chapter A7 – risk and reward](#)' (the 'risk and reward policy chapter'). We also outline our approach to uncertainty mechanisms in this policy chapter.

Our approach to PAYG and RCV run-off rates applied in the wholesale water and wastewater controls is discussed in detail in '[Policy chapter A8 – financeability and affordability](#)' (the 'financeability and affordability policy chapter').

The company-specific appendix for Thames Water also sets out further detail of the Thames Tideway Tunnel (TTT) price control: our assessment of the totex for this wastewater project, the uncertainty mechanisms and the approach to menu regulation for this price control. This has been dealt with separately given the unique characteristics of this project and the interactions with the appointment of an independent Infrastructure Provider. We have also amended Thames Water's

licence to enable its activities in respect of the TTT to be delivered under a separate, binding, price control. Key features of our final determination for the TTT price control are summarised below.

- Thames Water included totex spending in its business plan relating to the work necessary to allow the Infrastructure Provider to deliver the main project. Following our interventions at draft determinations Thames Water has reduced its estimate of totex to £404 million, but included a broadly defined uncertainty mechanism alongside these estimates.
- The final determination totex of £408 million takes account of our interventions on the costs claimed by Thames Water and a central view of development risks associated with the appointment of the Infrastructure Provider.
- Costs that relate to the acquisition and disposal of land will be subject to the 100:0 sharing mechanism that has been in place in 2010-15; all other costs will be subject to a menu sharing mechanism for the TTT price control.

These matters are not discussed further in this policy chapter.

A3.1.2 Our approach to assessing wholesale costs

In July 2013, we modified companies' licences¹ to allow separate binding price controls for retail and wholesale activities, and separate binding price controls for wholesale water and wastewater services. One reason for these changes was to facilitate the retail market reforms that form part of the wider industry reforms set out by the [Water Act 2014](#). This marked a move away from the single price control framework in place at previous price reviews for retail and wholesale activities. However, where there were advantages in doing so for customers we retained the core features of the previous approach to setting price controls, including the use of RCVs, designed to encourage the provision of flexible low-cost financing to support investment programmes and to allow the recovery of costs over the long term.

We set out the key features of our proposed approach to wholesale cost assessment in July 2013 in '[Setting price controls for 2015-20: final methodology and expectations for companies' business plans](#)' (our 'final methodology statement').

¹ '[Modification of the conditions of appointment \(licences\) of all water only and water and sewerage companies](#)'.

These included the following.

- A total expenditure (totex) approach to assess allowed costs in order to:
 - incentivise efficiency and encourage companies to develop innovative and low-cost solutions to meeting the needs of their customers; and
 - address concerns about a bias towards capital over operational solutions and expenditures.
- Deriving cost allowances on the basis of comparative efficiency, using benchmarking models where practicable. The intention was to both incentivise efficiency and share the benefits of these efficiencies with customers over the short and longer term.
- To help deliver the best results for customers in terms overall efficiency, we have given companies greater flexibility than in the past to:
 - propose the proportion of totex that should be recovered on a ‘pay as you go’ (PAYG) basis, rather than being added to the regulatory capital value (RCV), to help manage bill profiles, affordability and financeability issues over time. We have checked that companies have used this flexibility in a sensible way and intervened where appropriate as discussed in the financeability and affordability policy chapter;
 - use cost sharing incentives that have been extended from capital expenditure to totex, creating more balanced incentives and providing greater scope to share the benefits of efficiencies with customers. Where companies need to spend more to meet statutory requirements or to deliver services to customers then these extra costs will also be shared between companies and customers; and
 - make menu choices in relation to totex that will determine their allowed revenue and totex cost sharing rate and provide wider incentives for accurate and realistic forecasting.

Although we published a paper by Cambridge Economic Policy Associates (CEPA) on cost modelling in January 2013 as part of the process for developing our final methodology statement, we decided not to release the final choice of cost models that we would use in the RBR until after companies first submitted business plans in December 2013. The intention was to allow companies to focus on preparing their business plans during 2013, rather than being unduly influenced by the precise specification of our benchmarking models, which would in any case be the starting point for cost assessment and be moderated by the consideration of special cost factor claims.

For those companies with business plan forecasts of totex below or broadly consistent with our efficiency benchmarks then it has been clear since the publication of our RBR in April 2014 that their business plan forecasts are broadly consistent with our cost thresholds. These companies, including the enhanced companies (South West Water and Affinity), and others such as Dŵr Cymru and Northumbrian Water, have been able to get on with implementing their future plans.

Other companies, with substantial gaps between business plan forecasts and totex thresholds at the RBR have not had this certainty. In general these companies have continued to make representations on special cost factor claims and some of these companies have also taken the opportunity to reconsider their business plans.

As we explain in section A3.2 the detail of the approach that we have applied to assessing companies' proposed wholesale costs and revenues has also evolved through the process of implementing PR14. Since we published our final methodology statement, we have issued the following additional policy documents to explain our approach in more detail as shown in the table below.

Table A3.1 Additional policy documents published relevant to wholesale water and wastewater costs and revenues

Document name	Publication date	Description/policy content
IN 13/17, 'Treatment of companies' pension deficit repair costs at the 2014 price review'	October 2013	Explains our proposed treatment of costs associated with water companies reducing the deficits in their defined benefit pension schemes.
'Setting price controls for 2015-20 – pre-qualification decisions'	March 2014	<ul style="list-style-type: none"> • Overview of RBR test applied for wholesale cost assessment and companies' performance against these tests. • Outlines 'do no harm principle'. • SIM direction of travel for 2015-20.
'2014 price review cost allocation for retail and wholesale price controls' (our 'guidance on cost allocation')	March 2014	Sets out a standard set of cost drivers for allocating 2013-14 costs between both the wholesale and retail and the household retail and non-household retail parts of the business.

Document name	Publication date	Description/policy content
'Setting price controls for 2015-20 – policy and information update'	April 2014	<ul style="list-style-type: none"> • Sets out our approach to baselines and menus for companies that are not enhanced. • Sets out equivalence of treatment for June and August draft determinations.
'Risk-based review initial threshold model'	April 2014	<ul style="list-style-type: none"> • Provides an overview of the wholesale RBR template model and the main adjustments that are made in this model to derive RBR initial cost thresholds from the basic cost thresholds.
'2014 price review risk-based review – internal methodology' (our 'RBR internal methodology')	April 2014	<ul style="list-style-type: none"> • Sets out the principles applied when scoring the RBR tests and criteria. • Describes our detailed assessment methodology for each of our RBR tests.
'Setting price controls for 2015-20, Draft price control determination notice: technical appendix' ('the enhanced DD technical appendix')	April 2014	Our approach to wholesale price controls as part of the draft determinations for enhanced companies.
'Basic cost threshold feeder model'	April 2014	Guidance on the operation of the basic cost threshold feeder model including input data, variables, and totex and enhancement modelling.
'Setting price controls for 2015-20, Draft price control determination notice: technical appendix A3 – wholesale water and wastewater' ('the wholesale technical appendix to our August draft determinations').	August 2014	<p>Restatement of our approach to wholesale price controls.</p> <p>In addition, it outlines our approach to 'capping' the difference between company forecasts of costs and our cost thresholds where company forecasts were significantly below these thresholds.</p>

Document name	Publication date	Description/policy content
'IN 14/15: 2014 price review – timetable for setting charges for 2015-16 and making menu choices' (the 'information note on making menu choices')	September 2014	Sets out the timing for companies to make their menu choices.

We refined our modelling approach in our [April, May and August draft determinations](#) following:

- further quality assurance work;
- consideration of revised business plan proposals; and
- representations on the results of the RBR.

We also introduced an additional measure to protect customers in our draft determinations, intervening to 'cap' the difference between company forecasts of costs and our cost thresholds where company forecasts were significantly below these thresholds.

The main refinements to our modelling and policy since we received business plans in December 2013 include:

- finalising the use of an upper quartile efficiency benchmark for both wholesale water and wastewater costs;
- developing benchmark allowances for private sewer pumping station costs after receiving business plans in December 2013; and
- setting allowances for business rates and gross/net adjustments (associated with capital contributions from new connections) and third party costs.

In April 2014, we also:

- adjusted some of the wastewater model coefficients as a result of our continuing quality assurance work; and
- amended the non-normalised coefficients of the random effects econometric models used for projecting wastewater base and treatment expenditure, and of the unit cost models used for projecting sanitary determinands and ultraviolet disinfection expenditure.

In September 2014, we updated the private sewer model to correct for an error and to take account of additional data to extend the panel data period (but we decided not to update other models for 2013-14 data as discussed further in annex 1). We have also updated our water supply/demand balance model, where appropriate, to take better account of information in draft and final water resource management plans.

Company representations on modelling included concerns with our use of Jacobs/Ofwat forecasts of cost drivers (the model exogenous variables) and proposals for changing the weightings given to individual models in the averaging (or 'triangulation') calculations used to establish our cost thresholds.

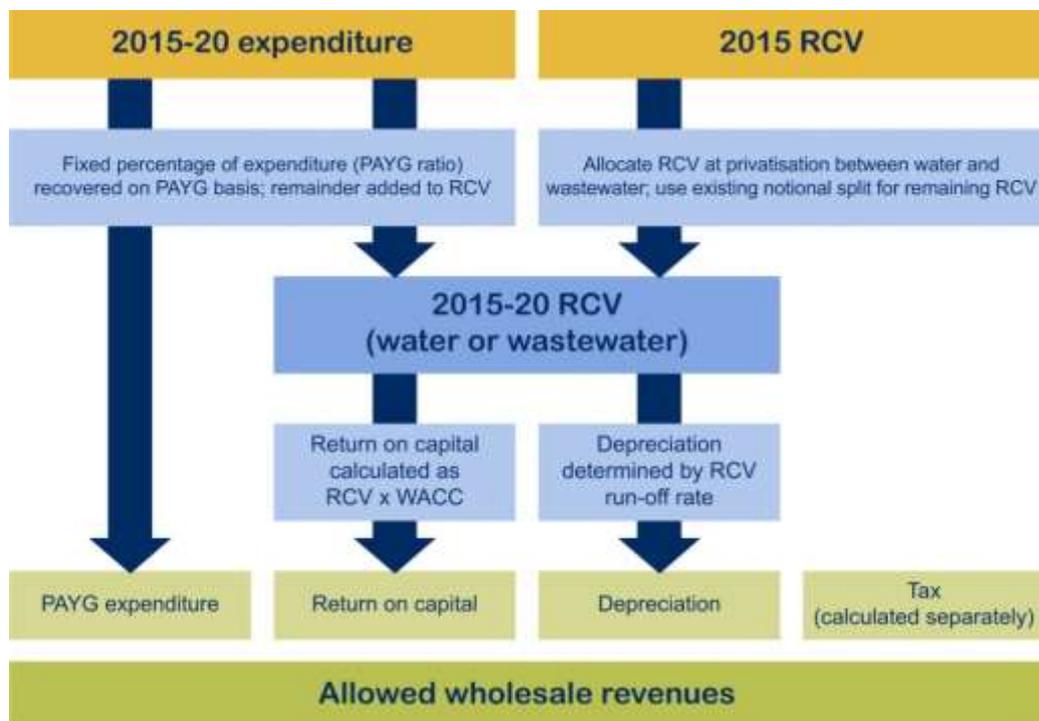
As explained in our draft determinations, with the exception of wholesale water service expenditure for the two enhanced companies, we have not generally adopted the forecasts of cost drivers used in business plans. We have also retained the original general approach to triangulation of the sector-wide model results that we used in the RBR, as published in April 2014.

Many company representations on our modelling were linked by companies to special cost factor claims, and we have made significant changes to companies' individual cost thresholds on a case-by-case basis, following consideration of these representations. We describe the company representations on modelling and our process for dealing with special cost factor claims in more detail in section A3.2.

A3.1.3 Approach to setting wholesale revenues

We described our approach to setting allowed wholesale revenues in the final methodology statement and in our draft determinations, including in section A3.2 of the wholesale technical appendix to our August draft determinations. Figure A3.3 below illustrates the broad approach. These allowed revenues are also subject to adjustments for performance arising from the period 2010-15, as explained in the reconciling 2010-15 performance policy chapter.

Figure A3.3 Approach to setting allowed wholesale revenues



The key parameters and estimates that were used to calculate wholesale price control revenue for the period 2015-20 are summarised below.

- Totex baselines/2015-20 expenditure** – our assessment of the efficient level of capital and operating expenditures for water and wastewater for each company over 2015-20. Totex baselines are used to calibrate wholesale totex menus, with certain items excluded from the scope of menus (such as allowances for pension deficit recovery costs) but allowed for as part of total wholesale price control revenue. Company performance against menus and cost sharing incentives will be reconciled at the end of the PR14 price control period. We will publish further guidance on these matters shortly.
- PAYG rate** – the allocation of totex to either PAYG (all of which will be recovered from revenue over 2015-20) or the RCV (which is recovered over a longer time period specified for each wholesale service).

- **RCV** – calculated as the RCV at the start of the period plus totex that is not funded on a PAYG basis minus RCV run-off (or regulatory depreciation). As noted in ‘Policy chapter A5 – household retail costs and revenues’, there was no allocation of the 2015 RCVs and they were hypothecated to the wholesale price controls.
- **Return on the RCV** – the wholesale weighted average cost of capital (WACC) applied to the average RCV in each year of the period from 2015-20.
- **Corporation tax allowance** – estimated from forecasts of accounting profits.
- **Income from other sources** – other income relating to the activities of the regulated business (‘other operating income’, ‘other income’ and ‘third party income’) taken into account to reduce the revenue required from the price controls (and so customer bills for services covered by the price controls).

We discuss our methodology for establishing the return on the RCV and the corporation tax allowance in the risk and reward policy chapter.

Consistent with the July 2013 licence modifications, revenues as calculated above will be recovered from wholesale charges and are controlled by a formula that limits changes in charges to the RPI plus or minus fixed percentage K factors.

A3.2. Estimating totex thresholds and the calibration of menus

This section describes in more detail how we have estimated totex expenditure thresholds and baselines for the period 2015-20 in these final determinations and how wholesale totex menus have been used in setting the price controls. It is structured as follows.

- Cost models and basic cost thresholds (section A3.2.1).
- Interventions framework and special cost factor claims (section A3.2.2).
- Cost thresholds that are significantly higher than companies' plans (section A3.2.3).
- Costs excluded from menu baselines (section A3.2.4).
- Menus (section A3.2.5).

A3.2.1 Cost models and basic cost thresholds

At previous price control reviews Ofwat has used benchmarking models as part of its process for establishing cost allowances – in particular in relation to operating expenditure. This reflected the monopoly characteristics of the industry, necessitating the development of regulatory incentives to encourage cost efficiency and the availability of comparative information from the relatively large number of water and wastewater licensees in England and Wales. Our final methodology statement explained that there are advantages in continuing to use these benchmarking models but where practicable to extend the modelling to encompass wholesale totex (that is, operating plus capital expenditure). It also explained that where the circumstances of individual companies were not adequately captured by modelling, then we would address this via the consideration of special cost factor claims.

We have developed a range of benchmarking models designed to deliver our initial assessment of efficient totex levels. These reflected broader feedback we have received about the advantages of totex modelling and previous comments by the Competition Commission that we should make greater use of panel data modelling. They include separate models for base cost and enhancement costs, and models that explain total costs (that is, both base plus enhancement totex). The models are either panel data econometric models or unit cost enhancement models. These models are then used to make projections of each company's costs over the period 2015-20. We take an average of these projections (using a process we have termed

‘triangulation’) to produce an overall projection of totex which we have called the basic cost threshold (BCT). The detail of the approach to triangulation was explained in the August draft determinations.

The wholesale cost assessment models used in these final determinations have evolved as follows.

- We published an initial report by CEPA on cost modelling in January 2013 in order to facilitate discussion on our broad approach to totex modelling. However, as envisaged in the final methodology statement, we first published the detail of the wholesale cost assessment models we used in the risk-based review (RBR) after companies submitted business plans and alongside the conclusions of the RBR on 4 April 2014. The intention was to allow companies to focus on preparing their business plans during 2013, rather than being unduly influenced by the precise specification of our benchmarking models, which would in any case be the starting point for cost assessment and be moderated by the consideration of special cost factor claims.
- For an explanation of our approach to modelling see the ‘[Basic cost threshold feeder model](#)’ guidance note and associated appendices covering our models and the projections of cost drivers (that are used in conjunction with the model coefficients to produce projections of totex). We set out a number of updates to these models reflecting the results of our own ongoing assurance process and feedback from stakeholders at the end of April 2014 in the ‘[Draft price control determination notice: technical appendix](#)’.

Following the RBR we asked companies to submit their representations on our wholesale cost models by 3 June 2014² and we received representations from 12 companies on modelling. The remaining 6 companies did not make representations. We discussed these representations in annex 1 of the wholesale technical appendix to our August draft determinations. In very broad terms these can be categorised as follows.

- Some companies supported our overall approach to cost modelling and suggested no further changes were appropriate.
- Some companies raised issues with individual models, including the water refined totex model and water full totex model.

² [Letter from Sonia Brown](#), 8 May 2014.

- Some representations commented on the approach to triangulation, in particular the relative weights given to the models in calculating the BCT.
- There were suggestions that we should use business plan forecasts of cost drivers/exogenous variables to produce totex forecasts for the period 2015-20, rather than Jacobs/Ofwat projections.
- Representations stated that the use of an upper quartile efficiency challenge was too severe.
- Other more company-specific issues were raised, including concerns that the cost models excluded certain explanatory variables particularly important to the companies concerned.

Many of these representations were linked to special cost factor claims – with the suggestion that we should either adjust the underlying modelling or make a special cost allowance for the company concerned. In general, we have retained the RBR approach to modelling, while making corrections for errors and certain updates for new information (such as that contained in the draft and final water resource management plans). However, we have considered the special factor cost claims that companies made and whether the case for these is strengthened by consideration of the associated modelling claim. We have made a number of adjustments to our thresholds for affected companies on this basis and as explained in section A3.2.2 below. These adjustments have been added to the BCTs as part of the process for establishing final cost thresholds and baselines for each individual company.

We also considered further representations on modelling made in response to draft determinations. We discuss these below.

A3.2.1.1 Our draft determinations

Our draft determinations in April, May and August reflected the above approach to modelling costs.

- For water, we used the results of three broad approaches to modelling (based on refined totex models, full totex models and base plus enhancement models (with this modelling stream also including an allowance for un-modelled enhancement spending). We calculated BCTs for each company as the simple average of the three modelling approaches.

- For wastewater, it was not practicable to construct totex models that would cover all aspects of company expenditure. Therefore, we calculated the BCTs using a mixture of base and enhancement models (which also included an allowance for unmodelled enhancement spending).
- Except for the enhanced companies' wholesale water services, we used Jacobs/Ofwat projections of cost drivers/exogenous variables, with updates for certain information contained in draft and final water resource management plans.
- We used an upper quartile efficiency challenge in calculating the BCTs, derived from the model results for the historical periods (typically five to seven years) over which the models were estimated. This was designed to provide stretching efficiency targets and protect the interests of customers.

A3.2.1.2 Issues raised by representations on our August draft determinations

In general, only companies commented on our cost modelling and the approach to calculating BCTs in the representations to our August draft determinations. Of those companies that commented, some companies re-iterated comments made in their responses received by 3 June. Other companies made new or more detailed modelling representations. Consistent with the representations received by 3 June, companies tended to link modelling representations with special cost factor claims that reflected their individual circumstances.

We allowed Bristol Water extra time to make modelling and other representations given the exceptionally large size of the gap between its business plan forecasts and our modelled allowances for costs³. However, we did not receive final representations from Bristol Water in relation to these matters until 7 November, which has limited the amount of time that we have had to consider these late representations.

Representations included the following.

- Bristol Water provided reports from Oxera Consulting suggesting that there were omitted variables from our water totex and base models, relating to the complexity of water treatment and asset age. It suggested that stochastic

³ See letter of 10 October 2014 from Sonia Brown on [further engagement with Bristol Water on wholesale water costs](#).

frontier analysis would be a more appropriate technique for identifying inefficiency compared to econometric models estimated using ordinary least squares (OLS) and/or random effects (RE). As noted above, the most detailed of these reports was not provided until 7 November 2014 and this has limited the amount of time we had to consider these representations.

- South East Water suggested that the totex models provided insufficient allowance for its enhancement programme costs.
- South Staffordshire Water contended that there was insufficient allowance in the refined and bottom up models for its extra costs associated with water pumping.
- Southern Water also provided a report by Oxera Consulting that suggested that it was particularly disadvantaged by the water full totex model.
- United Utilities suggested that the base totex sewerage models did not adequately capture the complexity of its operating environment.
- Wessex Water contended that its business plan forecasts of cost drivers/explanatory variables would provide a more robust basis for making projections of cost thresholds than the Jacobs/Ofwat projections.

A3.2.1.3 Our final determinations

The representations received from companies tended to focus on the specific circumstances of individual companies and so we have dealt with these as special factor cost claims in our interventions framework below. However, a small number of the modelling representations potentially have wider implications. Where this was the case, we considered whether we should make changes on a wider basis. The issues that appeared to have the most scope for sector-wide impacts were those that Bristol Water raised in relation to omitted variables and the use of stochastic frontier analysis.

Dr Andrew Smith from the University of Leeds has continued to provide us with expert academic advice on modelling issues. He has played an important role in advising on decisions around model selection and robustness, as well as helping us assess representations from companies on modelling issues.

In relation to Bristol Water's representations on omitted variables we have considered including a water treatment complexity variable in our water base

expenditure and totex models, using data extracted from our June returns. The resulting variable (the percentage of water treated of W3/W4 complexity⁴) was statistically significant in the base and refined totex model. The companies that this would benefit most include Bristol Water and Sutton & East Surrey Water (which we had already made a £23 million adjustment for extra costs associated with statutory water softening). Bearing this in mind we decided that consideration of further adjustments for water complexity could reasonably focus on Bristol Water. We address these matters further in its company-specific appendix.

Given the relative lateness of certain representations made by Bristol Water (as noted above it submitted a detailed report which it had commissioned by Oxera Consulting on 7 November) and concerns relating to the both the complexity and underlying assumptions necessary to implement stochastic frontier analysis, we decided not to pursue this approach further.

Following the draft determinations we also checked the robustness of our models and modelling results by re-estimating models using data that became available from companies for 2013-14. In general, the models proved to be reasonably robust, producing similar results when using the new data either to extend or update the panel and other data sets that were previously used. However, there were two main issues with unit cost enhancement models, as discussed below.

- Re-estimating the coefficients in the private sewers model revealed an error in the way the model had been implemented for the RBR and draft determinations in our wholesale cost modelling. We have both corrected for this error and extended the data set for 2013-14 as the model previously used only 18 months of data (other models typically use at least five years data). For ease of implementation these changes have been made through wholesale cost feeder model 11 using a new deep dive sheet (and company-specific versions of this model are published alongside these final determinations).
- There were issues with the performance of the wastewater storage unit cost model revealed with the updated data set, but we were unable to develop a better modelling approach with the updated data. We therefore retained the earlier model using data to 2012-13 as the relevant input to the BCT for these final determinations, but where the model substantially under-estimates

⁴ We collected data on the relative complexity of companies' water treatment processes until 2008-09. Treatment processes were categorised as W1 – W4 where categories W3 and W4 were those processes with the highest operating costs.

companies' own forecasts of spending in this area, we have then separately assessed whether the cost thresholds provide adequate funding for the related enhancement expenditure.

We set out further details of the results of the work on re-estimating cost models in annex 1.

In addition, we have updated the projections of cost drivers (exogenous variables) used in conjunction with the supply/demand balance water unit cost enhancement model to reflect the latest information in final water resources management plans, where changes in final plans caused material changes in our cost thresholds.

Otherwise we have retained our approach to modelling and calculating BCTs used to inform the August draft determinations.

A3.2.2 Interventions framework and special cost factor claims

As discussed in section A3.2.1 above, we have used benchmarking cost models to set BCTs. Consistent with the final methodology statement we have also developed an interventions framework to allow consideration of company representations on any special cost factors not captured by the modelling and the BCTs. For final determinations we have added a further step to our process to help ensure that our final cost thresholds represent efficient costs. This has involved considering whether there is any other evidence that justifies a change to the cost threshold, even if an associated special cost factor claim did not meet the established criteria.

A.3.2.2.1 Our draft determinations

We outlined our interventions framework used for draft determinations in section A3.3.1 of the wholesale technical appendix to our August draft determinations. This involved:

- adjustments to BCTs for 'policy' items (which reflect categories of costs excluded from our modelling, typically where future allowed expenditure is not best determined by reference to historical industry trends) such as business rates, third party costs and defined benefit pension deficit recovery costs (PDRCs); and
- consideration of special cost factor claims made by companies for factors within their business plans that have not been adequately taken into account in our BCT modelling or assumptions on policy items.

Consistent with the approach adopted at the RBR in assessing special cost factor claims, for our draft determinations we adopted two initial filters.

- Whether the claim was supported by substantial evidence.
- Materiality (consistent with the approach explained in the RBR any claim less than 0.5% of business plan service totex was considered immaterial and not considered further).

We then made an initial assessment of any implicit allowance already contained in the BCT for the relevant expenditures, and re-tested the remaining amount for materiality using the criterion described above.

Where the remaining amount was material, the special cost factor claim was then tested against four further criteria to establish whether:

- there was persuasive evidence of a need for an adjustment to modelled allowances, as opposed to the claim reflecting no more than business as usual activities for a water company, and whether the programme of work was supported by a clear need case (for instance, a statutory driver or evidence of customer willingness to pay for new outcomes enabled by enhancement investment);
- the claim represented the most cost beneficial solution or (where the decision could not be reasonably be guided by cost benefit analysis) lowest cost option;
- there was persuasive evidence that costs were consistent with upper quartile efficiency; and
- adjusting the cost threshold would be consistent with protecting the interests of customers, a review carried out in conjunction with the work on outcomes discussed in the outcomes policy chapter. In particular, where we have made an allowance for substantial spending over and above that indicated by modelling, we have intervened where necessary such that outcome delivery incentives fully protect customers from the possibility of non-delivery by the company.

We assessed each claim against these criteria and determined whether they passed, partially passed or failed.

- **Claims accepted in full** – we accepted a net claim (that is, after adjusting for any implicit allowance in the BCT) in full where the first three criteria listed above, where relevant, were assessed as passed.

- **Claims where we gave a partial allowance** – typically, we made a partial allowance for a net material claim, where we had concerns that the costs proposed by the company did not reflect upper quartile efficiency.
- **Claims where we did not make an allowance** – we did not make any allowance where the evidence on one or more of the first three criteria was assessed as failed.

Taken together with the policy items, the adjustments outlined above translated the BCTs to draft determination thresholds. We summarise these in our wholesale cost assessment, ‘[Draft determination summary](#)’ and in the tables below.

Table A3.2 Draft determination water cost thresholds and gaps to business plan totex

	BCT (£m)	Policy items (£m)	Special cost factors (£m)	DD cost threshold (£m)	Business plan totex (£m)	Difference %
ANH	1,417	253	17	1,687	1,773	5.1%
WSH	1,091	127	18	1,236	1,240	0.3%
NES	1,198	155	1	1,354	1,362	0.6%
SVT ¹	2,251	300	243	2,794	2,930	4.9%
SWT	591	132	18	741	686	-7.4%
SRN	696	75	0	771	816	5.9%
TMS	3,483	316	-388 ²	3,411	3,249	-4.8%
UU	1,949	322	-11	2,261	2,478	9.6%
WSX	463	95	124	682	707	3.6%
YKY	1,370	238	-47 ³	1,561	1,487	-4.8%
AFW	1,015	90	-9	1,095	1,049	-4.3%
BRL	315	30	14	359	562	56.6%
DVW	73	7	12	92	103	12.2%
PRT	128	13	1	142	137	-3.4%
SBW	111	18	3	132	136	3.5%

	BCT (£m)	Policy items (£m)	Special cost factors (£m)	DD cost threshold (£m)	Business plan totex (£m)	Difference %
SEW	699	83	-8	774	810	4.7%
SSC	357	41	1	399	411	3.1%
SES	185	19	23	227	234	3.1%
Total	17,393	2,314	11	19,718	20,171	

Key:

ANH = Anglian Water; WSH = Dŵr Cymru; NES = Northumbrian Water; SVT = Severn Trent Water; SWT = South West Water; SRN = Southern Water; TMS = Thames Water; UU = United Utilities; WSX = Wessex Water; YKY = Yorkshire Water; AFW = Affinity Water; BRL = Bristol Water; DVW = Dee Valley Water; PRT = Portsmouth Water; SBW = Sembcorp Bournemouth Water; SEW = South East Water; SSC = South Staffordshire Water; SES = Sutton & East Surrey Water.

Note:

1. Includes allowance for the Birmingham resilience scheme.
2. Includes cap of £362 million.
3. Includes cap of £35 million.

Table A3.3 Draft determination for waste water cost thresholds and gaps to business plan totex

	BCT (£m)	Policy items (£m)	Special cost factors (£m)	DD cost threshold (£m)	Business plan totex (£m)	Difference %
ANH	2,196	179	179	2,553	2,518	-1.4%
WSH	1,211	59	101	1,370	1,329	-3.0%
NES	948	76	1	1,026	989	-3.6%
SVT	2,634	164	-7 ²	2,791	2,658	-4.8%
SWT	790	51	58	900	898	-0.2%
SRN	1,522	106	251	1,878	1,988	5.8%
TMS ¹	3,059	239	423	3,721	3,744	0.6%
UU	2,275	152	213	2,641	3,414	29.3%
WSX	890	67	103	1,059	1,131	6.8%
YKY	1,643	127	200	1,970	1,976	0.3%

	BCT (£m)	Policy items (£m)	Special cost factors (£m)	DD cost threshold (£m)	Business plan totex (£m)	Difference %
Total	17,167	1,219	1,522	19,909	20,644	

Note:

- 1 Excludes Thames Tideway Tunnel.
2. Includes cap of £209 million.

The two companies with the largest differences between their business plan forecasts of totex and our cost thresholds were Bristol Water (water) and United Utilities (wastewater). These companies (along with Thames Water in relation to Thames Tideway costs, which are outside of the scope of the analysis set out in this chapter) were given early notice of these large differences (on 6 August 2014) so that they would have greater time to respond to their formal draft determinations (which were made at the end of August 2014, with responses due by 3 October 2014). Given the very large size of the differences with Bristol Water it was allowed to submit further information after 3 October 2014, but we only took this into account to the extent it was practicable to do so given the timetable for producing final determinations on 12 December 2014. As explained in section A3.2.1 above, this was a particular issue in considering its modelling representations received on 7 November 2014.

A3.2.2.2 Issues raised by representations

There were relatively few representations relating to policy items. These were all of a company-specific nature and included:

- United Utilities suggesting that its allowance for PDRCs should be adjusted in both the water and wastewater controls to take account of a previous error by the company in relation to the accounting treatment of these costs; and
- Anglian Water suggesting we had not taken proper account of its revenues and costs associated with third party activities in its wholesale water control.

We received a large number of representations from companies on individual special cost factor claims. We deal with these (together with the company-specific representations on policy items) in the company-specific appendices to the final determinations. These claims encompassed:

- large capital schemes that may not be fully funded by the cost modelling – including from United Utilities (water) in relation to the Thirlmere link

enhancement programme and from Thames Water (wastewater) in relation to the Counters Creek sewer flooding programme;

- cost models not capturing specific regional factors impacting particular companies – including from Bristol Water in relation to water treatment complexity and United Utilities (wastewater) on regional factors and base costs; and
- cost models producing asymmetric results for individual companies – including Southern Water (water) in relation to the full totex model and South East Water in relation to the allowances for enhancement spending in the totex models.

There were also a number of other representations, including from the Consumer Council for Water (CCWater), the Environment Agency, customer challenge groups (CCGs) and Natural Resources Wales (NRW).

In general, CCWater supported the approach that we have taken in challenging the efficiency of companies' business plan costs, but expressed some reservations in relation to certain special cost factor claims that we had proposed to disallow (in particular, where these were linked to a specific schemes, such as Southern Water's wastewater Eastney Pumping Station scheme) or where gaps between our assessments for the draft determinations and the assessment and company business plan forecasts were very large.

The Environment Agency noted that there were some schemes where there were only partial allowed or no adjustments had been to cost thresholds, including:

- United Utilities' (water) Thirlmere Link West Cumbria water supply scheme;
- United Utilities' (wastewater) chemical and phosphorus trials and investigations;
- United Utilities' (wastewater) NEP5 schemes
- Bristol Water's (water) NEP schemes; and
- Anglian Water's (water) restoring sustainable abstraction and eel regulation programmes.

It stressed the importance of companies completing the schemes highlighted above.

Natural England made similar representations to the Environment Agency, in supporting:

- Bristol Water's NEP schemes;
- United Utilities' Thirlmere scheme;

- United Utilities' wastewater phosphorus reduction programmes; and
- Sembcorp Bournemouth Water's NEP, water efficiency and catchment management schemes.

CCGs provided a mix of representations. Some did not comment directly on wholesale costs; others re-affirmed support for company business plans and/or welcomed changes that companies made in their business plans in response to our challenges following the RBR.

NRW made representations in relation to Dee Valley Water, in particular setting out its support for a number of the activities contained in the company's business plan, including in relation to environmental, reservoir safety and mains replacement programmes.

A3.2.2.3 Our final determinations

We welcome representations made by all stakeholders on our assessment of wholesale costs in draft determinations, including in relation to specific schemes and programmes. We have considered all these representations in making these final determinations, but it is important to re-iterate certain key aspects of our approach to cost assessment. In particular, whether a special cost factor claim has been allowed or disallowed does not determine whether the company should proceed or not with the underlying programme of work. It only indicates whether we considered it appropriate to adjust the results of cost modelling for the special cost claim. We have assessed a number of special cost factor claims where the underlying programme of work appears reasonable, but it reflects activities that we consider have already been allowed for in our modelling. In these circumstances, while we will not have made an adjustment to the cost threshold (because we consider that the costs have been captured in our modelling and so are implicitly allowed for in our cost threshold), we would expect the company to proceed with the underlying activities. Further, while representations from stakeholders on the merits of individual schemes have been useful, such representations have not necessarily determined whether we have adjusted our cost thresholds for these schemes. In particular:

- as noted above, we may deem activities as already funded by cost modelling; and
- where this is not the case, and we have assessed the special cost claim in detail, we would usually expect it to be supported by robust evidence, including in relation to cost-benefit analysis.

For those companies with business plan forecasts of totex below or broadly consistent with our efficiency benchmarks then it has been clear since the publication of our RBR in April 2014 that their business plan forecasts are broadly consistent with our cost thresholds. These companies, including the enhanced companies of South West Water and Affinity Water, and others such as Dŵr Cymru and Northumbrian Water, have been able to get on with implementing their future plans.

Other companies, with substantial gaps between business plan forecasts and totex thresholds at the RBR have not had this certainty. In general, these companies have continued to make representations on special cost factor claims, and, some of these companies have also taken the opportunity to reconsider their business plans.

In order to ensure that our final cost thresholds represent efficient cost we have added an additional step to our process that has involved considering whether there was any other evidence that justified a change to the cost threshold, even if an associated special cost factor claim did not meet the established criteria. For instance, in relation to Bristol Water we have made an extra adjustment to correct for a low allowance for enhancement spending associated with the refined totex model, in addition to considering its representations.

For 5 out of the 28 wholesale price controls there have been significant changes between draft and final determinations in the gaps between cost thresholds and the revised business plan forecasts of totex. These changes reflect both changes in business plan forecasts of totex and changes in the cost thresholds resulting from the consideration of special cost factor claims. Those companies with larger changes (that is, those companies with gaps between the cost threshold and business plan that have reduced by more than five percentage points) include the following.

- United Utilities (water) – an addition to the cost threshold to reflect those costs of the Thirlmere link (which is designed to facilitate compliance with the Habitats Directive and Environment Agency requirements) to be incurred in the PR14 price control period.
- Dee Valley Water (water) – an increase in the company’s totex allowance to reflect the much better evidence provided by the company on the exceptional costs associated with rebuilding and refurbishing a number of service reservoirs.
- Bristol Water (water) – an increase in the company’s allowance for enhancement spending to take account of the relatively low enhancement

allowance deriving from one of the totex models, and an increase in its allowance for base spending for water treatment complexity. However, Bristol Water's revised business plan totex forecasts remain very significantly above the final determination cost threshold.

- Thames Water (wastewater) – an increase in the company's totex allowance for Counters Creek (after a significant downward adjustment to the company's estimate of costs to reflect the relative immaturity of these estimates). The Counters Creek programme is designed to reduce the incidence of sewer flooding in west London.
- United Utilities (wastewater) – the company has worked particularly hard to close the gap between its original business plan and our cost threshold, revising its business plan forecasts of totex and providing better information on its enhancement programme. The gap has closed because of reductions in totex made by the company in its representations on our draft determinations and allowances within our final determination cost threshold for its revised NEP5 schemes. There have also been additions to the allowances for defined benefit PDRCs (relating only to the period of PR14 price control and not compensating for any lower allowance made for 2010-15, to correct for a company error in relation to the accounting treatment of certain pension costs at the 2009 price review). Finally, there have been adjustments for certain elements of base spending relating wastewater capacity and sludge disposal costs.

It is now for companies to deliver on all their statutory obligations, maintain their assets in such a way as to provide sustainable serviceability where required, and provide a good level of service to their current and future customers (including delivering the outcomes that they have promised to their customers and are part of these final determinations). If a company views the package of measures in its final determination, including the total allowed revenue, uncertainty mechanisms and protections within the appointee licence as insufficient to discharge these important obligations, then it should seek a reference to the Competition and Markets Authority (CMA), which will look again at all elements of its price controls.

Further, companies should not expect future price control allowances to fund them for the consequences of any shortcomings in their approach to serviceability or any other aspect of their regulated activities over the period 2015-20, or for any material errors or omissions from their PR14 business plans.

We summarise the basic cost thresholds, policy additions and allowances for special cost factor claims that support these final determinations in the tables below.

Table A3.4 Final determinations for water cost thresholds and gaps to business plan totex

	BCT (£m)	Policy items (£m)	Special cost factors (£m)	FD cost threshold (£m)	Business plan totex (£m)	Difference %
ANH	1,417	268	34	1,719	1,773	3.1%
WSH	1,091	127	18	1,236	1,240	0.3%
NES	1,198	154	1	1,353	1,362	0.7%
SVT	2,251	300	291	2,843	2,930	3.1%
SWT	591	132	18	741	684	-7.7%
SRN	696	75	-2	769	816	6.1%
TMS	3,483	316	-388 ¹	3,411	3,249	-4.8%
UU	1,949	338	107	2,395	2,404	0.4%
WSX	463	95	124	682	707	3.6%
YKY	1,370	238	-47	1,560	1,487	-4.7%
AFW	1,015	86	-9	1,091	1,034	-5.3%
BRL	315	30	64	409	541	32.2%
DVW	73	7	19	99	103	3.8%
PRT	128	13	1	142	137	-3.4%
SBW	111	18	4	133	134	1.2%
SEW	699	83	4	785	810	3.1%
SSC	357	41	1	399	411	3.1%
SES	185	19	23	227	234	3.1%
Total	17,393	2,340	263	19,996	20,057	

Note:

1. Includes cap of £343 million.

Table A3.5 Final determinations for wastewater cost thresholds and gaps to business plan totex

	BCT (£m)	Policy items (£m)	Special cost factors (£m)	FD cost threshold (£m)	Business plan totex (£m)	Difference %
ANH	2,196	179	185	2,559	2,518	-1.6%
WSH	1,211	59	101	1,370	1,329	-3.0%
NES	948	75	3	1,026	1,011	-1.5%
SVT	2,634	164	-7 ¹	2,791	2,658	-4.8%
SWT	790	51	54	895	898	0.3%
SRN	1,522	106	262	1,890	1,929	2.1%
TMS ²	3,059	239	526	3,824	3,757	-1.7%
UU	2,275	167	491	2,933	3,112	6.1%
WSX	890	66	142	1,099	1,131	2.9%
YKY	1,643	127	201	1,971	1,976	0.3%
Total	17,167	1,234	1,957	20,358	20,319	

Note:

1. Includes cap of £201 million
2. Excludes Thames Tideway Tunnel.

A3.2.3 Cost thresholds that are significantly higher than companies plans

In this section, we discuss our approach to adjusting our cost thresholds when these thresholds are significantly above revised business plan forecasts.

A3.2.3.1 Our draft determinations: enhanced companies

In the enhanced draft determinations technical appendix, we stated that:

“...where the expenditure within companies’ business plans is below our cost thresholds we need to consider whether the threshold is an appropriate

baseline for setting prices. This approach will help to ensure that customers' interests are protected."

For the enhanced companies, South West Water and Affinity Water, we adapted our initial cost threshold in our draft determinations. We did this by substituting the companies' forecasts of their explanatory variables in our calculations of the BCT. For these two companies, we had relatively high confidence that the cost driver projections were aligned with the companies' delivery commitments to customers. This reduced the level of South West Water's wholesale water cost threshold and in its final determination it is about 8% above business plan forecast totex, as it was in its draft determination. For Affinity Water, the cost threshold remains at about 5% above the business plan forecast of totex.

A3.2.3.2 Our draft determinations: other companies

There were three other (non-enhanced) companies where the cost thresholds were significantly above revised business plan forecasts of totex at draft determinations. These were:

- Thames Water (wholesale water);
- Yorkshire Water (wholesale water); and
- Severn Trent Water (wholesale wastewater).

While we have sought to ensure that our cost modelling is as robust as practicable it is part of a process of engagement with the companies on projections of their total wholesale expenditures. We were concerned that information asymmetries could lead to customer detriment if we placed too much reliance on our models when these imply higher costs than the companies' forecasts. In particular if Ofwat's modelling underestimates costs, companies may be expected to seek to correct any issues with the modelling. However, the position is likely to be different if Ofwat overestimates a company's costs, in which case the company may not actively seek to correct any modelling issues. In these circumstances there is a risk that some of the difference between the final determination cost threshold and the company's business plan is due to the models over-estimating the required totex. We considered a range of options and decided that we should 'cap' the difference between company projections and our assessment at 5% above the companies' revised business plan projections. The considerations underlying this decision included:

- the impact of the approaches adopted for the two enhanced companies and the two early draft determinations and viewing these as potential boundaries to what could be allowed (an upper bound of 8% and a lower bound of 4%);
- the need for a consistent approach across companies (but reflecting the special status of enhanced companies, where it is important to retain a higher cap to reflect the benefit of having achieved enhanced status in line with our approach in the RBR);
- providing a strong protection for customers that they would not be paying significantly more for services than a company estimated it would cost to provide them;
- the difference between the upper quartile and average efficiency levels;
- specific modelling impacts, such as the impact of historical enhancement spending on the level of the cost threshold for Thames Water, which, our analysis suggested could have influenced the modelling results underpinning our calculated cost threshold; and
- the importance of recognising that the companies' business plan forecasts suggest real efforts on the part of those companies to secure efficiencies over and beyond those expected by Ofwat.

A3.2.3.3 Issues raised by representations

Thames Water made representations suggesting that the approach to capping that we used in the draft determinations could significantly distort regulatory incentives in the longer term and might therefore not be in the interests of customers. The analysis that Thames Water presented in relation to these matters was supported by a report by FTI Consulting. Thames Water suggested two alternative approaches to capping, both of which would reduce the financial impact on Thames Water but increase costs to its customers over the period of the next wholesale price controls.

Neither Severn Trent Water or Yorkshire Water focused on capping in their responses to the draft determinations.

A3.2.3.4 Our final determinations

We remain of the view that the factors we considered for our draft determinations are important considerations in deciding whether it is appropriate to cap our calculated cost thresholds when they are significantly above business plan forecasts of totex. In particular we have significant concerns about the asymmetry of information and incentives in resolving modelling anomalies where a cost threshold is significantly above a company's forecast of totex

However, we accept that there may be some merit in Thames Water's representations that using such caps could have the potential to distort the incentives on preparing business plan forecasts at future price control reviews. This would be particularly true if the risks of capping distorted forecasts of totex, and in turn these distorted forecasts were to influence regulatory decisions on cost thresholds. While it is not clear that this would be the case, there remain potential difficulties with the use of caps in the medium and longer term. We will remain mindful of this in deciding on our approach to future price reviews.

Given the strong arguments in favour of customer protection, we intend to retain the caps on Severn Trent Water (wastewater) and Thames Water (water) elements for this price control review by capping the cost threshold/menu baseline at no more than 5% of the totex threshold.

As noted in section A3.2.1 we have made adjustments to the modelling when changes in final water resources management plans would cause material changes to the cost thresholds. The implications for Yorkshire Water are that our calculated water cost threshold has reduced and so the approach to capping developed for the draft determinations would not now have a material impact on its allowed costs.

A3.2.4 Costs excluded from the menu baseline

A3.2.4.1 Our draft determinations

The draft determination menu baselines excluded those costs and allowances where cost sharing incentives would not be appropriate. These were:

- defined benefit PDRCs (because cost sharing would undermine the approach to the regulation of these costs set out in October 2013 in IN 13/17);
- third party costs (where any variance in costs should be broadly matched by variances in third party revenue, which is outside the scope of the price control); and
- the 2014-15 allowance for the development of the new retail market arrangements as set out in '[Consultation on Ofwat's section 13 proposal to modify the licences of appointees in England and Wales – condition R1](#)'.

However, these costs are funded by being allowed for in the overall price control baseline (while not being subject to cost sharing and net of expected third party revenues from the services giving rise to the costs concerned). The allowances were phased as follows.

- PDRCs were phased equally in each year.
- Third party costs were phased in the same way as companies' business plan view of the corresponding third party income.
- Our estimate of 2014-15 costs for the development of the new retail market arrangements were added onto 2015-16 costs.

A3.2.4.2 Issues raised by representations

There were no issues raised on the allocation of items between menu and price control baselines in response to draft determinations.

A3.2.4.3 Our final determinations

We have retained the approach adopted in draft determinations in relation to these matters.

In addition, in determining final menu reconciliations during the 2015-20 period, it will be appropriate to consider whether any special treatment should be given to business plan forecasts of transition costs (which are explained in the reconciling 2010-15 performance policy chapter). Consistent with the guidance contained in our final methodology statement, these costs will have actually been incurred in 2014-15 but reflected in business plans as 2015-16 costs. Without an adjustment to the allowed costs in the menu, there would be a danger that the operation of the menu might penalise companies with transition programmes.

A3.2.5 Menus

Our final methodology statement explained that menu regulation can provide extra incentives for companies to reveal information, allows for some extra flexibility in setting totex baselines and cost sharing factors and allows companies to better manage risks and rewards (consistent with a relatively low risk business and lower financing costs, which benefit customers).

A3.2.5.1 Our draft determinations

The draft totex menus were published as follows:

- enhanced companies' menus were published in section A2.6 of the enhanced draft determinations technical appendix in April; and

- menus for other (non-enhanced companies) were published with the May and August draft determinations.

The menus for enhanced companies were different to those for other companies in two respects.

- Enhanced menus embodied greater cost sharing so these companies would retain a higher share of any cost outperformance in respect of efficiency gains.
- The enhanced menus also included a narrower range of choices reflecting our greater confidence in enhanced plans. We limited the range of the enhanced menu to choices within 80 to 115. A menu choice of 80 means that the company's expenditure choice is 20% lower than our estimate of efficient baseline costs and a menu choice of 115 means that the company's expenditure choice is 15% higher than our menu cost baseline. Other (that is, non-enhanced) menus limited the range of the menu to choices within 80 to 130. We considered that the menu ranges allow genuine choices, but within plausible bounds.

In our draft determinations, we set allowed revenues on the basis of the implied menu choices, based on the ratio of the revised business plan forecasts of totex and the cost thresholds (as adjusted to form the menu baseline). In the case of Bristol Water, because of the large difference between the cost threshold and business plan forecasts of totex and the limits on the range for menu choices, its menu choice was constrained to 130.

We confirmed that each company would have the opportunity to finalise its own menu choice after we published our final determinations in December 2014. We published an information notice (IN 14/15) on this process of making menu choices in September 2014. This stated that companies would be required to make menu choices by 16 January 2015, when companies also submitted their 2015-16 charges to us for approval.

We also noted that menu choices (even extreme ones) are likely to have a relatively small impact on allowed revenue and customer bills in the period from 2015-20 due to the offsetting effects of the allowed expenditure and the menu's 'additional income'. We therefore stated that any adjustment to companies' allowed revenues resulting from their menu choice arising from our PR14 decisions will be made as part of the price control review in 2019 (PR19).

We noted that the final determinations will take account of the implied menu choice based on the ratio of a company’s proposed expenditure, as submitted in its business plan (adjusted for representations to our draft determinations where appropriate) and our own menu cost baseline set out in the final determinations.

A3.2.5.2 Issues raised by representations

We received no substantial comments on menus in response to the draft determinations.

A3.2.5.3 Our final determinations

We confirm the proposed approach to menu regulation as set out in our draft determinations and our approach to menu choices set out in IN 14/15. The table below reproduces the draft menu for enhanced companies from the draft determinations and we confirm that this is the menu that will be used with these final determinations for enhanced companies.

Table A3.6 Final menu for enhanced companies

Company menu choice	80	85	90	95	100	105	110	115
Cost sharing rate	59%	58%	57%	56%	55%	54%	53%	52%
Allowed expenditure	95.00	96.25	97.50	98.75	100.00	101.25	102.50	103.75
Additional income	2.55	1.95	1.33	0.68	0.00	-0.70	-1.43	-2.18
Actual expenditure	Reward/penalty							
70	17.3	17.2	17.0	16.8	16.5	16.2	15.8	15.4
80	11.4	11.4	11.3	11.2	11.0	10.8	10.5	10.2
85	8.5	8.5	8.5	8.4	8.3	8.1	7.9	7.6
90	5.5	5.6	5.6	5.6	5.5	5.4	5.2	5.0
95	2.6	2.7	2.8	2.8	2.8	2.7	2.6	2.4
100	-0.4	-0.2	-0.1	0.0	0.0	0.0	-0.1	-0.2
105	-3.4	-3.1	-3.0	-2.8	-2.8	-2.7	-2.8	-2.8

Company menu choice	80	85	90	95	100	105	110	115
110	-6.3	-6.0	-5.8	-5.6	-5.5	-5.4	-5.4	-5.4
115	-9.3	-8.9	-8.7	-8.4	-8.3	-8.1	-8.1	-8.0
120	-12.2	-11.8	-11.5	-11.2	-11.0	-10.8	-10.7	-10.6
125	-15.2	-14.7	-14.4	-14.0	-13.8	-13.5	-13.4	-13.2
130	-18.1	-17.6	-17.2	-16.8	-16.5	-16.2	-16.0	-15.8
140	-24.0	-23.4	-22.9	-22.4	-22.0	-21.6	-21.3	-21.0

Note:

All figures, except for the cost sharing rate represent percentages of the company's relevant menu baseline expenditure amount. Cells highlighted in blue represent the maximum reward that can be obtained for a given level of actual relevant expenditure.

The table below reproduces the draft menu for non-enhanced companies from the draft determinations and we confirm that this is the menu that will be used with these final determinations for these companies.

Table A3.7 Final menu for non-enhanced companies

Company menu choice	80	85	90	95	100	105	110	115	120	125	130
Cost sharing rate	54%	53%	52%	51%	50%	49%	48%	47%	46%	45%	44%
Allowed expenditure	95.00	96.25	97.50	98.75	100.00	101.25	102.50	103.75	105.00	106.25	107.50
Additional income	2.30	1.76	1.20	0.61	0.00	-0.64	-1.30	-1.99	-2.70	-3.44	-4.20
Actual expenditure	Reward/penalty										
70	15.8	15.7	15.5	15.3	15.0	14.7	14.3	13.9	13.4	12.9	12.3
80	10.4	10.4	10.3	10.2	10.0	9.8	9.5	9.2	8.8	8.4	7.9
85	7.7	7.7	7.7	7.6	7.5	7.3	7.1	6.8	6.5	6.1	5.7
90	5.0	5.1	5.1	5.1	5.0	4.9	4.7	4.5	4.2	3.9	3.5
95	2.3	2.4	2.5	2.5	2.5	2.4	2.3	2.1	1.9	1.6	1.3

Company menu choice	80	85	90	95	100	105	110	115	120	125	130
100	-0.4	-0.2	-0.1	0.0	0.0	0.0	-0.1	-0.2	-0.4	-0.6	-0.9
105	-3.1	-2.9	-2.7	-2.6	-2.5	-2.5	-2.5	-2.6	-2.7	-2.9	-3.1
110	-5.8	-5.5	-5.3	-5.1	-5.0	-4.9	-4.9	-4.9	-5.0	-5.1	-5.3
115	-8.5	-8.2	-7.9	-7.7	-7.5	-7.4	-7.3	-7.3	-7.3	-7.4	-7.5
120	-11.2	-10.8	-10.5	-10.2	-10.0	-9.8	-9.7	-9.6	-9.6	-9.6	-9.7
125	-13.9	-13.5	-13.1	-12.8	-12.5	-12.3	-12.1	-12.0	-11.9	-11.9	-11.9
130	-16.6	-16.1	-15.7	-15.3	-15.0	-14.7	-14.5	-14.3	-14.2	-14.1	-14.1
140	-22.0	-21.4	-20.9	-20.4	-20.0	-19.6	-19.3	-19.0	-18.8	-18.6	-18.5

Note:

All figures, except for the cost sharing rate represent percentages of the company's relevant menu baseline expenditure amount. Cells highlighted in blue represent the maximum reward that can be obtained for a given level of actual relevant expenditure.

The implied menu choices for each company at final determination are shown in the company specific appendices. In general we have retained the approach adopted in draft determinations and so have set implied menu choices based on the ratio of the revised business plan forecasts of totex and the cost thresholds (as adjusted to form the menu baseline). Where we have capped cost thresholds then we have taken this lower threshold into account in determining the implied menu choice (consistent with our approach at draft determinations) and so the implied menu choice for these companies will be 5% below the capped threshold.

A3.3. Estimating other elements of price control revenue

In this section, we set out our approach to estimating the following elements of revenue.

- Income from other sources – income taken into account in setting price controls, but not part of the revenue subject to price controls.
- Income from connection charges – capital contributions that are included in the allowed revenue totals which are subject to the price control.

Other allowed expenditure elements not included in this section are:

- allowances for return on the RCV – see the risk and reward policy chapter;
- allowances for corporation tax – see the risk and reward policy chapter; and
- adjustments to allowed future revenues and RCV associated with reconciling 2010-15 performance – see the reconciling 2010-15 performance policy chapter.

A3.3.1 Income from other sources

Income from other sources does not form part of wholesale allowed revenue subject to annual limits, and does not form part of the regular water and wastewater bills that customers pay. However, estimates of the amount of income from other sources over the next price control period are included within the financial model, and have the effect of reducing the amount of allowed revenue subject to the annual price controls that is required from customers and consequently the affected customer bills.

A3.3.1.1 Our draft determinations

In our draft determinations we explained that income from other sources, as set out in [Regulatory accounting guideline 4.04 – Guideline for the definitions for the regulatory accounts tables](#), comprises:

- operating income – for example, current cost profit or loss on disposal of fixed assets and income from exceptional items;
- other income – for example, rental income and income from investments; and
- third party income – for example, non-potable water.

We stated that future revenue from land sales was not included within income from other sources because this would be adjusted through the RCV at the next price review under existing licence arrangements.

We explained that unless otherwise stated in the company-specific appendix, these estimates of income from other sources were based on the company's revised business plan forecasts, which were consistent with recent trends.

A3.3.1.2 Issues raised by representations

We received one representation on this subject in response to our draft determinations. Anglian Water considered that there was a mismatch between the treatment in its business plan of the projected revenue arising from the supply of non-potable water, and the method we used to calculate the costs associated with third party income, which are added to the basic cost threshold. It suggested that the effect of the mismatch was to cause our projected level of third party costs to be too low in relation to its projected level of third party income.

A3.3.1.3 Our final determinations

We have retained the broad approach set out at draft determinations.

While not changing our projections of third party income, we have accepted Anglian Water's contention and increased our projection of its third party costs by £15 million over the next price control period so that it better aligns with its business plan projections of third party income.

A3.3.2 Income from connection charges

For the first time, income from connection and infrastructure charges will be included within the total wholesale allowed revenue subject to annual limits for the next price control period. This is because changes made by the Government in the Water Act 2014 could mean that the balance between connection and infrastructure charges, and other wholesale charges could change within the next price control period. Therefore, including revenue from connection and infrastructure charges within the new total wholesale revenue control should protect customers and provide greater stability to total bill revenues collected over the period of the new price controls.

A3.3.2.1 Our draft determinations

In our draft determinations we explained that this category of income comprised capital contributions from connection charges and revenue from infrastructure charges – typically from developers of new properties and made in relation to new connections.

Unless otherwise stated in the company-specific appendix to our draft determinations, we used company business plan forecasts as the basis of expected receipts from these sources in our draft determinations.

A3.3.2.2 Issues raised by representations

We received one representation in response to our draft determinations on this subject.

South East Water identified that it had made an error in preparing its revised business plan in June 2014, which had the effect of understating its future level of expected income from connection and infrastructure charges by around £18 million over the next price control period. It stated that this did not affect the level of net totex in its plan, rather that it had understated both the level of gross capex and also the receipts from capital contributions, which offset each other.

A3.3.2.3 Our final determinations

We have retained the approach adopted at draft determinations, but updated our financial modelling to correct for South East Water's error.

We also reiterate what we said in our final methodology statement about connection charges:

“If a company increased revenue by unduly reducing connection charges we may take corrective action to ensure that companies returned these monies (with financing costs) to customers. Similarly, although we have decided not to allow automatic adjustments to allowed revenues for demand variations in wholesale controls, if demand for connections is unexpectedly high then we would nevertheless consider allowing extra revenue to compensate for the loss of price control revenue on a case-by-case basis.”

Annex 1: Re-estimating cost models

Part A: Changes to models and cost thresholds (using outturn data for 2013-14 and updated forecasts for 2014-15)

AA1.1 Introduction

In June 2014, we asked all companies to submit 2013-14 outturn data, and an updated forecast for the corresponding 2014-15 data, for a sub-set of the variables used in our wholesale cost assessment models. These models were based on available actual data collected up to 2012-13 for the purposes of our RBR and draft determinations. In our draft determinations, we said that in preparing final determinations, we would consider issues that the new data raised, including whether the underlying cost models should be updated to take account of this new information.

In this annex, we:

- set out the approach we followed to considering the new data and the results of re-estimating our models; and
- explain our consequential decision not carry out a general update of the wholesale water and wastewater cost models for these final determinations.

We were assisted by and advised by Cambridge Economic Policy Associates (CEPA) and our academic adviser, Dr Andrew Smith on the work associated with re-estimating cost models.

AA1.2 Our approach

In re-estimating our cost thresholds to explore the impacts of the new data, we adopted a proportionate approach and focused on only a sub-set of our models. We selected these with consideration to the:

- proportionality of the data request;
- materiality of the costs covered by the models; and
- information on model robustness.

For the wholesale water service, we requested data to enable us to update all the econometric models except the ‘full’ totex model. We considered that obtaining from companies the full cost driver data set required to update this fully specified totex model would not be proportionate – in particular, given our earlier testing demonstrated that this model was relatively stable to changes in a particular year’s data compared with the other models.

We also requested data to re-estimate the supply-demand unit cost model in wholesale water, which is relatively material and where companies had been finalising their water resources management plan assumptions when our original data were collected in August 2013.

In the wholesale wastewater service, we requested data to update all the econometric models plus the most material four (of 12) unit cost enhancement models. The table below lists the models that we have re-estimated.

Table AA1.1 Wholesale cost models re-estimated using 2013-14 out-turns and updated 2014-15 forecasts (where applicable)

Service	Model type*	Model name
Water	Econometric (OLS and RE)	Base cost
Water	Econometric (OLS and RE)	Refined totex
Water	Unit cost	Supply demand balance
Wastewater	Econometric (OLS and RE)	Base cost
Wastewater	Econometric (RE)	Network cost
Wastewater	Econometric (OLS and RE)	Treatment cost
Wastewater	Unit cost	Private sewers
Wastewater	Unit cost	Storage
Wastewater	Unit cost	Sewer flooding
Wastewater	Unit cost	Sludge

Note:

* OLS and RE refer to the estimation technique of the econometric model's coefficients. OLS denote ordinary least squares and RE denotes random effects. See CEPA (2014)⁵

In considering the impact of the new data on our cost assessment models, we limited our scope to examining the impact on our existing set of models. That is, we did not consider the use of alternative functional forms, cost drivers or estimation techniques. Such broader considerations would not be practicable given the relatively lengthy process necessary to make robust decisions on model selection.

In addition to re-estimating the models' coefficients with the new data, we have also calculated the revised upper quartile efficiency factor and updated our forecasts of the exogenous variables. We have updated only those forecasts of exogenous variables which were not based on companies' water resources management plans, by incorporating 2013-14 in to the historical average or trend. Consistent with our approach in draft determinations, we did not update the business plan forecasts of the exogenous variables for enhanced companies in the water service, or for variables where we adopted modified forecasts in response to special cost factor claims.

The re-estimated coefficients, alongside the revised upper quartile factor and updated forecast of exogenous variables, enabled us to re-estimate basic cost thresholds. As noted previously, we use the basic cost threshold to derive our view of efficient expenditure for the period from 2015 to 2020, before policy and special cost factor claims adjustments.

AA1.2.1 Extended versus shifted approach

Our econometric models are based on historical data. For our draft determinations, we used a five-year panel in wholesale water, from 2007-08 to 2012-13, and a seven-year panel in wastewater, from 2005-06 to 2012-13.

We tested two alternative approaches to incorporate the out-turn data for 2013-14 into the historical data set.

⁵ 'Ofwat cost assessment – advanced econometric models' by CEPA. This report is appendix B to the report titled 'Basic cost threshold models' published 30 April 2014 by Ofwat.
http://www.ofwat.gov.uk/pricereview/pr14/pap_tec1402feederbasiccostappb.pdf

- **The extended approach:** the data used is extended by one year, 2013-14. In water this means that the data is extended from five to six years and in wastewater from seven to eight years.
- **The shifted approach:** the data set used retains its size, but the oldest year in the dataset is replaced with the new data from 2013-14.

The extended approach has the advantage that it uses a longer time series of data, but the shifted approach puts greater weight on more recent data. Therefore, it presents a useful sensitivity check on the extended approach.

Part B of this annex reports the estimated coefficients under both approaches for the re-estimated econometric models.

The question of using the extended or shifted approach was not relevant for all but one of the five unit cost models that we have re-estimated: the sewer flooding model is based on actual data from 2008-09 to 2012-13, and we have re-estimated it by adding an extra year of actuals (2013-14).

For the other unit cost models that we have re-estimated, three⁶ were based on data for the period from 2010-11 to 2014-15, which we updated with the new 2013-14 actual and 2014-15 reforecast data; and one – the private sewers model – was based on only one year of data, which we were able to extend to two years with the additional actual year 2013-14.

AA1.3 The impact of the new data on our cost thresholds

AA1.3.1 Wholesale water

Table AA1.2 shows the impact of the new data on our draft determination basic cost thresholds (BCTs) for wholesale water.

Under the extended approach the BCT increases slightly in about half of the cases and decreases slightly in the other half of cases. The maximum increase is 2.2% (United Utilities) and the maximum decrease is 4% (Dŵr Cymru).

⁶ The three unit cost models are: W1 Enhancements to the supply and demand balance, S2 Sludge enhancements and S4 Storage at intermittent discharge.

Under the shifted approach all cost thresholds decrease by up to 6.6% (Sembcorp Bournemouth Water). At an industry level, including the new data reduces the cost threshold under both approaches.

Table AA1.2 Basic cost thresholds for wholesale water (£ million, totals for 2015-16 to 2019-20, 2012-13 prices)

Company	Draft determination	Extended approach	Shifted approach
Anglian	1417	1421 (0.3%)	1370 (-3.3%)
Dŵr Cymru	1091	1048 (-4%)	1025 (-6%)
Northumbrian	1198	1214 (1.3%)	1176 (-1.8%)
Severn Trent	2251	2202 (-2.2%)	2117 (-6%)
South West	591	600 (1.5%)	579 (-2.1%)
Southern	696	709 (1.9%)	685 (-1.5%)
Thames	3483	3419 (-1.8%)	3292 (-5.5%)
United Utilities	1949	1991 (2.2%)	1923 (-1.4%)
Wessex	463	457 (-1.3%)	441 (-4.8%)
Yorkshire	1370	1369 (-0.1%)	1323 (-3.4%)
Affinity	1015	1028 (1.3%)	992 (-2.3%)
Bristol	315	310 (-1.6%)	302 (-4.4%)
Dee Valley	73	72 (-1%)	69 (-6%)
Portsmouth	128	129 (0.6%)	125 (-2.8%)
Sembcorp Bournemouth	111	109 (-1.7%)	103 (-6.6%)
South East	699	702 (0.4%)	672 (-3.9%)
South Staffordshire	357	357 (0%)	347 (-2.6%)
Sutton & East Surrey	185	186 (+0.6%)	179 (-3.6%)
Total	17393	17325 (-0.4%)	16719 (-3.9%)

AA1.3.2 Wholesale wastewater

Table AA1.3 shows the impact of the new data on our draft determination BCTs for wholesale wastewater. Relative to wholesale water, the impact in wastewater tends to be larger, but the direction of the impact is sensitive to the approach. Under the extended approach the BCTs increase for all companies, with a maximum increase of 5.6% (Northumbrian Water and Wessex Water), while under the shifted approach, the BCTs reduce for all companies, with a maximum reduction of 4% (Severn Trent Water). At an industry level, including the new data increases the cost threshold by 3.3% under the extended approach and reduces it by 2.5% under the shifted approach.

Table AA1.3 Basic cost thresholds for wholesale wastewater (£ million, totals for 2015-16 to 2019-20, 2012-13 prices)

	Draft determination	Extended approach	Shifted approach
Anglian	2196	2257 (2.8%)	2129 (-3%)
Dŵr Cymru	1211	1239 (2.3%)	1184 (-2.2%)
Northumbrian	948	1002 (5.6%)	944 (-0.4%)
Severn Trent	2634	2667 (1.3%)	2528 (-4%)
South West	790	820 (3.8%)	769 (-2.6%)
Southern	1522	1577 (3.7%)	1497 (-1.6%)
Thames	3059	3161 (3.3%)	2965 (-3.1%)
United Utilities	2275	2374 (4.4%)	2251 (-1.1%)
Wessex	890	940 (5.6%)	878 (-1.4%)
Yorkshire	1643	1695 (3.2%)	1594 (-3%)
Total	17,167	17,732 (3.3%)	16,740 (-2.5%)

AA1.4 The impact of the new data on the unit cost models

AA1.4.1 The private sewers model

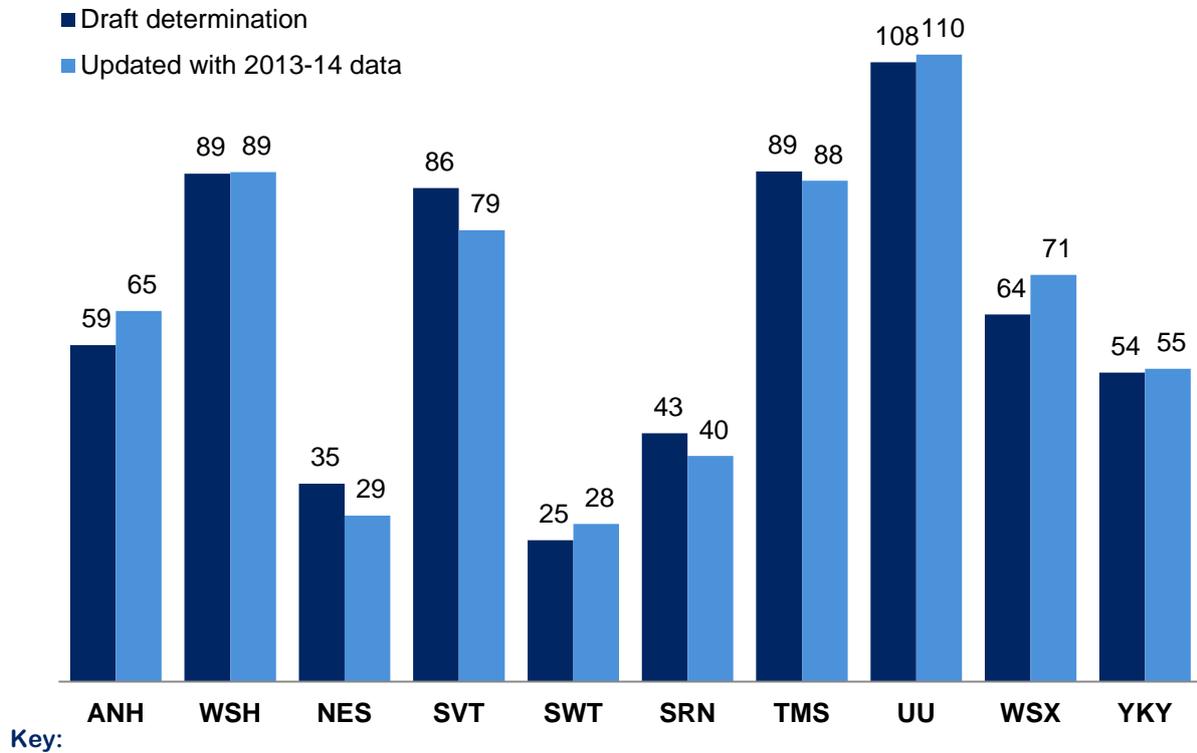
Our models are generally based on five years of data or more. The private sewers model, however, was based on a single year of data due to the fact that private sewers transferred to company ownership only in October 2011⁷. As such, an additional year of outturn data is relatively more important for the robustness and accuracy of the private sewers model than for other models.

In addition to the effect of the new data, we have also found an error in the application of this model in preparing our draft determination proposals. The error relates to the fact that this model uses only one year of data. In the linear and log regression forms of the model we did not multiply the intercept – which is an estimate of annual fixed costs – by 5⁸. Correcting this error and updating the model with the new data tend to offset each other. At the industry level, the net impact is essentially zero (£653 million in total under both approaches). At the company level, as shown in the figure below, the net impact is relatively small (always below £8 million). For ease of implementation, we have made the required adjustments through feeder model 11 using a new deep dive sheet.

⁷ The model's forecast drivers were based on 18 months of data.

⁸ That is, in the linear regression case we have calculated the forecast as $y=a+b*(5x)$ rather than $y=5*(a+bx)$ (where x and y are the forecast expenditure and driver for the 2015-20 period respectively, and a and b are the estimated intercept and slope respectively). If we were to use two years of data in this model's estimation the forecast is $y=2.5*(a+bx)$.

Figure AA1.1 Private sewers model – cost allowance by company (£ million, 2015-16 to 2019-20 totals, adjusted for the upper quartile, 2012-13 prices)



ANH = Anglian Water; WSH = Dŵr Cymru; NES = Northumbrian Water; SVT = Severn Trent Water; SWT = South West Water; SRN = Southern Water; TMS = Thames Water; UU = United Utilities; WSX = Wessex Water; YKY = Yorkshire Water.

AA1.4.2 Other unit cost models

For the sludge enhancement and sewer flooding unit cost models in wastewater we found very little impact on our current results and a small deterioration in the models' diagnostics when using the new data (that is, lower R-squared and higher mean squared error). We considered that the new data showed that the original models were fit for purpose and decided to retain them unaltered.

With respect to the storage schemes model in wastewater, at draft determination we noted that this model was heavily skewed by one company with relatively expensive storage schemes. This, in turn, pushed the estimated unit cost upward and resulted in model forecasts above companies' forecast for all other companies. With the incorporation of the new data this problem was even more pronounced, hence we decided to retain the draft determination model.

In relation to the supply-demand balance model for the wholesale water service, we found that updating the model resulted in an increase of about 22% in total estimated

cost allowances (for this activity alone, before triangulation) across the industry. However, on further investigation we found that this arose from a mismatch between expenditure and volume in the new data (the costs of an expensive scheme were largely included in the data but its delivery had been delayed), which in turn resulted in an increase in the model's estimated unit cost. As a consequence we did not consider that using the new data, which reflected this mismatch, would improve the model or would better reflect underlying unit costs over the longer term. When we updated the model and also corrected for the mismatch, its forecasts were very close to our draft determination forecasts.

AA1.5 Our decision

We have decided not to update our wholesale water and wastewater cost models with the newly available outturn data for 2013-14, but to retain our original cost model specifications and data for these final determinations. The only exception is the private sewers unit cost model in wastewater, which we have decided to update. The impact of updating the private sewers model on our cost baselines is small, with a maximum impact of -£7.4 million for Severn Trent Water (the maximum impact in percentage terms out of the basic cost threshold is for Wessex Water at +0.8%).

Our decision is based on the following main factors.

1. The relatively modest impact of the new data on our cost models suggests that our existing modelling suite is reasonably robust, and we found no significant advantages in introducing wide ranging changes to our cost thresholds on the basis of the model re-runs. In particular our benchmarking assessment was complemented by provision for companies to submit special cost factor claims where they considered that our models did not fully reflect their efficient costs. Companies submitted such claims and made their representations in reference to our draft determination models and cost thresholds. We therefore consider that without compelling evidence that the new data improves our modelling forecasts it would not be appropriate to adopt new models.
2. Both in water and wastewater the results, in terms of cost thresholds, were sensitive to the way the new data is added to our models. Specifically, when we added the new data to our existing dataset (the extended approach) cost thresholds have not moved much in water and increase in wastewater, but when we used the new data to 'refresh' our dataset (the shifted approach) cost thresholds tended to decrease in both water and

wastewater. In the majority of cases our current cost thresholds lie in between the results of the extended and the shifted approach.

3. We considered that the assurance of the new data and the re-estimation results, given the timescale, were more limited than those we had previously adopted and that these factors militated against changing models in the absence of compelling evidence to do so. Likewise, while the econometric models remained relatively stable with the addition of the new data, some movements in specific coefficients (see Part B below) warranted a more thorough investigation, without which we considered would not be prudent to adopt models based on the new data.

Part B: The impact of the new data on our econometric models

The tables below summarise the results of the two approaches (extended panel and shifted panel) relative to our draft determination results for water and wastewater.

Table AA1.4 The impact of using 2013-14 data on our econometric models' industry total expenditure forecasts – wholesale water (£ million, 2015-16 to 2019-20 totals not adjusted for the upper quartile, 2012-13 prices)

Water models	Draft determination	Extended approach	Shifted approach
Base cost	14860	15039 (+1.2%)	14583 (-1.9%)
Refined totex	18651	19062 (+2.2%)	17923 (-3.9%)

Table AA1.5 The impact of using 2013-14 data on our econometric models' industry total expenditure projections – wholesale wastewater (£ million, 2015-16 to 2019-20 totals not adjusted for the upper quartile, 2012-13 prices)

Wastewater models	Draft determination	Extended approach	Shifted approach
Base cost	14695	14359 (-2.3%)	14359 (-2.3%)
Network cost	5075	5180 (+2.1%)	4945 (-2.6%)
Treatment cost	9525	9057 (-4.9%)	8518 (-10.6%)

At an industry level, we observe some sensitivity to which of the two approaches to panel specification are used with the new data. For the wholesale water models and the network model in wastewater, forecast costs increase under the extended approach and decrease under the shifted approach, with our draft determination projections roughly in the middle of the two. On the other hand, the treatment model in wastewater shows a decline in forecast expenditure under both approaches, but in particular under the shifted approach.

We have also assessed the performance of the econometric models in terms of predictions, diagnostics and the impact on the mean estimate and statistical significance of the coefficients. In general, we found that the wastewater models are more affected by the alteration of data than the water models, but that the models remain relatively stable and perform reasonably well.

In terms of movements in coefficients, the coefficients under the extended approach moved less than under the shifted approach and the OLS and random effects coefficients were generally in line with each other. We have also found that the largest movements were confined to variables that are highly correlated, such as property density, population density and regional wages. This is not unexpected, given that the coefficients of correlated variables are sensitive to model specification.

The new data raised some issues around the movement of specific coefficients. For example, in the wastewater models the time trend and regional wage coefficients fall significantly under the shifted approach, with the time trend reducing from a statistically significant level of around 2% to a statistically insignificant level of around 1%. The movement in these two variables suggest that the information from the first year of the data, 2006-07, has a material impact on the results, and in part explains why under the shifted approach the models forecast a lower expenditure for the period from 2015 to 2020.

On balance, we considered that it would not be appropriate to update the models for use in the final determinations, in particular given the overall impacts are relatively small and sensitive to the shifted or extended panel specification.

The tables below present the estimated coefficients for all our econometric models under the current set of data (as used for draft determination and these final determinations) and under the extended and shifted approaches with the new year of data.

Table AA1.6 Estimated model coefficients – wholesale water econometric models⁹

Variable	Base cost OLS			Base cost RE			Refined totex OLS			Refined totex RE		
	DD	Extended	Shifted	DD	Extended	Shifted	DD	Extended	Shifted	DD	Extended	Shifted
Length of mains	1.037***	1.029***	1.032***	1.032***	1.015***	1.009***	1.072***	1.064***	1.065***	1.078***	1.064***	1.05***
Property density	0.275	0.317	0.309	0.405**	0.485***	0.557***	0.21	0.244	0.248	0.281	0.318*	0.371*
Length^2	0.014	0.008	0.003	0.019	-0.001	-0.01	-0.023	-0.025	-0.026	-0.019	-0.033	-0.049
Density^2	0.24	0.315	0.343	0.354	0.377	0.523	1.067**	0.99**	1.001**	0.942*	0.814	0.948*
Length x Density	0.359*	0.385**	0.378*	0.449***	0.477***	0.424**	0.512***	0.538***	0.51***	0.557***	0.577***	0.532***
Time trend	-0.001	0.0002	-0.007	0.009*	0.011*	0.005	-0.007	-0.001	-0.012	-0.003	0.002	-0.012
Regional wage	0.28	0.158	0.208	0.901***	0.636**	0.553**	0.72	0.791*	0.772	0.958***	0.887***	0.625*
Population density	2.032**	1.901**	1.839*	1.053**	0.597	0.373	0.989	0.741	0.798	0.495	0.073	-0.057
Proportion of mains restored/renovated	0.06**	0.058**	0.071***	0.038***	0.037***	0.045***	0.065***	0.077***	0.079***	0.056***	0.072***	0.076***
Proportion of water input from reservoirs	-0.007	-0.006	-0.005	0.002	-0.001	0.0004	-0.014	-0.011	-0.01	-0.012	-0.013	-0.014
Proportion of water input from rivers	0.005	0.006	0.007	0.004	0.005	0.005	0.02***	0.019	0.018***	0.012	0.013	0.018
Constant	2.92	3.34*	3.47*	1.71*	2.8***	3.36***	2.89*	2.88***	3.08*	2.51**	3.08***	4.17***

⁹ ***, **, * = Significance at 1%, 5%, 10% level.

Table AA1.7 Estimated model coefficients – wholesale wastewater econometric models⁵

Variable	Base cost OLS			Base cost RE			Network cost RE			Treatment cost OLS			Treatment cost RE		
	DD	Extended	Shifted	DD	Extended	Shifted	DD	Extended	Shifted	DD	Extended	Shifted	DD	Extended	Shifted
Load	0.977***	0.974***	0.964***	0.883***	0.913***	0.929***				0.881***	0.881***	0.878***	0.828***	0.815***	0.837***
Property density	0.05	0.082	0.126	0.043	0.310	0.332	0.578	0.88**	1.211***	-0.609***	-0.588**	-0.508*	-0.589*	-0.632**	-0.591**
Length of sewers							0.815***	0.789***	0.819***						
Load^2	0.102***	0.082***	0.082***	0.008	-0.013	0.013				0.127***	0.122***	0.112***	0.085	0.070	0.080
Density^2	-1.211	-1.710	-1.038	-2.647	-2.606	-1.512	-2.417	0.192	1.482	-2.472	-2.255	-1.711	-2.879	-3.450*	-2.738
Length^2							0.076	0.058	0.076						
Load x Density	-3.79***	-3.599***	-3.538***	-2.068***	-1.537***	-1.875***				-4.513***	-4.314***	-4.134***	-3.594***	-3.405***	-3.656***
Length x Density							-2.802***	-2.308***	-2.355***						
Time trend	0.020**	0.020***	0.010	0.024***	0.025***	0.014***	0.019***	0.022***	0.012	0.021**	0.016***	0.005	0.023***	0.021***	0.010
Regional wage	0.847**	0.960***	0.766**	1.199***	1.297***	0.965***	0.652	0.636	0.199	1.127***	0.99*	0.81	1.28***	1.326***	1.077***
Proportion treated in bands 1-3	0.127**	0.142**	0.127**	0.156**	0.220***	0.194***									
Constant	3.39***	3.15***	3.77***	2.49***	2.45***	3.43***	2.39*	2.38*	3.73***	1.71	2.17	2.83*	1.27	1.18	2.04*

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