The Strategic Review of Charges 2006-10: The draft determination

Financing delivery of the investment objectives of the Scottish Ministers

volume 5

WATER INDUSTRY COMMISSIONER FOR SCOTLAND

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Executive summary

Introduction

The capital programme is Scottish Water's largest single element of expenditure. In recent years, annual capital investment in Scotland has ranged from £350 million to £520 million[1].

This volume sets out the capital programme that is required to meet the 'essential' and 'desirable' objectives of the Scottish Ministers. It explains how we have reviewed this capital programme to ensure that it is delivered and financed at the lowest reasonable overall cost. Meeting the Ministerial objectives will require Scottish Water to deliver a larger capital programme (in terms of its cost) than has ever been delivered by companies of a similar size south of the border in any single four-year period.

It is an important principle that customers should pay for the level of service they receive. We have taken steps at this Strategic Review to ensure that the way in which capital expenditure is funded is more transparent. In this volume we set out clearly our assessment of the funding required to finance the capital programme and explain fully how we have reached our conclusions.

Background

It is necessary to invest in water and waste water assets for the following reasons:

- **To maintain the level of service to customers** – this investment is often termed capital maintenance. The assets of any business need to be replaced at the end of their useful lives if the business is to continue.

- **To improve the quality of service to customers and the public –** this investment is often termed capital enhancement, or quality investment. Investment in assets is necessary to meet higher environmental and quality standards.

- **To respond to customers' changing demand patterns –** this investment is often termed capital enhancement, or growth investment. The capacity of the assets may need to be increased to meet both the demands of new customers and growth in usage from existing customers.

The investment programme will benefit customers, both now and in the future. However, we believe that each generation of customers should pay the full cost of the water and sewerage services it consumes.

Any business could, at least in theory, borrow in order to cover any or all of its costs. However, any borrowings will need to be repaid, with interest, from future revenues. In other words, continuing to borrow to cover current costs will mean that revenues have to increase to meet the interest charges on the borrowing. If the underlying revenue is not sufficient to cover the ongoing operational and maintenance expenditure faced by the water industry, borrowing is only delaying and worsening the charge levels that future generations face. Unless revenues are brought broadly into line with the average continuing annual obligations of the water industry, there will be a continuing need to increase borrowing in order to balance the books at the end of the financial year.

The Ministerial Guidance[2], that we received in February 2005, recognised the importance of maintaining and, where possible, improving the financial strength of Scottish Water. By moving towards a regulatory capital value (RCV) approach to charge setting, we ensure that there will be a transparent and sustainable level of borrowing and that both current and future customers will be treated fairly.

Quality and Standards II

The Scottish Ministers establish investment priorities for the Scottish water industry through the Quality and Standards process. This process brings together a range of stakeholders to define the level and scope of investment in the water industry. Quality and Standards specifies the level of service to customers, and the environmental and water quality standards that the water industry in Scotland must deliver.

1 This excludes investment delivered through PPP schemes.
2 See Appendices 4 and 15.

Quality and Standards II set investment priorities for the period from April 2002 to March 2006. The investment programme was summarised in 'Water Quality and Standards: Investment priorities for Scotland's water authorities 2002-2006', which was published in August 2001. This indicated that the cost of the investment programme would be £2.34 billion (2000-01 prices).

In the Strategic Review of Charges 2002-06, we examined the scope for capital efficiency in the Quality and Standards II investment programme. We advised Ministers that efficiency savings of around £500 million were possible. Our analysis showed that Scottish Water should be able to deliver all of the required outputs for £1.81 billion. Ministers accepted this advice.

In the Strategic Review of Charges 2002-06, we forecast a rate of capital expenditure inflation (COPI)[3] of 1.5% a year. COPI has consistently continued at a higher level than we had expected and this is likely to increase the efficient cost of delivering Quality and Standards II to approximately £1.93 billion. Scottish Water is therefore required to deliver the Quality and Standards II outputs for this revised amount.

In our monitoring of the delivery of Quality and Standards II, we were concerned to verify £114 million of efficiencies that the former East of Scotland Water Authority had claimed in its development of Quality and Standards II. If the claimed efficiencies were not substantiated, customers faced higher bills because the efficiency target applied to the East of Scotland Water Authority was less challenging than it would otherwise have been[4]. It became apparent that no definitive list of projects existed to substantiate East of Scotland Water Authority's efficiency claim.

We reached an agreement with Scottish Water about the efficiency claim in early 2003. Scottish Water's Board agreed that the £114 million (which equated to £80.2 million post-efficiency), should be amortised in five equal instalments of £16.04 million during the period from 2006-07 to 2010-11. We have included this agreed adjustment in the capital efficiency target in this draft determination.

Scottish Water was also tasked with delivering additional outputs that were not known when the original investment programme was established. These included:

- additional security measures;
- unbudgeted development contributions; and
- measures necessary to comply with the Dangerous Substances and Explosive Atmospheres Regulations 2002.

Scottish Water estimated that the total cost of these additional outputs is £110 million. This increased the size of the Quality and Standards II investment programme to approximately £2.04 billion[5].

Delivery of Quality and Standards II

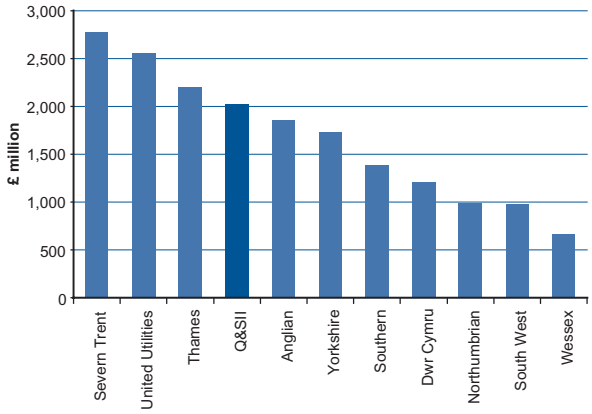
Analysis of the investment programmes that have been delivered by the companies in England and Wales demonstrates the challenge posed in delivering the Quality and Standards II programme.

We examined the capital investment delivered, and forecast, by all of the water and sewerage companies over the 12 consecutive four-year periods from privatisation in 1989 until 2005. We have adjusted the value of each programme to a 2003-04 price base.

A comparison of the largest ever four-year programme for each of the English and Welsh companies and Quality and Standards II[6], shows that only three companies have achieved a larger four-year investment programme.

3 COPI – Construction Output Price Index.
4 The overall efficiency applied to East of Scotland Water Authority was 11%, compared with 26% for North of Scotland Water Authority and 27% for West of Scotland Water Authority. See 'Strategic Review of Charges 2002-06', Table 19.12, Page 207.
5 In outturn prices.
6 £2,026 million in 2003-04 prices, including an estimate for capital inflation and Scottish Water's claim for new outputs.

Figure 1: Largest four-year investment total for each company (1990-2005) (2003-04 prices)



Five water and sewerage companies in England and Wales are either broadly the same size as Scottish Water or larger. Thames Water, Severn Trent Water and United Utilities are larger, while Anglian Water and Yorkshire Water are similar in size to Scottish Water. Table 1 shows key statistics for these companies and for Scottish Water.

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Table 1: Key company statistics[7]

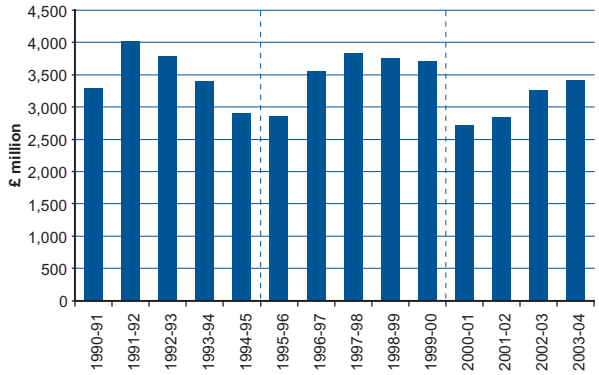
Company	WATER				SEWERAGE			
	Connected properties (millions)	Population (millions)	Length of mains (km)	Number of treatment works	Connected properties (millions)	Population (millions)	Length of sewers (km)	Number of treatment works
Thames	3.49	8.26	31,416	97	5.38	13.06	67,335	349
Severn Trent	3.30	7.31	45,949	172	3.71	8.87	54,040	1,017
United Utilities	3.13	6.69	40,741	140	3.07	6.66	40,018	599
Scottish Water	2.48	5.18	46,508	371	2.37	4.69	44,854	1,836
Yorkshire	2.12	4.66	31,217	81	2.12	4.65	30,157	614
Anglian	1.93	4.18	36,762	143	2.47	5.70	35,394	1,077

Anglian Water and Yorkshire Water, the two companies of similar size to Scottish Water, have never delivered a four-year programme as large as Quality and Standards II.

In England and Wales, regulatory control periods last five years. Companies use the first part of a regulatory control period to decide how best to deliver the agreed capital programme. An analysis of total investment since 1990 shows the effect of the regulatory control period on the delivery of investment. This is illustrated in Figure 2.

7 Information for 2003-04 is taken from the Ofwat June Return for the companies in England and Wales and from the WIC Annual Return for Scottish Water.

Figure 2: Total capital investment of the water and sewerage companies 1990-91 to 2003-04 (in 2003-04 prices, adjusted for inflation)



This analysis shows that the level of investment in the first year of each regulatory control period (1990-91, 1995-96 and 2000-01) is generally lower than in subsequent years of the period. The shorter four-year regulatory control period in Scotland therefore further increased the challenge in delivering Quality and Standards II.

Quality and Standards III

Quality and Standards III covers the period 2006-14. Detailed work in defining the required investment was completed by a number of specialist stakeholder groups, each of which had particular responsibility for a specific work package. These work packages included:

- maintenance;
- growth in the water and sewerage networks;
- environmental improvements;
- drinking water quality; and
- other important issues for customers.

Each work package identified investment 'drivers'. In most cases, the driver of a need for investment was legislation. A number of scenarios were then drawn up, ranging from 'do nothing' to 'aspirational' improvement. Scottish Water was then asked to cost the gap between the expected position at the end of Quality and Standards II and each of the identified scenarios. The specialist groups responsible for work packages produced interim reports, which were used by the Scottish Executive to inform the Quality and Standards III consultation process. It is important to highlight that only Scottish Water was involved in costing the required outputs.

Scottish Water's first draft business plan

Scottish Water submitted its first draft business plan to this Office on 29 October 2004. The plan contained its initial investment proposals. We had expected the proposals to take account of the likely investment priorities emerging from the Quality and Standards III process, Scottish Water's assumptions on any likely overhang from Quality and Standards II, and its views on the size of investment programme that could be managed efficiently.

Scottish Water provided details of its proposed investment programme in an appendix to the draft business plan, Table C[8]. This listed 790 projects that were planned to be completed over the Quality and Standards III period. These projects had a total value of £4,891 million[9]. Scottish Water proposed to invest £2,199 million of this during the 2006-10 regulatory control period[10]. This equates to £550 million of investment each year and represents around £226 a year for every connected property in Scotland.

This proposed investment programme would have represented a significant delivery challenge. Figure 3 shows the level of investment[11] that has been delivered each year since 1996-97.

8 The first draft business plan, including Table C, was completed using 2005-06 prices. The second draft business plan was completed using 2003-04 prices. In order to ensure comparability throughout this chapter, we have unwound Scottish Water's inflation adjustment in the first draft business plan, and reported all investment in 2003-04 prices unless otherwise stated.

9 Of the 790 projects listed in Table C, six had a negative value recorded against them. If these negative values were not taken into account, then the actual cost of the proposed investment programme would be £5,412 million in 2003-04 prices.

10 In the main body of the business plan, Scottish Water actually proposed to invest £2,211 million, the equivalent of £553 million for each year of the 2006-10 period, or £229 per property a year (in 2005-06 prices). This figure does not appear to be consistent with those reported in Table C. We have relied on Table C for the analysis in this section.

11 This is the total cash cost of investment rebased to 2003-04 prices, we have not adjusted values to take account of the relative efficiency of the Scottish water industry in each year.

Figure 3: Total investment by the Scottish water industry per year (2003-04 prices)

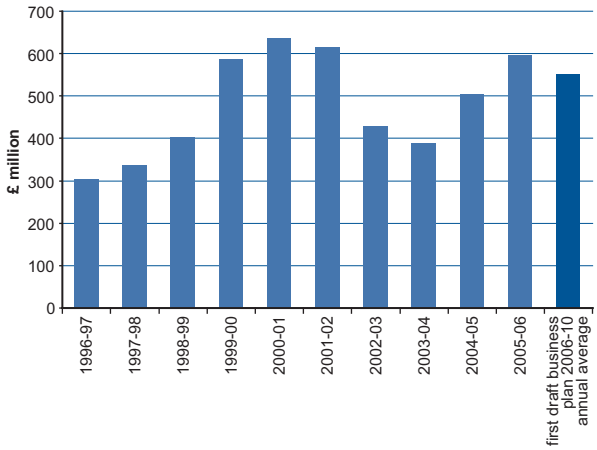
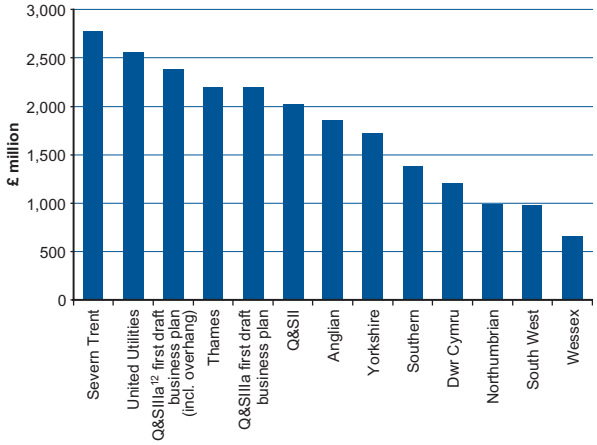


Figure 4 shows that the first draft business plan proposed an investment programme for the 2006-10 regulatory control period that was comparable to the biggest programme so far delivered by Thames Water.

Figure 4: Largest four-year investment total



Moreover, Table C did not include the expected £183 million[13] overhang from Quality and Standards II. Scottish Water therefore proposed to deliver a £2.38 billion investment programme over four years.

Scottish Water's proposed investment programme was, therefore, almost without precedent in the recent history of the water and sewerage industry in the UK. Table 2 shows that the largest five privatised water and sewerage companies[14] have delivered programmes of more than £2.4 billion on only four occasions.

Table 2: Delivery of four-year investment programmes of more than £1.1 billion by the largest five companies (1990-2005)[15]

Size	Per year	Number of occasions	Cumulative %
Over £2.6 billion	£650m	2	3.3%
Over £2.5 billion	£625m	3	5.0%
Over £2.4 billion	£600m	4	6.7%
Over £2.3 billion	£575m	7	11.7%
Over £2.2 billion	£550m	12	20.0%
Over £2.1 billion	£525m	20	33.3%
Over £2.0 billion	£500m	24	40.0%
Over £1.9 billion	£475m	32	53.3%
Over £1.8 billion	£450m	35	58.3%
Over £1.7 billion	£425m	37	61.7%
Over £1.6 billion	£400m	41	68.3%
Over £1.5 billion	£375m	47	78.3%
Over £1.4 billion	£350m	50	83.3%
Over £1.3 billion	£325m	52	86.7%
Over £1.2 billion	£300m	56	93.3%
Over £1.1 billion	£275m	60	100%

Scottish Water's first draft business plan also contained a number of projects that did not appear to be consistent with likely Quality and Standards III priorities which have subsequently been confirmed in February's Ministerial Guidance. They were referred to in the business plan as 'investment in other service areas'. These projects accounted for around £195 million of investment.

The Reporter audited Scottish Water's first draft business plan. We were concerned by his comments about both the cost and the scope of projects in the investment programme.

In an open letter[16] to Scottish Ministers in December 2004, we noted that Scottish Water should be set challenging but achievable objectives. In this regard, we emphasised the importance of defining a capital programme of a size that could be delivered efficiently.

12 Q&S IIIa: Quality and Standards III investment required in the period 2006-10.
13 Scottish Water reported a Quality and Standards II overhang of £194 million at 2005-06 prices. This figure includes Quality and Standards II investment to be delivered after March 2006 (£154 million) and new obligations to be delivered after March 2006 (£40 million).
14 Described in Table 1
15 The number of occasions is cumulative. That is to say there were two occasions when a programme of more than £2.6 billion was delivered and one occasion when a programme of £2.5 billion to £2.6 billion was delivered. Accordingly, there were three occasions when a programme of more than £2.5 billion was delivered.
16 This letter can be found on our website – www.watercommissioner.co.uk

The letter also noted that Quality and Standards II was itself a substantial investment programme and it seemed increasingly likely that a large proportion of that programme would not be delivered during the current regulatory control period. This limited the opportunity for Quality and Standards III outputs to be delivered in the 2006-10 regulatory control period.

The Ministerial Guidance[17] issued in February this year marked the completion of the Quality and Standards III process. It set out the objectives of the investment programme for Quality and Standards III. It also set out the detailed objectives for the period of the Strategic Review of Charges 2006-10.

The investment objectives in the Ministerial Guidance were divided into those that are 'essential' and those that are 'desirable'. Ministers required the Strategic Review of Charges 2006-10 to fund Scottish Water to deliver all of the essential objectives. These outputs were to be delivered irrespective of their impact on customers' bills.

Ministers also set out desirable objectives that we were required to fund provided that:

- it was reasonable to expect that they could be delivered efficiently; and
- projected charges to customers in the period to 2010 did not rise by more than the level of inflation.

Scottish Water's second draft business plan (April 2005)

In its second draft business plan, Scottish Water set out its investment plan for the period 2006-10. It provided details of the costs involved in delivering the investment objectives set out in the Ministerial Guidance.

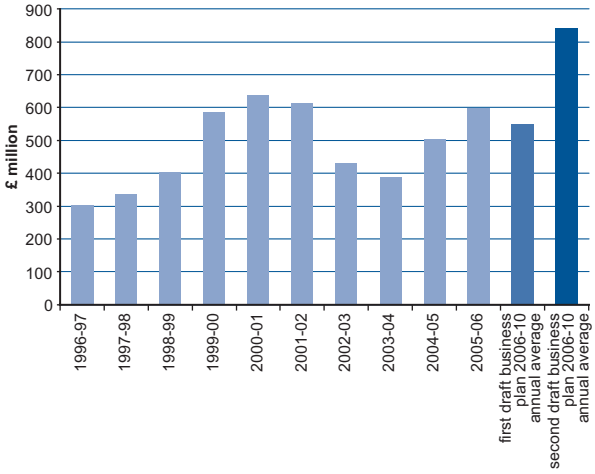
The second draft business plan suggested that the cost of delivering even the essential objectives set out in the Ministerial Guidance would lead to a significant increase in charges. Scottish Water put forward three alternative solutions to keep charges stable:

- a re-phasing of the investment objectives, with less being undertaken in 2006-10 and more in 2010-14;
- increasing the borrowing limits permitted to Scottish Water; or
- reducing the scope of the objectives.

Scottish Water stated that it would need to invest £3.37 billion to meet the Ministers' essential and desirable objectives over the same period. Some £2.92 billion would be required to meet the Ministers' essential objectives.

Our analysis of Scottish Water's proposed investment programme confirmed that not even the essential objectives could be delivered effectively during the 2006-10 regulatory control period unless there were significant reductions in cost available either because of efficiency or because the investment programme had been over-scoped. Figure 5 compares the total investment per year suggested by the first and second draft business plans with historic and actual spending.

Figure 5: Total investment per year – comparison of actual performance with first and second draft business plans (2003-04 prices)



We have, however, been able to identify significant cost reductions in the programme.

[17] We discussed the Ministerial Guidance in more detail in Volume 4, Chapter 14.

Transition from Quality and Standards II to Quality and Standards III

Managing overhang from one regulatory control period to the next is difficult if:

- a large proportion of the programme (either in terms of money or the number of projects) is still to be delivered at the end of the period; and/or
- resources that were made available to deliver the capital programme have been spent inefficiently.

It now appears very likely that the Quality and Standards II investment programme will not have been delivered in full by April 2006. In its second draft business plan, Scottish Water estimated the overhang at £283 million.

We initially estimated that the size of the Quality and Standards II overhang that should be funded by customers was in the range of £140 million to £180 million[18]. This range was based on deducting the actual amount invested over the 2002-06 period from the total budget for Quality and Standards II. We adjusted the total budget for Quality and Standards II to take account of the unexpected effect of capital inflation in the period 2002-06. We asked Scottish Water to make any representations on this assessment by 20 May 2005.

We were not fully persuaded by Scottish Water's explanation of the need for £283 million to deliver the remainder of Quality and Standards II. Our analysis of Scottish Water's claimed allowance indicated that the £283 million included an allowance for likely inflation beyond the end of the current regulatory control period. It also seemed to include an allowance to cover inefficient delivery in the early years of Quality and Standards II. We made two adjustments to the claimed £283 million overhang.

First, we removed the effect of inflation after 31 March 2006. This ensures that customers do not fund the additional costs associated with late delivery. This reduced the overhang to £274.5 million (at 2005-06 prices).

Second, we restated the £274.5 million to 2003-04 prices to ensure that it was presented on a consistent basis with the remainder of the capital expenditure funded in this draft determination. This reduced the £274.5 million to £253.0 million.

From this claim we subtracted £54.9 million at 2003-04 prices to reflect the agreement we had reached with Scottish Water concerning the former East of Scotland Water Authority's claimed efficiencies. This produced an allowed overhang for Quality and Standards II of £198.1 million.

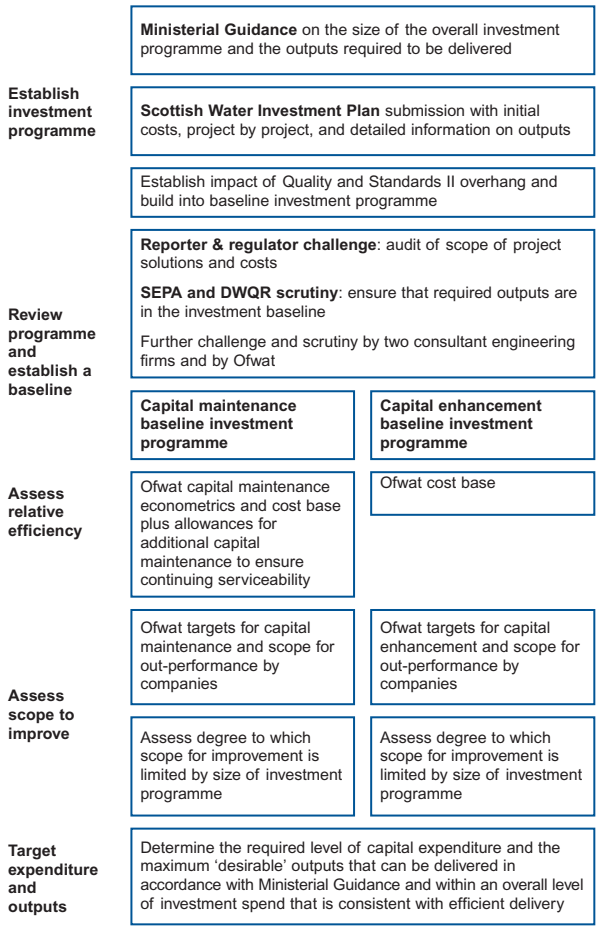
Reviewing the capital programme

Scottish Water's investment plan has been scrutinised in detail by the Reporter, the quality regulators[19] and this Office. The Reporter raised a number of concerns about the scope and composition of the proposed investment programme. We therefore asked two firms of engineering consultants and Ofwat to help us carry out a more detailed review of the capital programme than we had originally planned.

Figure 6 sets out the process we undertook in carrying out our analysis.

[18] Letter from the Commissioner to the Chief Executive of Scottish Water, 2 May 2005.
[19] The Drinking Water Quality Regulator (DWQR) and the Scottish Environment Protection Agency (SEPA).

Figure 6: Framework for assessing capital investment requirements



Scope for capital efficiency

In determining the scope for efficiency in the delivery of capital maintenance, we have broadly followed the approach that is adopted by Ofwat for the companies in England and Wales. We have adjusted our approach to take account of the situation in Scotland. Our methodology included the following stages:

- An assessment of the level of capital maintenance expenditure required by Scottish Water, given its current asset base. This assessment was carried out using Ofwat's capital maintenance econometric models.

- An adjustment to the required level of capital maintenance expenditure to take account of any circumstances specific to Scotland that could affect Scottish Water's costs.

- An assessment of the scope for efficiency. We used Ofwat's cost base approach to determine the scope for efficiency and have drawn on the evidence gathered by Ofwat on the scope for continuing improvement.

We are confident that our approach is robust. To verify our results, we carried out a series of high-level comparisons between our assessment for Scottish Water and the levels of capital maintenance spend in England and Wales. In these comparisons we took account of:

- the value of the asset base,

- the condition of the asset base, and

- the number and type of assets.

We used Ofwat's cost base approach to benchmark Scottish Water's efficiency in delivering capital enhancement projects. We took account of special factors relating to the industry in Scotland.

We recognise that this analysis is particularly specialised. We therefore commissioned independent consultants, Faber Maunsell, to carry out the analysis of relative efficiency. The results of their work were reviewed by SMC (Strategic Management Consultants) and by Ofwat to ensure that our approach was consistent with that which is used south of the border.

We assessed the scope for efficiency for both capital maintenance and capital enhancement at a programme level. We did not seek to review the relative efficiency of individual projects. The project costs contained in the baseline programme are therefore the pre-efficiency costs. It will be for Scottish Water to determine how these same projects will, at a programme level, be delivered within the overall post-efficiency budget.

Faber Maunsell reviewed the standard costs submitted by Scottish Water to ensure that they were consistent with Scottish Water's investment programme and

Ofwat's benchmark costs. When Faber Maunsell were satisfied with the cost information, we assessed the procurement efficiency gap for the capital investment programme contained in the second draft business plan expressed as a percentage of total investment and separated by water and sewerage, infrastructure and non-infrastructure. The capital efficiency factors that resulted from this analysis are shown in Table 3.

Table 3: Capital efficiency factors applied to the quality, growth and customer service investment for the highest estimated cost investment programme

	Cost base efficiency gap	Reduction required to close 75% of gap	Additional reduction required to match 'continuing improvement' by water companies[20]	Total reduction required
Water				
Infrastructure	23.5%	17.6%	3.7%	20.7%
Non-infrastructure	25.7%	19.3%	3.7%	22.3%
Weighted average	25.6%	19.2%	3.7%	22.2%
Sewerage				
Infrastructure	17.2%	12.9%	4.4%	16.7%
Non-infrastructure	29.8%	22.4%	4.4%	25.8%
Weighted average	22.4%	16.8%	4.4%	20.5%
Combined				
Infrastructure	17.9%	13.4%	4.3%	17.2%
Non-infrastructure	26.9%	20.0%	3.9%	23.1%
Weighted average	**24.2%**	**18.2%**	**4.0%**	**21.4%**

In line with the approach of the Competition Commission[21] when determining price caps for Sutton and East Surrey Water and Mid Kent Water, we have phased the efficiency challenge for Scottish Water over the first three years of the regulatory control period.

The lowest estimated scope for efficiency improvement averaged over the entire phased investment programme is 15.4%. The highest realistic efficiency gap calculated over the entire programme is 20.8%.

PPP contracts

Public Private Partnerships (PPP) play an important role in delivering waste water services to customers in Scotland. There are nine PPP contracts. Some 50% of Scotland's total waste water and 80% of Scottish Water's sludge is processed through PPP contracts.

The nine projects are outlined in Table 4. This also shows the projected fee payable to each consortium.

Table 4: PPP contracts with Scottish Water

Project name: Company name	Contract signed	Duration years	Construction costs (£m)	Annual fee in 2003-04
Almond Valley, Seafield and Esk Valley: Stirling Water (Seafield) Ltd	1999	30	£100m	£21m
Levenmouth: Caledonian Environmental Services Ltd	2000	40	£46m	£9m
Highland (Fort William and Inverness): Catchment Ltd	1996	25	£33m	£7m
Tay: Catchment (Tay) Ltd	1999	30	£84m	£19m
Aberdeen: Aberdeen Environmental Services Ltd	2000	30	£64m	£13m
Moray: Catchment (Moray) Ltd	2001	30	£60m	£11m
Daldowie/Shieldhall: SMW Ltd	1999	25	£66m	£14m
Dalmuir: Scotia Water UK Ltd	1999	25	£37m	£7m
Meadowhead, Stevenston & Inverclyde: Ayr Environmental Services Ltd	2000	30	£59m	£12m
Scotland total			**£549m**	**£112m**[22]

20 'Continuing improvement' reflects the minimum improvement that Ofwat expects the frontier company to make during the regulatory control period.

21 Reports on references under sections 12 and 14 of the Water Industry Act 1991, 2000. See for example, paragraph 6.148 of the report on Sutton and East Surrey Water.

22 Totals do not add due to rounding.

At the last Strategic Review of Charges our analysis showed that PPP offered a more efficient option than traditional procurement and operation of the same treatment works by the three authorities. We also noted that the cost of providing the required new treatment works using the PPP route was £550 million. The authorities estimated that the cost of these works would have been £700 million using traditional procurement. The three authorities also incurred operating and capital maintenance costs that were some 40-65% higher than the average south of the border.

At the current time, the PPP contractors appear to be earning a relatively high return on their investment. In 2003-04, Scottish Water paid the PPP contractors approximately £112 million. We used Ofwat's capital maintenance and operating cost econometric models to review the likely capital maintenance and operating costs. The models suggest that capital maintenance costs at average efficiency would amount to around £20 million.

The Ofwat operating cost models suggest that operating costs at average efficiency would amount to approximately £35 million[23].

The remaining £57 million of the annual charge could be attributed to financing costs.

If 90% of the initial capital costs were funded through debt and 10% through equity, then we estimate that the annual interest and principal repayment costs would be approximately £43 million[24]. This would leave £13 million as a return for the equity invested in the project by the PPP contractors. This would imply an equity return of below 20%[25].

To an extent this equity return can be justified by the risk that the PPP contractors took in agreeing to build the treatment works for a much lower cost than the three authorities. The risks that the contractors absorbed include:

- meeting required standards;
- cost overruns during construction – if a project or site is not delivered on time or to budget, the contractor incurs the associated costs;
- timely completion – the contractor is paid only when the assets are fully operational.

PPP contracts are complex and typically operate over an extended period. If there is significant initial capital expenditure the risk to the contractor is likely to be greater in the early part of the contract. The cost of borrowing will reflect this extra risk.

Although all of the PPP contracts are now operational, we are not aware of any attempt to refinance these contracts. We would hope that it may be possible for customers to share the benefits of a possible refinancing of the projects since construction risks have been managed and the cost of capital also appears to be lower than it was when these contracts were originally let.

In its second draft business plan, Scottish Water identified a total investment requirement of some £66 million (2003-04 prices) at three PPP waste water treatment sites. This investment appears to relate to odour and unsatisfactory discharges.

The total operating costs associated with this investment were £1.4 million (2003-04 prices) a year.

We have reviewed the proposed new investment at the PPP sites and have reduced this investment to reflect the opportunity for efficiency. We have also reduced the scope of what is required to reflect the advice that we have had from the Reporter and our more detailed review of the capital programme.

We have calculated an appropriate annual PPP operating cost. This is set out in Table 5.

[23] This figure comprises all operating costs, including charges paid to SEPA and local authority rates, where appropriate.
[24] This is based on a fixed annual percentage interest rate of 7.5%, with 27 equal payments made at the end of each year of the concession. The initial capital cost is assumed to be £550 million.
[25] This is the internal rate of return on the assumption that the interest charges are fixed and the operating costs and capital maintenance costs are at average efficiency. We have assumed that the equity and debt were committed two years before the treatment works were fully operational. We have also assumed that Scottish Water made a payment equal to the PPP contractors' interest and principal repayment cost in the year before full operation.

Table 5: Allowed for additional PPP costs 2006-10

	2006-07	2007-08	2008-09	2009-10
Additional PPP costs[26]	£1.0m	£1.0m	£3.2m	£7.0m

Setting the allowed level of capital maintenance

Ofwat uses econometric modelling in its assessment of the relative efficiency of the capital maintenance expenditure of the water and sewerage companies in England and Wales. This method uses statistical analysis to establish relationships between the capital maintenance expenditure made by companies and a number of factors that might drive costs which are common to all companies. Once the relationships have been established, the models can be used to predict the appropriate level of expenditure for each company. This predicted expenditure can then be compared directly with the companies' actual expenditure. Information to allow this comparison is collected from each company in a systematic manner.

The capital maintenance econometric models that are used by Ofwat were first used for its 1999 price review and were published in April 1998[27]. In 2003, Ofwat conducted a detailed review of the models, in consultation with industry representatives, in preparation for its 2004 price review. In the review, Ofwat worked with professor Mark Stewart from the University of Warwick, who provided an independent verification of the models. Ofwat published the final form of the capital maintenance econometric models for the 2004 price review in January 2005[28].

Each of the nine capital maintenance models includes a relationship between the capital maintenance expenditure reported by the companies and the factors that might drive costs. These factors must have a clear impact on costs but should also be as far outside the control of the management of the company as possible.

The factors that might drive costs that are used within the econometric models are known as explanatory factors. The models themselves take different forms. These are summarised in Table 6.

Table 6: Summary of econometric models and explanatory factors

Model	Model type	Explanatory factors
Water resources and treatment	Unit cost	Total connected properties
Water distribution infrastructure	Log linear	Length of main; total connected properties
Water distribution non-infrastructure	Log linear	Pumping station capacity; water service reservoir and water tower storage capacity
Water management and general	Log linear	Billed properties; proportion of billed properties that are non-household
Sewerage infrastructure	Log linear	Length of sewer; number of combined sewer overflows; proportion of critical sewers
Sewerage non-infrastructure	Unit cost	Number of pumping stations
Sewage treatment	Log linear	Total load; total number of works
Sludge treatment and disposal	Unit cost	Total weight of dry solids
Sewerage management and general	Unit cost	Billed properties

In assessing Scottish Water's capital maintenance requirements in 2006-10 we broadly followed the four-stage process that Ofwat used in its 2004 price review[29]:

- **Stage A** Maintaining serviceability to customers to date.

  We have made an assessment of the level of expenditure required to maintain current serviceability of Scottish Water's assets. In the approach used by Ofwat, this stage takes into account evidence of historic levels of capital maintenance expenditure, current serviceability and asset performance information. For our assessment of Scottish Water's proposals, we have not been able to rely on information on historic expenditure, serviceability measures or asset performance. This is because the information available is not adequately robust to use in the manner that Ofwat's approach demands. We have therefore used an alternative approach based on the capital maintenance econometric models developed by Ofwat. We have used these models to derive the future expenditure we consider is appropriate at Stage A.

26 Based on outturn prices, assumes enhancement investment is fully operational in Quarter 4 of 2008-09.
27 'Assessing the scope for future improvements in water company efficiency: a technical paper', Ofwat, 30 April 1998.
28 'Water and sewerage service unit costs and relative efficiency 2003-04 report', Ofwat, January 2005.
29 Ofwat's approach is described in the publications 'Maintaining water and sewerage systems in England and Wales: Our proposed approach for the 2004 periodic review' (May 2002) and 'Setting the price limits for 2005-10: Framework and approach – a consultation paper' (October 2002).

- **Stage B** Is the future period different?

  This stage examines the forward-looking element of capital maintenance expenditure. In essence this step considers how much more (or less) capital maintenance expenditure (compared with the Stage A assumptions) should be required in the future due to changes (in for instance the rate of deterioration of assets, or changes in other risks due to service failure) that have occurred, are occurring or are likely to occur. In the December 2004 determination, Ofwat used an assessment based on the principles set out in the UK Water Industry Research (UKWIR) common framework and we have assessed Scottish Water's proposals in a similar manner[30].

- **Stage C** Scope for improvements in efficiency.

  Ofwat derives efficiency targets in Stage C that generally reduce the expenditure assumptions for price limits. As we have used an alternative methodology to derive the amount of expenditure at Stage A, we have also used a different approach in Stage C. We have, however, used Ofwat's cost base methodology to underpin our assumptions. We have assessed by how much Scottish Water can improve its efficiency in capital maintenance over the four year period.

- **Stage D** Impact of the improvement programme.

  This stage takes into account the overlaps between the improvement programme and the base capital maintenance programme.

From our analysis we have drawn the following conclusions:

- Scottish Water's knowledge of the condition and performance of its assets is poor and it does not allow a sound, risk-based approach to capital maintenance planning to be adopted.

- Scottish Water is not adopting best practice under the principles of the Capital Maintenance Planning Common Framework (CMPCF).

- Synergies between the capital maintenance and quality programmes and between the capital maintenance programme and operating expenditure are not understood.

We set out the estimated required level of annual capital maintenance for Scottish Water in Table 7. We report our results for infrastructure and above-ground assets separately for the water and sewerage services. The four-year total may not add exactly due to rounding.

Table 7: Scottish Water's assessed capital maintenance requirements using Ofwat's models

	Water service	Sewerage service	Combined total	Four year total
Infrastructure assets	£29.3m	£24.1m	£53.4m	£213.6m
Above-ground assets	£50.0m	£43.0m	£93.0m	£372.0m
Service total	£79.3m	£67.1m	£146.4m	£585.5m

These results reflect the average level of efficiency in England and Wales in 2003-04. The best performing company incurred capital maintenance costs that were around 8% lower than those predicted by the econometric models.

We have allowed seven exceptional items.

Exceptional item 1 Contingency to address public health concerns - up to £20 million.

Exceptional item 2 Contingency to address environmental concerns - up to £20 million.

Exceptional item 3 To achieve CMPCF 'best practice' - up to £15 million.

Exceptional item 4 To achieve progress towards economic levels of leakage - up to £40 million.

Exceptional item 5 Transfer from quality investment programme, to meet iron and manganese drivers - £17.5 million (£22 million transferred, less efficiencies).

Exceptional item 6 Metering - up to £12 million.

Exceptional item 7 Quality programme - up to £20 million.

[30] Capital Maintenance Planning: A Common Framework, UKWIR/Tynemarch Associates, May 2002.

We also reallocated £0.7 million per year (£2.8 million over the period 2006-10) to operating costs to reflect Scottish Water's cost allocation practice for its central laboratory. We made a corresponding special factor allowance in operating costs.

Our view is that Scottish Water should not commit the resources made available to reduce leakage until it has agreed its economic level of leakage with the new Water Industry Commission. It should also agree with SEPA the priority areas for leakage reduction consistent with its economic level of leakage.

We have set a range for the allowed level of capital maintenance in this draft determination. Our final allowance for capital maintenance can only be determined once Scottish Water has had the opportunity to make representations on the draft determination.

In this draft determination we believe that the maximum level of capital maintenance should be £780 million. The lower end of our proposed range for the allowed level of capital maintenance is £647 million. Even this lower allowed level of capital maintenance is higher than an average company south of the border (in receipt of an upward adjustment for its use of the CMPCF) is likely to have required for an equivalent asset base. This compares with Scottish Water's estimated capital maintenance of more than £1 billion.

Financing the quality, growth and customer service investment necessary to meet ministerial objectives

The technical review of the programme by the Reporter and Faber Maunsell highlighted a number of issues in relation to Scottish Water's proposed investment programme. These included:

- duplication of project lines in the programme;
- inclusion of projects that did not meet ministerial objectives;
- inclusion of investment targeted at PPP schemes;
- a lack of a strategic approach in a number of areas;
- over-scoping of project solutions;
- over-reliance on the use of generic costing approaches; and
- duplication of outputs that were already required in Quality and Standards II.

Similarly, analysis of Scottish Water's project costs by both Ofwat and this Office indicated that, in certain areas of the programme, the costs per scheme proposed by Scottish Water significantly exceeded the costs put forward to Ofwat by the companies in England and Wales at the 2004 price review. There was also evidence that the costs per scheme in certain areas were significantly higher than the outturn costs for similar schemes in the current Quality and Standards II programme.

In the following sections we discuss the rationale for the changes we have made in more detail. It is important to note that we have not reduced, delayed or otherwise amended the outputs required by Ministers. For each area of the programme we have estimated the highest level of spending (pre-efficiency) that we consider to be appropriate. We also set the lowest level of investment that we believe, realistically, could be required.

Review of planned investment in drinking water quality

Scottish Water estimated that £1,064 million of investment is required to meet the Ministers' objectives for improvements to drinking water quality during the 2006-10 regulatory control period. This implied an investment of £266 million a year, or around £113 each year for every connected customer. In comparison, the total investment in England and Wales in the period 2005-10 is £425[31] million a year, or around £18 each year per customer.

[31] This figure is from Ofwat's final determination of water and sewerage charges 2005-10. It has been inflated by 5.46% to represent capital goods inflation between 2002-03 and 2003-04.

Water treatment works

Table C includes investment in improved drinking water quality at 239 of the 371 water treatment works in Scotland[32]. At a total cost of £831 million, this comprises more than 80% of the total investment in improvements in drinking water quality. This cost is around one-third higher than the cost in England and Wales to upgrade 239 works (where the average size of works is considerably larger).

The Reporter carried out site visits at a random sample of eight water treatment works. Faber Maunsell selected a further 36[33] water treatment works for site visits. They visited a representative range of works by size and by level of proposed investment. They also carried out desk top analysis of a further five sites.

This review indicated that there is considerable evidence that the investment required to meet the ministerial objectives had been scoped incorrectly. In particular, the use of generic solutions to establish investment needs at the smaller water treatment works appears to have led to a significant overestimate of the scope of the work required. Lack of strategic solutions also appears to have resulted in increased costs.

The Reporter concluded that the issues identified in relation to project scoping at water treatment works resulted in Scottish Water's cost estimates being around 15% too high. This was based on the limited sample of eight sites, which were reviewed in detail.

The analysis carried out by Faber Maunsell concluded that there were significant issues concerning Scottish Water's methodology for assessing the scope of work required at water treatment works. For example, when assessing 'need' Faber Maunsell discovered sites in the representative sample where there was no clear requirement to carry out the proposed works. Examples included sites where it was proposed to fit a new membrane treatment plant where one already existed at the site.

Faber Maunsell also identified a number of sites where strategic solutions, such as rationalising the number of water treatment works, had not been given proper consideration.

Faber Maunsell also found that the use of generic solutions in the costing process had led to major over-scoping of requirements. Examples included costings for installing contact tanks where Scottish Water had costed new tanks of the total required volume, rather than adding additional volume to the existing tanks.

From their analysis, Faber Maunsell concluded that the degree of over-scoping in Scottish Water's proposals for water treatment works justified a pre-efficiency reduction in costs of between 45% and 55%.

We have reviewed the Reporter's and Faber Maunsell's findings in detail. We have concluded that there is significant opportunity to reduce the scope of investment at water treatment works. Our assessment is that this reduction lies within the range of 30% to 50% of Scottish Water's estimate. This would reduce the pre-efficiency total cost of the quality investment at water treatment works from £831 million to a highest estimated cost of £582 million and a current lowest realistic cost of £415 million.

Water resources

The Reporter and our engineering consultants have assessed Scottish Water's proposed investment of £135 million on water resources. This is primarily associated with the Water Framework Directive[34]. They both concluded that costs in this area are very uncertain.

The Reporter commented that Scottish Water did not appear to have taken full account of the benefits available from reducing leakage.

The engineering consultants commented that further investigations (including the development of a water resources plan) are required to reduce uncertainties and that reducing leakage should be the preferred first choice for replacing lost supplies. They recommend that Scottish Water should establish economic levels of leakage in the water resource zones that are affected by the Water Framework Directive.

[32] Scottish Water's second draft business plan includes proposals to reduce the number of operational water treatment works to 301 by 2009-10.
[33] In total, Faber Maunsell completed 37 site visits. However, one of these sites was also visited by the Reporter.
[34] The Water Framework Directive element of the water resources expenditure amounts to around £134 million. The remaining £0.9 million relates to flood studies to comply with the Reservoirs Act.

Based on the conclusions of the Reporter and of Faber Maunsell, we have set a range of between £94.3 million and £68 million for investment in water resources.

Security enhancement

The Reporter reviewed Scottish Water's proposed investment of £76 million for security enhancement at water treatment works and other assets. He concluded that Scottish Water's estimates of the required scope of work appeared to be conservative in a number of areas. He has also suggested that the unit costs used in its assessment appear high.

We have concluded that a reduction of 20% in Scottish Water's assessment of the costs for security enhancement is appropriate.

We have not made any other adjustments to the scope of Scottish Water's proposals for drinking water quality investment. The outcome of our review of the scope of the work required to meet the Ministers' objectives for drinking water quality is shown in Table 8.

Table 8: Outcome of our assessment of drinking water quality investment requirements (pre-efficiency)

Sub-categories	Original Table C project cost total 2006-10	Highest estimated cost	Current lowest realistic cost
Water treatment works	£830.8m	£581.6m	£415.4m
Water mains rehabilitation (DW5 iron and manganese)	£22.2m	£0.0m	£0.0m
Water resources (Water Framework Directive)	£134.7m	£94.3m	£67.8m
Security enhancement at water treatment sites	£76.4m	£61.1m	£61.1m
Customer requested lead pipe removal	£20.7m	£20.7m	£20.7m
Other minor elements	£30.2m	£30.2m	£30.2m
Scottish Water reduction for 'Programme overlap'	-£51.2m	-£35.9m	-£25.6m
Total 2006-10	**£1063.7m**	**£752.0m**	**£569.6m**

Review of planned investment in environmental objectives

Unsatisfactory intermittent discharges

The Reporter's review of Scottish Water's proposed investment in unsatisfactory intermittent discharges (UIDs) indicated a number of significant concerns relating to the scoping and costing of the programme. These included:

- the use of a generic approach to develop solutions, with no allowance for the possible development of integrated catchment solutions;
- insufficient modelling work being carried out accurately to size the required solution – this was particularly the case for the three major catchments that impact on the programme for the 2006-10 regulatory control period;
- a particular concern regarding the algorithm that was used to generate storage volumes for combined sewer overflows (CSOs) that impact on bathing and shellfish waters;
- high unit costs for schemes;
- concerns about the assessment of interconnecting pipework costs; and
- concerns about the percentage of on-costs applied to the UID programme.

The Faber Maunsell team agreed that the proposed investment raised a number of issues. Examples of over-scoping of requirements included the following:

- The proposed solution for one UID project with an estimated cost of over £10 million was to fit a 1,120m^3 storm tank and screen. Faber Maunsell concluded that the scheme as presented did not require a storage solution.
- An allowance at every site for a 50metre x 4.5metre access road and hard standing of 25m^2. In many cases the sites are on or adjacent to existing sites and roads.
- An assessed cost of £2.4 million for a storage volume of 70m^3, equivalent to a standard double garage.

Faber Maunsell concluded that the extent of over-scoping in the programme was sufficient to justify a reduction in the estimated costs of 58%.

Scottish Water is also fixing many UIDs during Quality and Standards II. A review of the Quality and Standards II baseline investment programme would suggest that a current adjusted unit cost of £0.42 million would be appropriate. In England and Wales, the average pre-efficiency cost of 'AMP4[35]' UID schemes in company submissions was £0.45 million[36]. This would give a total programme cost of £126 million[37]. The highest realistic cost would appear to be around £252 million[38].

We have accepted the Reporter's overall views on other aspects of the environmental quality programme. Our conclusions are shown in Table 9.

Table 9: Outcome of our assessment of environmental quality investment requirements (pre-efficiency)

Sub-categories	Adjusted Table C project cost totals 2006-10	Highest estimated cost	Current lowest realistic cost
Unsatisfactory Intermittent Discharges	£601.0m	£252.4m	£126.0m
Study work		£6.0m	£6.0m
UID sub-total		£258.4m	£132.0m
Sewage treatment work upgrade	£99.9m	£99.9m	£99.9m
Septic tank upgrade	£12.0m	£12.0m	£12.0m
IPPC[39] schemes	£9.4m	£9.4m	£9.4m
Landfill Directive	£3.5m	£3.5m	£3.5m
Other minor programme elements	£3.6m	£3.6m	£3.6m
Total 2006-10	**£729.3m**	**£386.8m**	**£260.4m**

Review of planned investment on development constraints and first time connection

Scottish Water's second draft business plan proposes investment of £221 million to meet demand for new network capacity from new housing and businesses. It also proposes £70 million for the first time connection of existing properties to the public water and waste water networks. Part 3 costs relate to the costs of connections to the water or sewer mains. Part 4 costs relate to the costs of connections to the trunk mains and treatment works. This was discussed in detail in Volume 3 of our methodology. This is shown in Table 10.

Table 10: Breakdown of Table C development constraint and first time connection investment

Sub-categories	Project cost totals 2006-10
Development constraints 'Part 3'	£66.9m
Development constraints 'Part 4'	£144.0m
Development constraints water resources	£10.4m
Total development constraints[40]	**£221.4m**
First time provision 'Part 3'	£40.2m
First time provision 'Part 4'	£29.9m
Total first time provision[41]	**£70.0m**

Development constraints

The Reporter and our engineering consultants conducted a detailed review of the methodology employed by Scottish Water to estimate the investment required to release development constraints. They raised several concerns including:

- assumptions on leakage;
- assumptions on demand; and
- the overall methodology that Scottish Water had employed.

Based on our own analysis and the comments provided by the Reporter and our independent engineering consultants, we consider that the allowance for Part 4 costs for both water and waste water, and for water resources, should be reduced by between 15% and 25%. Part 3 costs can also be reduced significantly. We believe that Scottish Water should have used a higher discount rate and taken account of likely infrastructure charges in estimating Part 3 costs. These changes give a highest estimated cost for development constraints (pre-efficiency) of £193 million and a current lowest realistic cost of £170 million[42].

35 AMP4 is the investment programme in England and Wales for 2005-10.
36 Inflated to 2003-04 prices.
37 After removal of duplications and PPP works, and assuming 280 UID schemes.
38 Based on the assessed reduction of 58% of the total UID programme cost, after the removal of duplications and PPP works.
39 IPPC – Integrated Pollution Prevention and Control.
40 Totals do not add due to rounding.
41 Totals do not add due to rounding.
42 Both costs include a £30 million contribution from connecting customers through the infrastructure charge.

First time provision

We have reviewed the comments of the Reporter and of our independent engineering consultants concerning Scottish Water's proposed investment for first time provision of water and waste water services to existing houses.

We have noted similar concerns to those expressed for development constraints above. We have also reduced the investment required for Part 4 constraints by between 15% and 25%, consistent with our approach for development constraints and for the same reasons. We note, however, that first time provision for water does not appear to form part of the Ministerial Guidance of February 2005. We will therefore require confirmation from Scottish Water that this investment is required to meet the Ministers' objectives.

The highest estimated cost for first time provision then becomes £62 million and the current lowest realistic cost £55 million[43].

A summary of our assessment of the pre-efficiency baseline investment programme for expenditure on development constraints and first time provision is shown in Table 11.

Table 11: Outcome of our assessment of development constraints and first time connections investment requirements (pre-efficiency)

Sub-categories	Original Table C project cost totals 2006-10	Highest estimated cost	Current lowest realistic cost	Contribution from connecting customers (infrastructure charge)	Highest estimated cost - contribution from customer base	Currrent lowest realistic cost - contribution from customer base
Development constraints 'Part 3'	£66.9m	£61.4m	£54.0m	£30.0m	£31.4m	£24.0m
Development constraints 'Part 4'	£144.0m	£122.4m	£108.0m	£0.0m	£122.4m	£108.0m
Development constraints water resources	£10.4m	£8.9m	£7.8m	£0.0m	£8.9m	£7.8m
Total development constraints	**£221.4m**	**£192.7m**	**£169.9m**	**£30.0m**	**£162.7m**	**£139.9m**
First time provision 'Part 3'	£40.2m	£36.9m	£32.4m	£10.0m	£26.9m	£22.5m
First time provision 'Part 4'	£29.9m	£25.4m	£22.4m	£0.0m	£25.4m	£22.4m
Total first time provision	**£70.0m**	**£62.2m**	**£54.8m**	**£10.0m**	**£52.3m**	**£44.9m**
Total for growth investment	**£291.4m**	**£254.9m**	**£224.7m**	**£40.0m**	**£214.9m**	**£184.7m**

[43] Both costs include a £10 million contribution from connecting customers through the infrastructure charge.

Customer service

We have accepted the pre-efficiency costings in this area. We have also added £15 million (pre-efficiency) to cover the costs of establishing the competition framework.

Summary

A summary of the changes to the baseline investment programme resulting from our review process is shown in Table 12.

Table 12: Summary of the proposed changes to the baseline investment programme

Investment category	Project cost totals 2006-10	Highest estimated cost	Current lowest realistic cost
Drinking water quality	£1063.7m	£752.0m	£569.6m
Environmental	£845.2m	£386.8m	£260.4m
Customer service + initial retail investment	£84.1m	£98.4m	£98.4m
Growth (contribution from the customer base)	£291.4m	£214.9m	£184.7m
Total 2006-10	**£2,284.4m**	**£1,452.2m**	**£1,113.1m**

Allowed level of capital expenditure

We have applied the cost base efficiencies to the programme in Table 12. The resulting post-efficiency investment profile, including the capital maintenance element, is shown in Table 13. The totals may not add exactly due to rounding.

Table 13: Allowed level of capital expenditure 2006-10

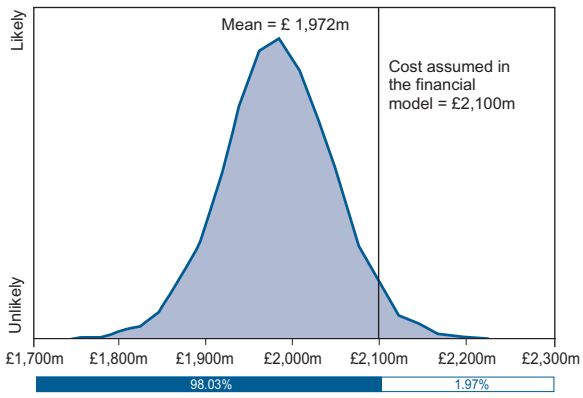
	2006-07	2007-08	2008-09	2009-10	Total
Draft determination					
Capital maintenance, current lowest realistic	£90.9m	£171.1m	£187.3m	£197.6m	£646.9m
Capital maintenance, highest estimated	£109.6m	£206.3m	£225.9m	£238.3m	£780.0m
Water quality, current lowest realistic	£63.4m	£119.3m	£130.6m	£137.8m	£451.1m
Water quality, highest estimated	£89.4m	£168.3m	£184.2m	£194.3m	£636.2m
Waste water quality, current lowest realistic	£29.0m	£54.5m	£59.7m	£63.0m	£206.2m
Waste water quality, highest estimated	£46.0m	£86.5m	£94.8m	£99.9m	£327.2m
Customer service, current lowest realistic	£9.3m	£17.5m	£19.1m	£20.2m	£66.1m
Customer service, highest estimated	£9.9m	£18.7m	£20.4m	£21.6m	£70.6m
Growth, current lowest realistic	£21.9m	£41.2m	£45.2m	£47.6m	£156.0m
Growth, highest estimated	£26.8m	£50.5m	£55.3m	£58.3m	£190.8m
Introduction to competition, lowest estimated	£8.5m	£2.4m	£0.5m	£0.5m	£11.9m
Introduction to competition, highest estimated	£9.1m	£2.6m	£0.5m	£0.5m	£12.7m
Total Quality and Standards III, current lowest realistic	£222.9m	£406.1m	£442.4m	£466.7m	£1,538.2m
Total Quality and Standards III, highest estimated	£290.8m	£532.8m	£581.1m	£612.9m	£2,017.5m
Overhang from Quality and Standards II	£224.6m	£28.4m	£0.0m	£0.0m	£253.0m
ESWA unsubstantiated efficiency adjustment	-£14.4m	-£13.9m	-£13.5m	-£13.1m	-£54.9m
Grand total, current lowest realistic	**£433.2m**	**£420.6m**	**£428.9m**	**£453.5m**	**£1,736.2m**
Grand total, highest estimated	**£501.0m**	**£547.3m**	**£567.5m**	**£599.8m**	**£2,215.6m**

Assessment of the level of investment included in the financial model

In setting a level of capital investment for the financial model we have taken account of the scope for efficiency and the range of investment we consider could be required. We examined each category of capital investment where we had identified a range of possible costs. We assumed that there was only a 5% chance of costs being lower than the minimum values that we identified, and a 5% chance of costs being higher than the maximum values.

We carried out a risk analysis that combined the ranges that we had estimated. The result of this analysis was a probability distribution for the cost of the entire capital programme. Figure 7 shows the results of our risk analysis.

Figure 7: Results of risk analysis on capital investment costs 2006-10



This analysis suggested that, given the ranges we described above, there is less than a 2% chance that the required capital programme will exceed our estimate of £2,100 million (2003-04 prices). This includes Scottish Water's full claim for the Quality and Standards II overhang[44]. We have also taken account of the unsubstantiated claim for capital expenditure efficiency made by the former East of Scotland Water Authority in 2001[45].

[44] Adjusted only for inflation in the next regulatory control period. It would not, in our view, be reasonable to ask customers to pay more because of the late delivery of the Quality and Standards II investment programme.

[45] See background in Chapter 6.

Our review will ensure that customers can benefit from the objectives set out in the Ministers' Guidance of February 2005 at the lowest reasonable overall cost. It may be that a further reduction in Scottish Water's proposed capital programme will be warranted after our review of the investment programme has been completed.

Infrastructure renewals charge

Infrastructure assets are generally underground assets with long useful lives. These lives, however, tend to be difficult to assess accurately. The rate of wear will vary with a range of factors such as construction method, choice of material, soil type, climate and usage. This makes it difficult to assess the annual cost of use of the infrastructure.

The underground network will never be replaced in its entirety. Instead, sections are renewed when their condition and performance deteriorates to the point where it is cost-effective to replace them (reducing repair costs, for example) or it is necessary to replace them in order to maintain customer service levels (to reduce interruptions, for example).

We analysed the infrastructure renewals charges of the companies south of the border relative to the assets and customers served. This analysis would suggest that the total infrastructure renewals charge (IRC) for Scottish Water in 2003-04 should have been in the range £45 million to £75 million. Its actual IRC in 2003-04 was £143 million.

If we assume that the 22% increase[46] in maintenance that is allowed by Ofwat applies equally to both infrastructure and non-infrastructure assets, then we may expect an IRC of around £55 million to £90 million in 2003-04 prices. If outturn inflation is 2.5%, this would suggest that by 2009-10 the IRC could be as high as £65 million to £105 million.

Based on this evidence, we have allowed Scottish Water an IRC of £79 million per year in 2003-04 prices (£86 million in 2005-06 prices).

Depreciation

Depreciation is the mechanism by which we recognise that the effectiveness and value of assets declines over time. This is a cost that should be borne by customers as they receive the benefit from use of the assets.

Establishing the appropriate depreciation charge for an asset involves three critical elements:

- estimating the asset's useful life,
- the choice of depreciation method, and
- valuing the asset.

Our approach to calculating Scottish Water's depreciation charge is consistent with Ofwat's approach in England and Wales. In this draft determination, therefore, our approach to calculating depreciation:

- uses Ofwat's five-step classification of asset life, ranging from very short to long;
- establishes the economic value of the asset on the basis of a modern equivalent asset valuation; and
- assumes straight-line depreciation over the life of the asset.

We have added the ongoing depreciation charge on existing assets to the depreciation charge on new assets that are expected to be added during this regulatory control period. This is set out in Table 14.

Table 14: Total depreciation charge 2006-10

Annual depreciation (outturn prices)	2006-07	2007-08	2008-09	2009-10
Very short	£16.6m	£23.1m	£23.4m	£24.0m
Short	£58.7m	£66.2m	£74.7m	£84.0m
Medium	£59.3m	£64.5m	£70.2m	£76.3m
Medium long	£8.4m	£9.7m	£11.1m	£12.7m
Long	£44.1m	£47.7 m	£51.3m	£55.3m
Total	**£187.2m**	**£211.2m**	**£230.7m**	**£252.3m**

Corporation tax

Scottish Water has not yet had to pay any significant amounts of corporation tax. This reflects accumulated losses inherited from the three predecessor authorities.

[46] This is the average increase in capital maintenance investment allowed by Ofwat in its 2004 price review following its assessment of companies' application of CMPCF.

Changes to accounting rules are likely to increase the tax paid by the water industry both north and south of the border. We have decided to take a conservative approach in our calculation of the potential tax liability (i.e. the highest realistic estimate of the tax payable) that will be faced by Scottish Water. This reflects a clear concern of customers that charges should be as predictable as possible.

Introducing the RCV method of charge setting

Our move towards the RCV method of charge setting at this draft determination will have no material impact on the charges faced by customers, on the resources available to Scottish Water, or on the implications for public expenditure.

Under the RCV method of charge setting, the revenue that Scottish Water should be allowed is calculated as set out in Figure 8.

Figure 8: The calculation of revenue

Return allowed on the regulatory capital value
+
allowed for operating costs
+
depreciation on non-infrastructure assets
+
infrastructure renewals charge
+
costs of PPP contracts
+
tax
+
current cost working capital adjustment

Scottish Water will receive an appropriate rate of return on its RCV. The RCV is a proxy for the current value in use of Scottish Water's above-ground asset base. This value will change over time to reflect the ageing (use) of assets (the cost of which is recognised by the infrastructure renewals and depreciation charges) and investment in new assets. The current below-ground assets (infrastructure) are considered to be assets that are required in perpetuity and are therefore not included in the RCV. The cost of maintaining and replacing infrastructure assets is met through the annual infrastructure renewals charge.

The level of the RCV does not, by itself, impact on the charges that customers pay. It is the cash return allowed on the RCV that determines the level of charges. The second element of the calculation of the allowed return on the RCV is the rate of return.

We multiply the rate of return by the RCV (adjusted in future years to reflect investment, depreciation and inflation) to establish the cash return allowed on the RCV. This ensures that customers only contribute towards those assets that have been created and which are providing a benefit to customers.

Moving towards the RCV approach to charge setting has several key benefits. Firstly, it should provide a basis for incentives for management that will be transparent, published in advance and objectively measurable. A further benefit of our RCV approach is that it allows us to compare financial ratios on a like-for-like basis with other regulated utilities, so providing a better indication of financial sustainability.

In the longer term, an important feature of the RCV method of charge setting is that it does not require the regulator to determine how much Scottish Water should seek to borrow or how much the Scottish Executive should seek to lend[47].

The allowed rate of return

The allowed rate of return is the rate of return that we believe Scottish Water requires in order to meet the objectives that have been set by the Scottish Ministers. Our role is to set maximum charges which are consistent with delivery of these objectives at the lowest reasonable overall cost.

We have sought a balance between current and future customers by ensuring that the allowed rate of return is only just high enough to cover the costs of the benefits provided to current customers.

As a public corporation, Scottish Water has only two sources of funds: revenue from customers and new debt. Scottish Water does not borrow directly from the capital markets, nor does it borrow at commercial rates. Scottish Water borrows from the Scottish Consolidated Fund at public sector borrowing rates.

47 See Chapter 19 for more detail of how we set the initial RCV.

Scottish Water does generate surpluses and therefore has retained earnings, which it can invest to achieve the outputs set by Scottish Ministers. It does not currently pay dividends and therefore all of the surplus generated can be reinvested for the benefit of current and future customers.

We have decided to apply a modified version of the weighted average cost of capital (WACC) approach that is used by the regulators of private sector companies. We have combined an observed real cost of debt with an estimate of an appropriate rate of return on the customer retained earnings (the equity portion of Scottish Water's RCV) in order to produce an allowed rate of return[48].

The future real rate of interest on debt for Scottish Water was estimated by looking at an average of current borrowing rates faced by Scottish Water. We concluded that a nominal pre-tax cost of debt of 4.6% was reasonable.

We have also, however, made an allowance for the full cost of embedded debt[49].

We have set the pre-tax allowed rate of return on the customer retained earnings at the post-tax allowed rate of return for debt. We believe that it is appropriate for customers to finance a relatively low return on the customer retained earnings. There is consequently no incentive for Scottish Water to seek to change its current ratio of debt to its regulatory capital value.

The allowed rate of return on customer retained earnings is 3.22%[50].

How we set the initial RCV

We believe that a variant of the comparator approach to setting the initial RCV is the most appropriate. This approach is consistent with that which Ofwat used to set the RCV of the water only companies.

We have set the initial RCV such that if Scottish Water meets the terms of its regulatory contract, it will be in a financially sustainable position by the end of the regulatory control period. In other words, the cash allowed rate of return in 2009-10 (given the allowed levels of operating cost, capital expenditure and depreciation) is sufficient to ensure that all of the targeted cash-based financial ratios are met at the end of the regulatory control period. We then used the comparator method to assess the reasonableness of this initial regulatory capital value.

Our calculation of the initial RCV is shown in Table 15. We have adjusted the average RCV in 2006-07. This reflects investment during 2006-07 and the reduction in the RCV that we included to compensate customers for the overhang from Quality and Standards II[51].

Table 15: Calculation of the initial RCV (outturn prices)

	2006-07	2007-08	2008-09	2009-10
Opening RCV	£3,519.8m	£3,847.8m	£4,214.3m	£4,606.1m
Inflation adjustment	£70.4m	£77.0m	£84.3m	£92.1m
New investment	£534.3m	£593.0m	£633.3m	£689.5m
Depreciation	£187.2m	£211.2m	£230.7m	£252.3m
Infrastructure renewals charge	£88.6m	£91.2m	£94.0m	£96.8m
Disposal of assets	£1.0m	£1.1m	£1.1m	£1.1m
Closing RCV	£3,847.8m	£4,214.3m	£4,606.1m	£5,037.5m
Year average	£3,683.8m	£4,031.0m	£4,410.2m	£4,821.8m

An initial RCV of £3,794.3 million (£3,519.8 million plus £274.5 million[52]) is consistent with achieving financial sustainability.

We chose to use the water and sewerage companies in England and Wales as the comparators. We did not use the water only companies because they do not provide a reasonable comparator with the scope of activities that is undertaken by Scottish Water. This confirmed the reasonableness of our initial RCV[53].

48 This equity (unleveraged) portion of the RCV is equivalent to the Glas Cymru financial buffer.
49 Embedded debt is debt taken out prior to April 2004 that carries a higher coupon than the allowed rate of return.
50 4.6% less value of the 30% corporation tax shield (1.38%).
51 The value of the overhang at the start of the 2006-07 financial year.
52 See Chapter 19.
53 We discuss the extent of the investment overhang from Quality and Standards II in Chapter 6 of this volume. We also discuss how we have taken account of the unsubstantiated efficiencies claimed by East of Scotland Water Authority.

Summary of costs of funding the capital programme

The total asset financing costs in this draft determination are outlined in Table 16.

Table 16: Total asset financing costs 2006-10

Cash allowed return on the RCV	2006-07	2007-08	2008-09	2009-10
Cash allowed return on the RCV	£182.7m	£195.9m	£209.6m	£224.8m
IRC	£88.6m	£91.2m	£94.0m	£96.8m
Depreciation	£187.2m	£211.2m	£230.7m	£252.3m
Total	**£458.4m**	**£498.3m**	**£534.3m**	**£573.9m**

Section 1: Introduction and background
Chapter 1: Introduction

Introduction

The capital programme is Scottish Water's largest single element of expenditure. In recent years, annual capital investment has ranged from £350 million to £520 million[54]. This represents around £200 every year for each connected customer.

This high level of investment is required both to maintain the performance of the existing network and to fund required improvements to water quality, environmental performance and customer service. Ongoing investment is essential if we are to have a sustainable water industry that meets our public health and environmental expectations.

It is important for Scottish Water to invest sufficiently in order to maintain the assets that provide services to customers. If insufficient maintenance funding is made available then customer service levels will fall and expected improvements in the environment or in water quality may not materialise. If too much funding is provided then there may be inefficiency and customers' money could be wasted.

Scottish Water must invest to ensure compliance with European Union (EU) directives on public health and the environment. It is, however, the EU member state that carries the risk of non-compliance, not Scottish Water.

It is also an important principle that customers should pay for the level of service they receive. We have taken steps at this Strategic Review to ensure that the way in which capital expenditure is funded is more transparent.

In this volume we set out our assessment of the funding required to finance the capital programme. We explain fully how we have reached our conclusions. Customers and stakeholders can be confident that the funding that is made available is sufficient to deliver the objectives established by Ministers for the water industry in Scotland over the next four years. This significant expenditure on capital is an important element of the regulatory contract between customers and Scottish Water. Customers will fund these improvements and it is vital that they are delivered in a timely fashion.

[54] This excludes investment delivered through PPP schemes.

This volume contains five sections:

Section 1 contains two chapters and introduces the volume.

- **Chapter 1** is this Introduction.
- **Chapter 2** discusses background issues. These include how we dealt with capital funding in the last Strategic Review and the factors that have led to changes in our approach for this Review.

Section 2 contains five chapters. It begins with a discussion of the Quality and Standards II and Quality and Standards III processes. It then outlines our assessment of the scope for capital efficiency in delivering the investment programme.

- **Chapter 3** describes the Quality and Standards II investment programme covering the period 1 April 2002 to 31 March 2006.
- **Chapter 4** discusses Scottish Water's performance in delivering Quality and Standards II and the impact that this has had on the Strategic Review of Charges 2006-10.
- **Chapter 5** describes the Quality and Standards III investment programme.
- **Chapter 6** discusses the issues associated with the transition from the Quality and Standards II period to Quality and Standards III.
- **Chapter 7** describes our approach to the assessment of the scope for capital efficiency.

Section 3 contains four chapters. It deals with Scottish Water's Public Private Partnership (PPP, or formerly Public Finance Initiative) contracts.

- **Chapter 8** provides background information about Scottish Water's PPP contracts.
- **Chapter 9** explains why it is important for us to assess these contracts as part of establishing the funding requirements for the industry in Scotland.

– **Chapter 10** outlines our approach to analysing Scottish Water's PPP contracts.

– **Chapter 11** discusses the way forward with PPP.

Section 4 contains ten chapters. It covers the financing of the required capital programme. As such, it begins by explaining the approach that we have taken to make the financing of the capital programme more transparent. It then explains our review of the investment programme contained in the second draft business plan of Scottish Water. This is the investment required to meet the Ministers' objectives for the water industry in the 2006-10 regulatory control period. The definition of the level of investment required to meet the Ministers' objectives impacts on the level of depreciation and infrastructure renewals charges. The section concludes with an explanation of how we have calculated the cash allowed for return to finance the investment programme.

– **Chapter 12** explains the introduction of a regulatory capital value (RCV) for Scottish Water and the advantages of this approach.

– **Chapter 13** explains our assessment of the allowed level of capital maintenance and of an appropriate infrastructure renewals charge.

– **Chapter 14** sets out our assessment of the level of investment required to meet the Ministers' essential and desirable objectives.

– **Chapter 15** summarises the total investment programme required to meet the Ministers' objectives.

– **Chapter 16** explains our calculation of depreciation. This depreciation charge covers the costs of refurbishing the above-ground assets to maintain the level of service provided to customers.

– **Chapter 17** discusses the important issue of corporation tax.

– **Chapter 18** discusses the 'allowed rate of return' that we have set for Scottish Water. This is effectively an estimate of the cost of capital for a public sector regulated body.

– **Chapter 19** describes how we have set the initial RCV for Scottish Water.

– **Chapter 20** is a summary of our assessment of the various costs of funding the capital programme.

– **Chapter 21** is a sensitivity analysis of the cash allowed return on the RCV. This chapter reviews the sensitivity of customers' bills to changes in the value of the initial RCV and the allowed rate of return.

Section 5 contains one chapter. This section describes how we propose to monitor performance in delivering the investment component of the regulatory contract.

– **Chapter 22** explains how we will monitor delivery of the investment programme.

Section 1: Introduction and background
Chapter 2: Background

Introduction

Capital expenditure is crucial to ensuring that levels of service to customers are maintained and that improvements in water quality, environmental standards and customer service are delivered.

This chapter explains the importance of proper capital expenditure. It provides a general introduction to the funding of capital expenditure and compares our approach in this strategic Review with our approach at the Strategic Review of Charges 2002-06. We will explore the financing of the capital programme in more detail in later chapters of this volume.

Scottish Water's assets

Capital expenditure is the cost incurred in creating, maintaining and enhancing the assets of a business. Scottish Water has a large number of assets that it uses to provide a water and waste water service. These include:

- water storage facilities;
- water mains;
- water treatment works;
- sewers;
- sewage treatment works;
- pumping stations;
- offices and depots; and
- vehicles and IT equipment.

It is important to maintain these assets appropriately and to be in a position to replace those assets that reach the end of their useful lives and must be replaced. There is also a continuing pressure to improve the level of customer service and the quality of treated water and discharges of waste water to the environment and to service new development. Meeting these expectations will entail further investment in new assets to improve or expand the service.

The assets required to deliver water and waste water services can be divided into five broad types:

Water infrastructure – the underground network of pipes, pumps and valves through which water is supplied to customers. Water infrastructure also includes dams, reservoirs and raw water aqueducts.

Water non-infrastructure – water treatment works, pumping stations, service reservoirs and water towers.

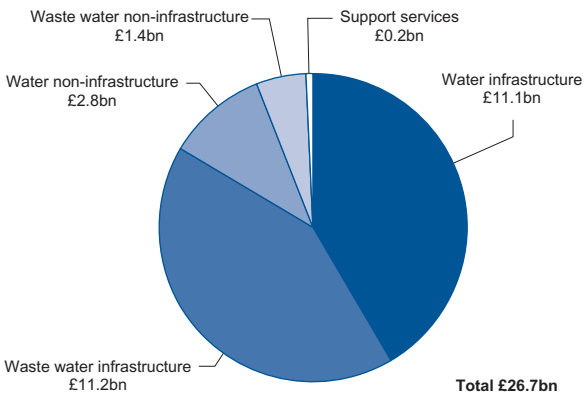
Waste water infrastructure – mainly comprises sewers that collect sewage and storm water and transport it to where it can be treated. This category also includes sea outfalls.

Waste water non-infrastructure – waste water treatment works, pumping stations and sludge treatment facilities.

Support services – operational assets that are essential to effective management of the business, including vehicles, information systems, offices, depots and stores.

In its 2003-04 Annual Return, Scottish Water estimated that it would cost approximately £27 billion to replace all of the public water and sewerage assets (pipes, valves, treatment works and so on) in Scotland. This gives a good idea of the extent of investment that has had to take place to achieve the water and sewerage service we have now. It is important that we maintain these assets appropriately. The replacement cost of these different asset types is summarised in Figure 2.1.

Figure 2.1: Asset replacement cost[55]



Capital expenditure in the Scottish water industry

It is necessary to invest in water and waste water assets for the following reasons:

- **To maintain the level of service to customers** – this investment is often termed capital maintenance. The assets of any business need to be replaced at the end of their useful lives if the business is to continue.

- **To improve the quality of service to customers and the public** – this investment is often termed capital enhancement, or quality investment. Investment in assets is necessary to meet higher environmental and quality standards.

- **To respond to customers' changing demand patterns** – this investment is often termed capital enhancement or growth investment. The assets' capacity may need to be increased in order to meet both the demands of new customers and growth in usage from existing customers.

We believe that maintenance of assets should be the highest investment priority for Scottish Water. The sustainability of the water industry in Scotland and its ability to deliver environmental, public health and customer service improvements depends on adequate maintenance on an ongoing basis.

Investment in water and waste water assets is also necessary to meet higher environmental and quality standards or to increase the level of service to customers, rather than simply replacing assets on a 'like-for-like' basis to maintain the water and waste water service.

Scottish Water will have to invest in a number of areas in order to meet the standards that have been, and will continue to be, set by environmental protection and public health legislation. In addition to this, it is important to strive for improvements in service reliability and standards for customers.

Customers require services to be available 'on demand' and at 'reasonable cost'. The capital investment programme must therefore be delivered to meet the requirements of customers and environmental regulations now, and in the medium term, while reconciling this with the long-term nature of the water and sewerage business and the significant replacement cost of the assets.

Capital expenditure represents a significant proportion of Scottish Water's total outgoings. In 2003-04, when Scottish Water spent £389 million on capital expenditure, this accounted for just under 40% of its total expenditure of £1,019 million for the year. This is shown in Table 2.1 below.

Table 2.1: Outline of expenditure 2003-04

	2003-04
Capital expenditure	£389m
Operating expenditure	£309m
Public Private Partnerships	£112m
Spend to save	£72m
Interest	£137m
Total	**£1,019m**

[55] Scotish Water's Annual Return for 2003-04.

Borrowing to fund capital expenditure

Water and sewerage assets may have quite short lives (for example IT), or very long lives (for example, trunk sewers). The funding for investment can come from two sources – new debt and/or post-tax surpluses earned by Scottish Water.

The investment programme will benefit customers, both now and in the future. However, we believe that each generation of customers should pay the full cost of the water and sewerage services it consumes.

If post-tax retained surpluses are used to fund a significant proportion of new investment, the impact will be that future customers pay relatively less, but that current customers pay relatively more for the improvement in service they receive.

Effective price regulation also requires management to face a hard budgetary constraint if customers are to have confidence that they will focus on improving efficiency. Any business could, at least in theory, borrow more cash in order to cover any or all of its costs. However, any borrowings will need to be repaid, with interest, from future revenues. In other words, continuing to borrow to cover current costs will mean that revenues have to increase to meet the interest charges on the borrowing. If the underlying revenue is not sufficient to cover the ongoing operational and maintenance expenditure faced by the water industry, borrowing is only delaying and worsening the charge levels that future generations face. Unless revenues are brought broadly into line with the average continuing annual obligations of the water industry, there will be a continuing need to increase borrowing in order to balance the books at the end of the financial year.

Financial sustainability is achieved when the growth in new debt in each year is broadly limited to the growth in the free cash flow available to service that debt. A sustainable business requires interest charges over the long-term to remain at about the same percentage of the cash generated from operations.

Some commentators have referred to the Treasury's 'Golden Rule' to suggest that current charges could have been lower if more borrowing had been available. The Treasury's 'Golden Rule' was introduced to ensure that, as a country, we measure the level of our current consumption accurately. The rule warns against using borrowing to meet the costs of current consumption. It also makes it clear that borrowing should be affordable and sustainable. By moving towards an RCV approach to price setting, we ensure that there will be a transparent and sustainable level of borrowing and that both current and future customers will be fairly treated.

Approach at Strategic Review of Charges 2006-10

Scottish Water has made progress in its understanding of its asset base. As a result, at this Review we have introduced an RCV for Scottish Water and have moved towards the RCV method of charge setting. We do not believe that move to the RCV method of charge setting will have any immediate material impact on the charges faced by customers, on the resources available to Scottish Water, or on the implications for public expenditure. The changes are designed principally to allow greater transparency.

Most other utility regulators establish an appropriate level of revenue by using an RCV. This Review will bring the approach to charge setting for Scottish Water into line with that for the English and Welsh water and UK energy sectors. It also reflects the views of the Competition Commission (formerly the Monopolies and Mergers Commission). The approach allows us to make more direct comparisons of financial ratios and risks to customers than was possible previously.

The RCV is the value in-use of the physical assets used to provide a service to customers and on which it should earn a return. Obviously this value will change over time. As the assets represented by the RCV grow older, their physical usefulness declines. As a result, the financial value of the assets also declines. We refer to this reduction in value over time as depreciation.

The RCV approach ensures that customers only pay for new capital expenditure as and when it is actually delivered and not before. When Scottish Water invests in new assets, the efficient value of that asset is added to the RCV. This increases prices to customers and so they are paying for expenditure that has actually occurred and is in use. Scottish Water will only earn a return once a project has been delivered and the efficient cost of that project is added to the RCV.

Our approach at the last Review relied on forecasts of capital expenditure expected in each year. We set customer charges to cover this. There was a risk that customers would be charged for investment that did not, for whatever reason, occur in the year.

The RCV method of price setting has a second important advantage. At the last Review, we had to make a judgement on how much investment should be funded from revenue and how much from new borrowing. The RCV method of price setting does not require the regulator to determine how much Scottish Water should seek to borrow or how much the Scottish Executive should seek to lend. The onus is on the management of Scottish Water and its owner, the Scottish Executive, to ensure that the agreed levels of service and investment programme are delivered.

In their February Guidance, Ministers indicated a desire to see the financial strength of Scottish Water improve over the regulatory control period. We have measured the financial strength of Scottish Water for this purpose using the debt to RCV ratio[56].

Summary

Capital expenditure represents a significant proportion of Scottish Water's expenditure. It is essential to the maintenance and improvement of the level of service provided to customers and compliance with public health and environmental standards.

We have adapted the approach that we used to fund capital expenditure in the Strategic Review of Charges 2002-06 and moved towards a regulatory capital value method of charge setting. This reflects improvements in the level of understanding that Scottish Water has about its asset base. This change in approach will bring the Scottish Water industry into line with the other utility providers in the rest of the UK, enabling more direct comparisons to be made of performance and costs.

Our move towards the RCV method of price setting also ensures that customers do not pay for capital expenditure until it has actually been delivered.

These issues are discussed further in Section 4 of this volume.

[56] This is discussed in more detail in Volume 7.

Section 2: Capital expenditure
Chapter 3: Quality and Standards II

Introduction

In making investment decisions, it is necessary to strike a balance between a number of priorities, including:

- maintaining the assets appropriately;
- improving compliance with public health and environmental standards;
- improving customer service; and
- connecting more properties to the water and waste water network.

Total investment is limited not only by the impact on customers' bills but also by the physical size of the investment programme that Scottish Water can manage efficiently and effectively. There are also practical limits on the capacity of the civil engineering market in Scotland to deliver the required investment.

Scottish Ministers establish investment priorities for the Scottish water industry through the Quality and Standards process. The Quality and Standards process brings together a range of stakeholders to define the level and scope of investment in the water industry. This process specifies the level of service to customers, and the environmental and water quality standards that the water industry in Scotland must deliver.

The Scottish Executive introduced the Quality and Standards process in 1999 to ensure a coordinated approach to assessing the required level of investment for the industry. Quality and Standards I established the investment priorities of the three former water authorities for 2000-01 and 2001-02. Scottish Ministers published their decisions in November 1999. This was the first time that the aims of investment in the water industry had been clearly and publicly documented.

Quality and Standards I defined what the Scottish Executive expected the three former water authorities to deliver in terms of drinking water quality, safe and sustainable sewage disposal and environmental protection.

Quality and Standards II set investment priorities for the period from April 2002 to March 2006. This chapter discusses the difficulties that have arisen in defining and monitoring the outputs established by Quality and Standards II. We have sought to learn from these difficulties. It is important that the Quality and Standards III investment programme clearly defines each project required to deliver improvements to the environment, public health and customer service.

Development of Quality and Standards II

In January 2001, the Scottish Executive published a consultation document[57] setting out clear options for the water authorities' investment programmes during the Quality and Standards II period.

Ministers sought customers' views on the investment priorities of the water authorities for the 2002-06 regulatory control period. The consultation document outlined three options:

Minimum option: Investing only to meet the legal standards set by regulations on water and sewage treatment. This option used low-cost solutions and did not fully address maintenance of existing assets, such as treatment plants, water mains and sewers.

Central option: Investing at a level that met legal standards and allowed for some improvement in the above-ground asset base, but not sufficient to improve the condition and performance of the underground infrastructure.

Enhanced option: Investment at this level would allow substantial progress in improving the industry's assets. Only this option included significant resources to remove development constraints and provide first time water and sewerage connections.

Customers' views were also sought about the speed with which underground assets should be replaced. The consultation clearly highlighted that the quick-fix method was cheaper in the short term but more costly in the long run.

[57] Scottish Executive, 'Water Quality and Standards 2002-06', 2001.

There were 40 responses to the consultation. The majority of the responses came from local authorities and environmental organisations. Only 5% of respondents supported the minimum option, even though this would have meant that charges for customers would have been lower. Some 42% of respondents (including the Scottish Environment Protection Agency, SEPA) supported the enhanced option. These respondents argued that there was a clear opportunity to invest properly in Scotland's water services, and to deal with the backlog of underinvestment in the underground network of pipes. They argued that this would improve the level of service to customers by reducing the risk of burst water mains and flooding from sewers. Some 33% including the three water authorities and this Office, supported the central option. The remaining 20% did not indicate a preference.

In August 2001, the Minister for the Environment and Rural Development, Ross Finnie MSP, decided that the central option "struck the right balance between environmental and public health improvements and affordability for customers"[58].

The Minister also took account of views expressed in the consultation that money should be available to help ease constraints on new developments, and to allow first time sewerage provision in rural areas. An additional £50 million[59] of 'high priority' expenditure was made available for this purpose.

The investment programme was summarised in 'Water Quality and Standards: Investment priorities for Scotland's water authorities 2002-2006', which was published in August 2001. This indicated that the cost of the investment programme would be £2.34 billion.

In the Strategic Review of Charges 2002-06 we examined the scope for capital efficiency in the Quality and Standards II investment programme. We advised Ministers that efficiency savings of around £500 million were possible. Our analysis showed that Scottish Water should be able to deliver all of the required outputs for £1.81 billion. Ministers accepted this advice.

In the Strategic Review of Charges 2002-06, we forecast a rate of capital expenditure inflation (COPI) of 1.5% a year. COPI has consistently continued at a higher level than we had expected and this is likely to increase the efficient cost of delivering Quality and Standards II to approximately £1.93 billion. Scottish Water is therefore required to deliver the Quality and Standards II outputs for this revised amount.

Definition of the Quality and Standards II investment programme

The Scottish Executive's summary of Quality and Standards II outputs contained more detail than the summary of Quality and Standards I. The outputs set out in the summary included:

- relining or replacing 3,506 km of water mains across Scotland;
- reducing to 3,300 the number of properties suffering from poor pressure in the former East of Scotland Water Authority's area; and
- providing secondary treatment of waste water for 85% of properties in the former North of Scotland Water Authority's area.

The summary also included the following additional higher level outputs:

- a reduction in the number of properties affected by low pressure, a decrease in the number of bursts and an improvement in water quality; and
- a reduction in the number of properties liable to sewer flooding, a reduction in the number of sewer blockages and an improvement in the environment.

These high level outputs were not sufficiently well defined to allow us to monitor progress in their delivery.

WIC 18

When we need to collect information that is not included in the regular regulatory returns, we write to the Chief Executive of Scottish Water[60] asking for the required

[58] From 'Water Quality and Standards: Investment priorities for Scotland's water authorities 2002-2006', August 2001, Foreword by Ross Finnie MSP.
[59] This £50 million was subject to the efficiency targets set in the Strategic Review of Charges.
[60] Before April 2002 we wrote to the Chief Executives of the three water authorities. These letters are available on our website and in Appendix 10.

information. These letters are called WIC letters. In May 2001 we wrote the WIC 18 letter, 'Quality and Standards final output'[61]. This letter asked the three authorities to provide a project by project definition of their proposed investment programme. This proposed programme needed to be consistent with the outputs of Quality and Standards II.

We did not envisage that the authorities would find it difficult to provide this information, as they had already provided detailed costs for Quality and Standards II. North of Scotland Water Authority and West of Scotland Water Authority were able to provide a substantially complete investment programme, with a detailed breakdown of projects. We had a number of questions relating to specific projects, particularly the inclusion of 'spend to save' projects, which were funded separately and should not have formed part of the baseline programme.

East of Scotland Water Authority provided a summary list with an insufficient breakdown to allow project level monitoring. We asked for more detailed information about the specific projects which the authority intended to undertake. We also asked the authority to substantiate its claim of capital efficiency which it had included in its costing of Quality and Standards II. East of Scotland Water Authority, however, failed to provide the required level of detail. When Scottish Water was formed in April 2002, this problem had still not been properly addressed.

Following its creation, Scottish Water began a process of reviewing the entire capital investment programme. We understand the reasoning behind this decision. However, our concern continued to be to make sure that customers received value for money; we therefore still wanted to achieve clarity on the baseline investment programme.

East of Scotland Water Authority's claimed efficiencies

Our initial concern was to gain better information about £114 million of efficiencies that the former East of Scotland Water Authority had claimed in its development of Quality and Standards II. If the claimed efficiencies were not substantiated, customers faced higher bills than would otherwise have been allowed because the efficiency target applied to East of Scotland Water Authority in the Strategic Review of Charges 2002-06 reflected the claimed efficiency[62]. During 2002, we had protracted discussions with Scottish Water about the claimed capital efficiencies; it became apparent that no definitive list of projects existed to substantiate East of Scotland Water Authority's efficiency claim.

Agreeing the baseline programme

We continued to require Scottish Water to provide a fully defined investment programme.

The first step was to ensure that the investment programme contained sufficient detail for us to be able to monitor its delivery. This was particularly difficult for the East of Scotland Water Authority investment programme, which included a number of high-level projects such as 'East of Scotland Water reservoirs' and 'corporate billing systems'. We could not monitor the delivery of such high-level projects. It was important to break these down into individual, named projects with specific outputs. We also needed this level of detail in order to ensure that the quality regulators were content with the full detail of the Quality and Standards II programme.

The next step in defining an appropriate baseline for the investment programme was to review the detailed project list and to establish whether each proposed project was necessary. A number of workshops were held in March 2003 where key stakeholders examined the WIC 18 programme lists, line by line, and allocated projects into two distinct categories:

- The 'red' category meant that the project was no longer required and could be replaced by an alternative project.

- The 'green' category was reserved for those projects which delivered agreed Quality and Standards II outputs.

61 The WIC 18 letter is published in Appendix 10.

62 The overall efficiency applied to East of Scotland Water Authority was 11%, compared with 26% for North of Scotland Water Authority and 27% for West of Scotland Water Authority. See Strategic Review of Charges 2002-06, Table 19.12, Page 207.

We set up a steering group to oversee this process and to develop a 'substitution process'. The substitution process allows the 'red' projects to be exchanged for alternative projects that provide an equivalent set of outputs.

The steering group also sought to resolve a number of other issues, relating to the baseline programme, which emerged during this initial review. These included the following:

- Inclusion in the original WIC 18 submissions by the three authorities of £103 million of 'spend to save' projects. Spend to save investment had been funded separately, so should not have been included in the baseline programme. Our view was that replacement projects were required for this investment. However, Scottish Water asserted that removing these projects formed part of the required capital efficiency and that there was therefore no justification for replacement projects.

- The definition of projects (totalling £50 million) to ease development constraints and help with first time sewerage provision in rural areas. We originally asked for a list of these projects in our WIC 16 letter[63].

- The treatment of expenditure on Quality and Standards I investment projects that had overrun into the Quality and Standards II period. Scottish Water's initial estimate of this overrun was as high as £157 million. Our analysis indicated[64] that all of the money allocated to Quality and Standards I had been spent and there was therefore no reason why additional funding for Quality and Standards I projects should be made available. In our view customers should not be asked to pay twice for the same output.

The substitution process

The steering group agreed the high level principles of the substitution process in July 2003. These included stakeholder agreement to changes and a requirement that we should scrutinise the project costs associated with all changes to the WIC 18 list. The Reporter for Scottish Water helps with this process. There was also an agreement that any substitutions should not alter the stated objectives of Quality and Standards II.

In September 2004 the steering group agreed a solution to the £103 million of spend to save expenditure included in the original WIC 18. This agreement allowed £58.12 million of the £103 million to be allocated to projects where the scope of the project had changed or problems had arisen. The remainder was allowed to offset any Quality and Standards I liabilities inherited by Scottish Water. Scottish Water has agreed to make no further claims for spending on Quality and Standards I projects[65].

Stakeholders have also now identified potential projects to satisfy the WIC 16 criteria[66].

Scottish Water has issued a series of WIC 18 baseline project lists in an agreed format. The stakeholder group examines the list of projects to ensure that all of the agreed outputs of Quality and Standards II are met. There has now been a number of iterations and the WIC 18 list is, in the main, fully defined. It is important to note that the majority of projects in the original responses of the three authorities to the WIC 18 letter are still in the revised baseline.

Scottish Water has sought to argue that non-delivery of Quality and Standards II results from delays in defining the project list. However, this is invalid because most of the additional definitions have related to capital maintenance investment and to the high level programme that was supplied by the former East of Scotland Water Authority. Customers will rightly expect Scottish Water to have taken all possible steps to ensure that the investment programme is delivered efficiently and effectively.

We are still concerned about the length of time taken to define the baseline investment programme for Quality and Standards II. Customers, and the wider group of stakeholders, would benefit if future Quality and Standards investment programmes were fully defined

63 This letter is published in Appendix 10.
64 See our 'Investment and Asset Management Report 2000-02', Chapter 5, Section 5.2, Page 24.
65 Scottish Water has however again raised this issue in its explanation of the resources required to complete the delivery of Quality and Standards II. See Chapter 6 for more details.
66 Regulatory letter WIC 16, 'Development constraints and rural sewerage connections', 28 May 2001.

before the start of the regulatory control period. This would ensure that stakeholders' expectations are met and that we can monitor delivery of the investment programme effectively.

Additional outputs required under Quality and Standards II

Scottish Water notified the steering group that it had been tasked with delivering additional outputs that were not known when the original investment programme was established. In particular, Scottish Water identified the following areas:

- Additional security measures

  Scottish Water has indicated that increased government security requirements have increased the investment it will have to deliver during Quality and Standards II.

- Unbudgeted development contributions

  Scottish Water claims there is a shortfall between the funding provided in Quality and Standards II for 'reasonable cost' contributions to developers[67] and its current estimated liabilities in this area.

- Dangerous Substances and Explosive Atmospheres Regulations 2002

  Scottish Water has indicated that it will incur significant costs associated with the requirements of these regulations. Quality and Standards II did not anticipate these requirements.

Scottish Water has estimated that the total cost of these additional outputs is £110 million.

We have agreed that Scottish Water will provide a detailed report on these costs at the end of the Quality and Standards II period. We will ask the Reporter to assess whether Scottish Water's spending to meet these requirements has been reasonable and efficient. The Scottish Executive has made public expenditure available to cover these additional outputs.

Delivery of Quality and Standards II

In response to the capital efficiency targets set in the Strategic Review of Charges 2002-06, Scottish Water decided to establish Scottish Water Solutions. Scottish Water Solutions is a joint venture company. Scottish Water owns 51% and the remaining 49% is split equally between two consortia, Stirling Water (comprising Thames Water, construction group KBR, Alfred McAlpine and MJ Gleeson) and UUGM (which is made up of United Utilities, Galliford Try and Morgan).

Scottish Water expects that Scottish Water Solutions will deliver two-thirds of the Quality and Standards II capital investment programme. The joint venture is considered key to the overall delivery of Quality and Standards II. However, Scottish Water is still accountable for delivery of the investment programme.

Scottish Water has cited the delays associated with establishing Scottish Water Solutions as a principal reason for its slow start in delivering Quality and Standards II. In our Investment and Asset Management Report 2002-03, published in April 2004, we noted that halfway through the regulatory control period only around £600 million of the £1.8 billion Quality and Standards II programme had been delivered. Further, our analysis showed that only some 10% of the projects had been completed to beneficial use. We commented that[68]:

"Delivery of the Quality and Standards II investment programme is off to a slow start. This delay will impact on much needed improvements to water quality, environmental standards and customer service."

Phasing delivery of the investment programme towards the back end of the regulatory control period does not, in itself, jeopardise delivery of the overall investment programme. However, the longer projects are delayed, the harder it becomes to deliver the programme efficiently. Our 2004 Investment and Asset Management Report commented[69]:

67 These 'reasonable cost' contributions are provided by Scottish Water to developers as a contribution towards the cost of installing water and waste water infrastructure to new properties.
68 Investment and Asset Management Report 2002-03, published by WICS, Executive Summary, Page 10.
69 Investment and Asset Management Report 2002-03, published by WICS, Chapter 5, Section 5.7, Page 31.

"It will be a significant challenge to deliver investment efficiently at such an accelerated rate …. only two companies south of the border have ever increased investment at a similar rate and no company has successfully increased actual capital spending by the cash amount required."

We return to this issue in Chapter 6.

Summary

The second Quality and Standards process covered the regulatory control period 2002-06. The three water authorities estimated the cost of the investment programme to be £2.34 billion.

In the Strategic Review of Charges 2002-06 we advised Ministers that there was significant scope for efficiency and that Scottish Water should be expected to deliver the programme for £1.81 billion.

Over the past three years we have worked with the Scottish Executive, SEPA and the DWQR to finalise the baseline investment programme for Quality and Standards II. We have taken steps to ensure that a detailed baseline investment programme is in place for the next regulatory control period.

Section 2: Capital expenditure
Chapter 4: Delivery of Quality and Standards II

Introduction

In the Strategic Review of Charges 2002-06, we allowed £1.81 billion to deliver Quality and Standards II. However, capital investment inflation has run at a higher level than predicted and we now calculate that the efficient cost of Quality and Standards II is approximately £1.93 billion.

New outputs, relating to security, the removal of hazardous substances and unexpected contributions to developers, may have further increased the efficient cost of the programme to £2.04 billion.

In this chapter we review Scottish Water's performance in delivering this investment. Our analysis of capital programmes south of the border suggests that delivering Quality and Standards II was a significant challenge. The extent of this challenge was not fully appreciated by the three authorities at the time of the Strategic Review of Charges 2002-06. We discuss the impact of the size of the capital programme on the efficiency of programme delivery.

We then examine the overall efficiency of delivering the Quality and Standards II programme to date. We compare current performance with the targets set in the Strategic Review of Charges 2002-06. Our analysis indicates that delivery of Quality and Standards II is currently some £80 million less efficient than was required by the Strategic Review of Charges 2002-06. This inefficiency will increase the challenge posed in delivering the rest of the programme within the originally agreed budget.

Finally, we examine the comparative efficiency of different delivery options used by Scottish Water. This would appear to indicate that Scottish Water Solutions (SWS) has improved the efficiency with which capital investment is delivered. However, as we highlight in Chapter 14 , there is still considerable scope for improvement in the efficiency of capital expenditure.

Size of the capital programme

Analysis of the investment programmes delivered by the companies in England and Wales demonstrates the challenge posed in delivering the Quality and Standards II programme. Five water and sewerage companies in England and Wales are either broadly the same size as Scottish Water or larger. Thames Water, Severn Trent Water and United Utilities are larger, while Anglian Water and Yorkshire Water are similar in size to Scottish Water. We can compare the size of the Quality and Standards II investment programme with investment programmes delivered by these companies.

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Table 4.1: Key company statistics[70]

Company	WATER				SEWERAGE			
	Connected properties (millions)	Population (millions)	Length of mains (km)	Number of treatment works	Connected properties (millions)	Population (millions)	Length of sewers (km)	Number of treatment works
Thames	3.49	8.26	31,416	97	5.38	13.06	67,335	349
Severn Trent	3.30	7.31	45,949	172	3.71	8.87	54,040	1,017
United Utilities	3.13	6.69	40,741	140	3.07	6.66	40,018	599
Scottish Water	2.48	5.18	46,508	371	2.37	4.69	44,854	1,836
Yorkshire	2.12	4.66	31,217	81	2.12	4.65	30,157	614
Anglian	1.93	4.18	36,762	143	2.47	5.70	35,394	1,077

We have examined the capital investment delivered by all of the companies over the 12 consecutive four-year periods from privatisation in 1989 until 2005. We have adjusted the value of each programme to a 2003-04 price base.

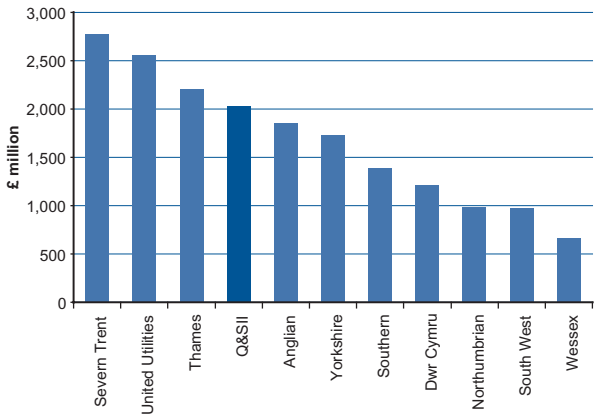
Table 4.2: Four-year total capital investment in England and Wales 1990-2005[71]

Company	1990-94	1991-95	1992-96	1993-97	1994-98	1995-99	1996-00	1997-01	1998-02	1999-03	2000-04	2001-05
Anglian	£1,829m	£1,856m	£1,722m	£1,676.9m	£1,599.5m	£1,574.3m	£1,600.5m	£1,465.3m	£1,315.2m	£1,199.6m	£1,105.4m	£1,132.2m
Dwr Cymru	£981.0m	£998.9m	£1,009.4m	£1,043.9m	£1,129.2m	£1,197.3m	£1,205.8m	£1,126.4m	£1,021.7m	£984.7m	£977.8m	£1,000.3m
Northumbrian	£523.6m	£482.3m	£470.7m	£525.6m	£705.9m	£815.9m	£958.1m	£989.9m	£905.7m	£912.3m	£831.8m	£762.7m
Severn Trent	£2,773.1m	£2,751.5m	£2,336.0m	£2,131.1m	£2,120.4m	£2,211.9m	£2,358.6m	£2,129.7m	£1893.7m	£1,688.4m	£1,521.4m	£1,625.6m
South West	£944.8m	£975.3m	£870.7m	£789.8m	£713.5m	£631.1m	£645.6m	£618.2m	£604.1m	£673.5m	£666.1m	£660.7m
Southern	£749.6m	£759.9m	£713.3m	£787.5m	£918.6m	£1,099.8m	£1,295.4m	£1,380.1m	£1,306.9m	£1,156.6m	£981.9m	£911.3m
Thames	£2,200.9m	£2,031.4m	£1,912.3m	£1,907.0m	£1,982.6m	£2,132.2m	£2,197.6m	£2,049.1m	£1,915.9m	£1,911.5m	£1,992.1m	£2091.0m
United Utilities	£2439.0m	£2,331.2m	£2,174.3m	£2,133.1m	£2,160.4m	£2,274.3m	£2,270.7m	£2,070.9m	£1,927.6m	£1,953.3m	£2,286.3m	£2,554.1m
Wessex	£645.7m	£623.6m	£543.5m	£487.0m	£484.8m	£530.2m	£575.4m	£595.0m	£594.9m	£608.5m	£631.5m	£663.0m
Yorkshire	£1,411.5m	£1,294.5m	£1,183.4m	£1,207.3m	£1,322.4m	£1,517.4m	£1,727.1m	£1,584.4m	£1,522.1m	£1,425.3m	£1,231.8m	£1,271.6m

A comparison of the largest ever four-year programme for each of the English and Welsh companies and Quality and Standards II[72], shows that only three companies have achieved a larger four-year investment programme.

70 Information for 2003-04 taken from the Ofwat June Return for companies in England and Wales and from the WIC Annual Return for Scottish Water.
71 All values have been adjusted to 2003-04 prices. Future forecasts are based on Ofwat's final determination for the 2005-10 price review period.
72 £2,026 million in 2003-04 prices, including an estimate for capital inflation and Scottish Water's claim for new outputs.

Figure 4.1: Largest four-year investment total for each company (1990-2005)

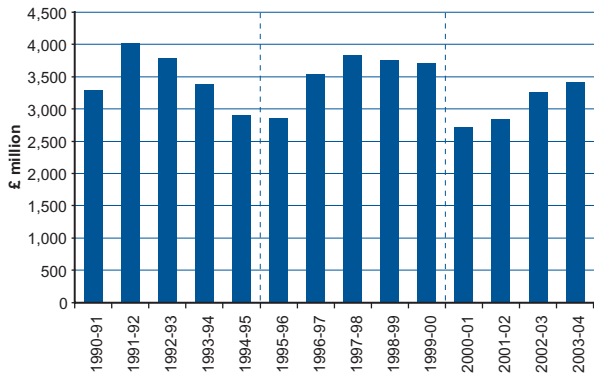


As Figure 4.1 illustrates, only the three biggest companies south of the border have delivered larger investment programmes than Quality and Standards II. Anglian Water and Yorkshire Water, the two companies of similar size to Scottish Water, have never delivered a four-year programme as large as Quality and Standards II.

Impact of the length of the regulatory control period on investment

In England and Wales regulatory control periods last five years. Companies use the first part of a regulatory control period to decide how best to deliver the agreed capital programme. An analysis of total investment since 1990 shows the effect of the regulatory control period on the delivery of investment. This is illustrated in Figure 4.2.

Figure 4.2: Total capital investment of the water and sewerage companies 1990-91 to 2003-04



This analysis clearly shows that the level of investment in the first year of each regulatory control period (1990-91, 1995-96 and 2000-01) is generally lower than in subsequent years of the period. The shorter four-year regulatory control period in Scotland therefore further increased the challenge in delivering Quality and Standards II.

Efficiency in delivering Quality and Standards II

Our assessment of Scottish Water's capital investment efficiency for Quality and Standards II uses the WIC 18 baseline. Any expenditure on projects that are not part of the agreed Quality and Standards II baseline is, by definition, inefficient. Such expenditure does not contribute to the agreed outputs.

We have compared the project expenditure reported by Scottish Water in its quarterly 'Capital Investment Return' (CIR) with the WIC 18 baseline. We examined projects that had been completed to 'beneficial use' from the most recent CIR[73]. When a project has reached beneficial use, the required output has been delivered, although further costs may still be incurred.

Of the 4,772 projects listed in the latest CIR, 2,338 (49%) are said to have been completed to beneficial use. Of these, 1,936 projects were included in the WIC 18 baseline investment programme. We also included the Scottish Water Solutions incentive[74] expenditure of around £13 million.

These projects have a WIC 18 pre-efficiency value of around £492 million. We adjusted the WIC 18 pre-efficiency value of each project to take account of higher than expected inflation. We then reduced the pre-efficiency value by the efficiency targets outlined in the Strategic Review of Charges 2002-06[75]. Table 4.3 shows these adjustments.

[73] In this chapter we have used the Capital Investment Return for quarter 3 - 2004-05, which was supplied to our Office in January 2005. The quarter 4 – 2004-05 CIR was received in May 2005, too late to be included in this document. Our initial analysis of the quarter 4 CIR has, however, confirmed that it does not impact to any significant extent on our findings.

[74] Project Autocode 9809 labelled 'Scottish Water Solutions Share account'.

[75] See Strategic Review of Charges 2002-06, Section 4, Chapter 19.

Table 4.3: Inflation and efficiency adjustments applied to projects completed to beneficial use

Financial year	Strategic Review of Charges 2002-06 forecasted COPI Index	COPI real and forecasted	Inflation adjustment	Efficiency target
Pre 2002	124.41	128.22	3.07%	14.0%
2002-03	124.41	128.22	3.07%	14.0%
2003-04	126.27	135.25	7.11%	19.9%
2004-05	128.17	141.56	10.45%	25.3%
2005-06	130.09	145.73	12.03%	30.8%
Post 2006	130.09	145.73	12.03%	30.8%

We compared the adjusted post-efficiency value for each project completed to beneficial use with the actual spend reported in the CIR, as shown in Table 4.4.

Table 4.4: Assessment of efficiency for projects completed to beneficial use

Number of projects	1,936
WIC18 pre-efficiency value	£ 492.4m
Inflation adjustment	£ 39.4m
Adjusted pre-efficiency	£ 531.8m
Efficiency target	£ 114.7m
WIC18 post efficiency value	£ 417.1m
Actual spent to date	£ 497.5m
Overspent	£80.3m
% overspent	19.3%

This shows that there has been an overspend of around £80.3 million on projects completed to beneficial use. This represents a 19.3% inefficiency in delivery of the programme. Indeed, actual expenditure on these completed projects is greater than their original projected pre-efficiency cost. This level of inefficiency in the early part of the Quality and Standards II programme, when the efficiency targets were lower, significantly increases the efficiency required for the remainder of Quality and Standards II.

Scottish Water has indicated that Scottish Water Solutions will out-perform the efficiency targets set in the last Strategic Review. In the next section we examine the relative efficiency of the different delivery options used by Scottish Water in delivering Quality and Standards II.

Importance of the delivery method

In its quarterly CIR submissions, Scottish Water allocates each project to one of the following three categories:

- Scottish Water project

  Projects which have been, or are being, delivered entirely by Scottish Water. In general, these appear to pre-date the formation of Scottish Water Solutions in September 2003. Some smaller projects continue to be delivered by Scottish Water.

- Scottish Water Solutions allocated

  These are projects that have been allocated to Scottish Water Solutions. Scottish Water Solutions is responsible for all aspects of the work, including strategic planning. Scottish Water hopes that using Scottish Water Solutions in this way will help identify better ways to deliver the required outputs.

- Scottish Water Solutions managed

  These are projects that were started by Scottish Water but where responsibility for management and delivery has now been passed to Scottish Water Solutions.

We repeated our efficiency analysis for each of these three categories. The results are shown in Table 4.5.

Table 4.5: Efficiency analysis for projects delivered through different procurement routes

Accountability	Number of projects	WIC18 post efficiency value	Actual spent to date	Over / underspent	% over / underspent
Scottish Water Project	1,348	£158.6 m	£213.7m	£55.1m	34.7%
SWS Allocated	479	£149.8m	£110.0m	-£39.8m	-26.6%
SWS Managed	109	£108.8m	£173.8 m	£65.1 m	59.8%
	1,936	**£417.1m**	**£497.5m**	**£80.3 m**	**19.3%**

This analysis suggests that the projects allocated to Scottish Water Solutions have been delivered the most

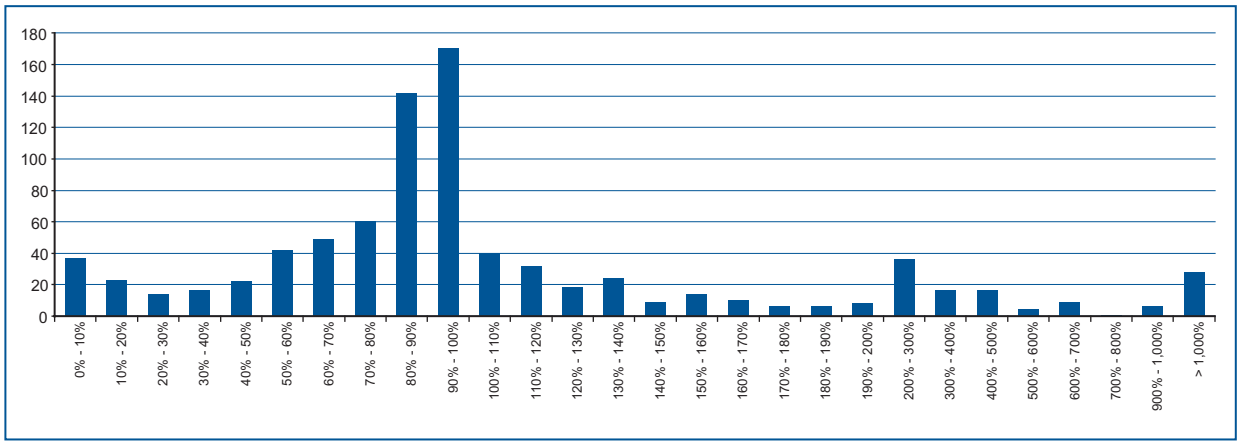
efficiently, and the projects managed by Scottish Water Solutions have been least efficient.

The low efficiency of the Scottish Water Solutions managed projects may reflect 'damage limitation', ie projects may have been allocated to Scottish Water Solutions in order to limit the extent of overspend.

The distribution of differences between the actual level of spending and the post-efficiency values for this group of projects may support such a hypothesis. We illustrate the distribution of differences in Figures 4.3 to 4.6 for each of the three delivery options. Any percentage greater than 100% is an overspend and any figure less than 100% is a saving[76].

The analysis also takes account of the different sizes of the projects. It is better to save £5,000 on a £10,000 project than the same amount on a £100,000 project.

Figure 4.3: Scottish Water projects: actual as a percentage of pro-rata post-efficiency value

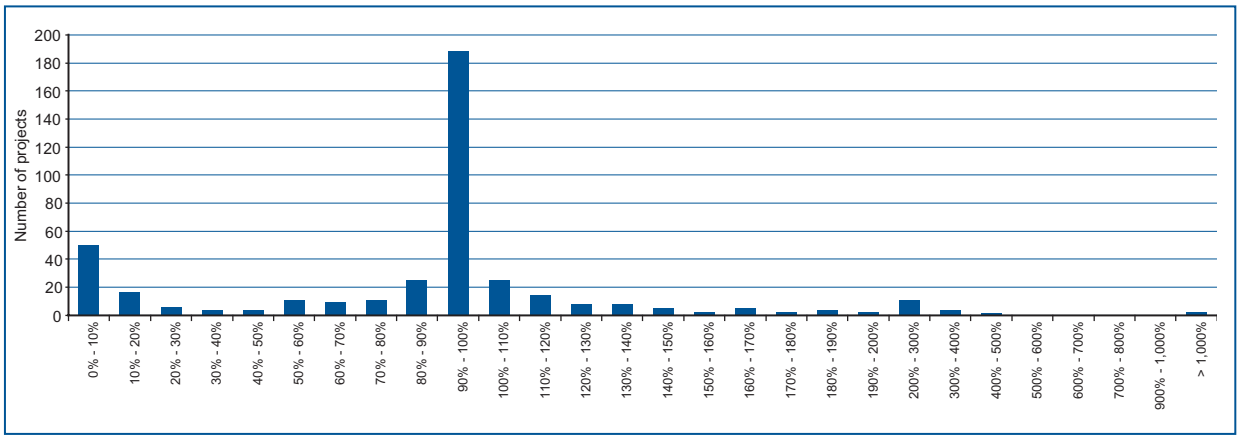


Most of the Scottish Water projects have been delivered for between 80% and 100% of their post-efficiency value. However, a large number of projects have exceeded their post-efficiency value by a significant percentage.

Figure 4.4 shows the same analysis for those projects allocated to Scottish Water Solutions.

[76] We used 1,374 projects in this analysis. 562 projects were excluded as they had zero or negative pre-efficiency or spend to date, so could not easily be used as a comparison.

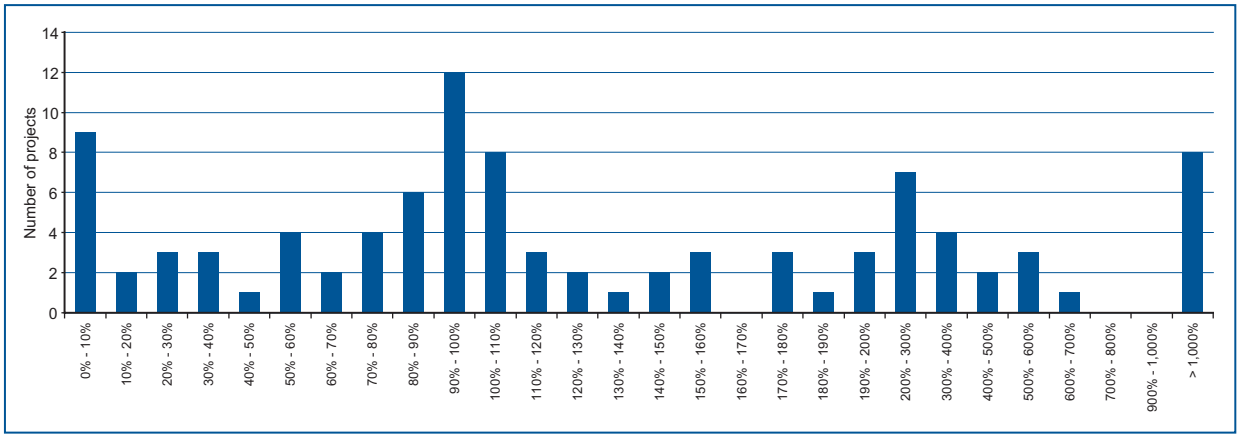
Figure 4.4: Scottish Water Solutions allocated: actual as a percentage of the post-efficiency value



Most of the Scottish Water Solutions allocated projects have been delivered for 90% to 100% of their post-efficiency value. Fewer projects have been delivered for more than 100% of their post-efficiency value. This may suggest that Scottish Water Solutions is bringing a better focus to cost control and meeting budgets.

Figure 4.5 repeats the analysis for the Scottish Water Solutions managed projects.

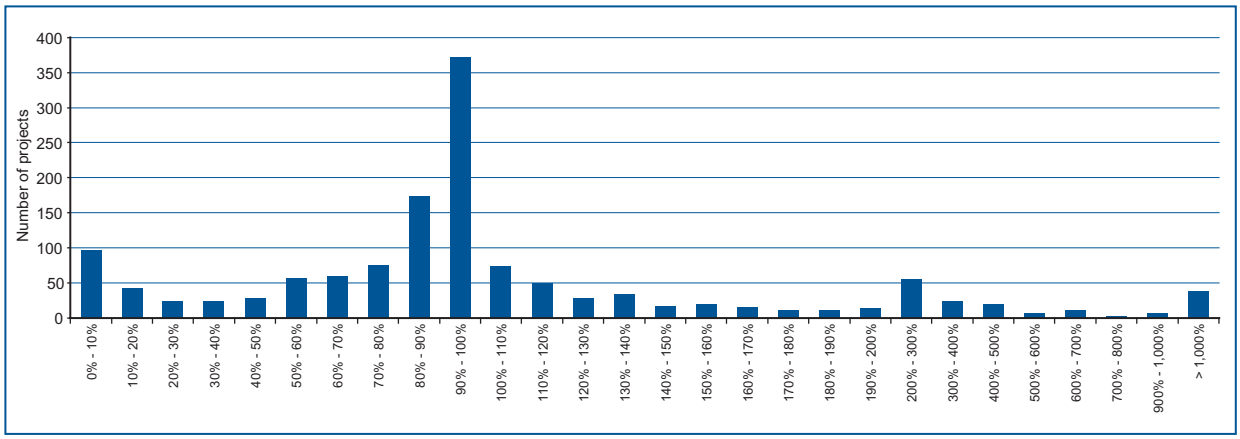
Figure 4.5: Scottish Water Solutions managed projects: actual as a percentage of the post-efficiency values



This analysis shows that the Scottish Water Solutions managed projects have often overspent their post-efficiency budget significantly.

Figure 4.6 illustrates the overall picture.

Figure 4.6: All beneficial use projects: actual as a percentage of the post-efficiency value



Overall, this analysis would suggest the following:

- The majority of projects are being delivered to the post-efficiency budget set in the Strategic Review of Charges 2002-06. This suggests that the targets were achievable.
- Overall performance is being adversely affected by a relatively small number of projects that are coming in well over budget.
- Cost control for projects that are wholly delivered by Scottish Water Solutions appears to be better.
- Inefficiency in delivering the initial phase of Quality and Standards II will impact on the challenge that Scottish Water and Scottish Water Solutions face in delivering the rest of the programme to budget.
- Projects which, in the later stages, have been passed to Scottish Water Solutions to manage have performed least well. Post-project appraisal of these projects is required to find out what went wrong.

The impact of inefficiency on stakeholders

It is important to recognise the impact that inefficient delivery of the investment programme will have on customers and other stakeholders.

Scottish Water has a fixed amount of funding available to deliver the Quality and Standards II investment programme. Inefficient spending consumes resources that were intended for other projects. This could potentially delay improvements in water quality, environmental performance and customer service unless future projects are delivered below their post-efficiency costs.

The Strategic Review of Charges 2002-06 set an average efficiency target of around 23% for delivery of the Quality and Standards II programme. The original set of WIC 18 baseline projects totalled £2,340 million (pre-efficiency). Scottish Water was tasked with delivering Quality and Standards II for £1,802 million (£2,340 million x 77% = £1,802 million). If Scottish Water achieved only an 18% improvement in efficiency across the whole programme, delivery of the programme would cost £1,919 million.

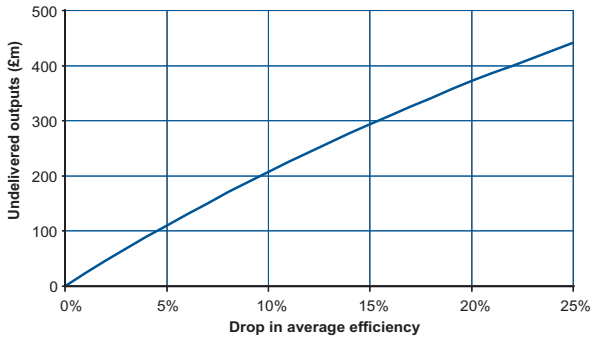
This level of improvement in efficiency would mean that only 94% of the programme could be delivered within the budget available and that outputs worth £110 million would not have been delivered. The relationship between inefficiency and undelivered outputs is illustrated in Table 4.6. Even a single percentage point failure to meet the efficiency target has a significant effect on the outputs that would be undelivered at the end of the regulatory control period.

Table 4.6: Relationship between efficiency and output delivery

Shortfall from targeted efficiency	Average efficiency	Actual	Overspend required to deliver all outputs	% required overspend	Delivered outputs	Percentage of outputs delivered	Undelivered outputs
0%	23%	£1,802m	£0m	0.0%	£1,802m	100.0%	£0m
3%	20%	£1,872m	£70m	3.9%	£1,734m	96.3%	£68m
6%	17%	£1,942m	£140m	7.8%	£1,672m	92.8%	£130m
9%	14%	£2,012m	£211m	11.7%	£1,613m	89.5%	£189m
12%	11%	£2,083m	£281m	15.6%	£1,559m	86.5%	£243m
15%	8%	£2,153m	£351m	19.5%	£1,508m	83.7%	£294m
18%	5%	£2,223m	£421m	23.4%	£1,460m	81.1%	£341m
21%	2%	£2,293m	£491m	27.3%	£1,416m	78.6%	£386m
24%	-1%	£2,363m	£562m	31.2%	£1,374m	76.2%	£428m

Figure 4.7 shows the same analysis in graph form.

Figure 4.7: Relationship between efficiency and output delivery



We currently estimate[77] that £1,838 million of Quality and Standards II will have been spent by March 2006. We estimate that outputs with a value of around £253 million[78] will still need to be delivered. We return to the impact of any overhang of projects into the next regulatory control period in Chapter 6. Scottish Water has claimed that it needs £283 million to complete Quality and Standards II.

Summary

The Quality and Standards II investment programme was larger than any four- year programme that has been delivered by companies of a similar size to Scottish Water. Scottish Water has also had to make significant improvements in its capital expenditure efficiency.

Our analysis shows that, to date, Scottish Water lags behind the efficiency profile set in the Strategic Review of Charges 2002-06 by £80.3 million. However, the projects allocated to Scottish Water Solutions have, to date, achieved the efficiency targets set out in the last Strategic Review.

Inefficiency will tend to delay the delivery of outputs. This is clearly not in the interests of customers or other stakeholders.

[77] From information in Scottish Water's CIR for Quarter 3 2004-05.
[78] See Chapter 6.

Section 2: Capital expenditure
Chapter 5: Quality and Standards III

Introduction

The Quality and Standards III process established the investment priorities for the water industry in Scotland for the period 2006 to 2014. Scottish Ministers set the priorities for the 2006-10 regulatory control period.

The chapter includes an overview of the key stages in Quality and Standards III. The process began with initial consultations with stakeholders about their views on investment priorities, and ended with publication of Ministerial Guidance and Scottish Water's second draft business plan. In this chapter we discuss the consultation and the content of the guidance, then examine whether the investment programme that Scottish Water set out in its second draft business plan is consistent with the guidance.

Development of Quality and Standards III

Many stakeholders appear not to have appreciated that the investment objectives for the industry for four years would be fixed by the Quality and Standards II process. Establishing a clear baseline for the 2002-06 regulatory control period reduced the scope for responding to new priorities.

The Scottish Executive regarded the establishment of a clear baseline for investment as essential and therefore took steps to make sure that a wide range of stakeholders were engaged at an early stage of the Quality and Standards III process. The Executive set up a project board which had overall responsibility for developing the options to be included in the Quality and Standards III consultation.

The following stakeholders were represented on the board:

- Communities Scotland;
- Confederation of British Industry (Scotland);
- Convention of Scottish Local Authorities and local authorities;
- Drinking Water Quality Regulator (DWQR);
- Historic Scotland;
- Homes for Scotland;
- Scottish Consumer Council;
- Scottish Environment Protection Agency (SEPA);
- Scottish Executive Departments;
- Scottish Federation of Housing Associations;
- Scottish National Heritage;
- Scottish Water;
- Water Customer Consultation Panels; and
- Water Industry Commissioner for Scotland.

Detailed work in defining the required investment was delegated to a number of specialist groups, each of which had particular responsibility for a specific work package. These work packages included:

- maintenance;
- growth in the water and sewerage networks;
- environmental improvements;
- drinking water quality; and
- other important issues for customers.

Each work package identified investment 'drivers'. In most cases, the driver of a need for investment was legislation. A number of scenarios were then drawn up, ranging from 'do nothing' to 'aspirational' improvement. The performance of Scottish Water's assets relative to the identified investment drivers at the end of the Quality and Standards II investment programme was also assessed.

Scottish Water was then asked to cost the gap between the expected position at the end of Quality and Standards II and each of the identified scenarios. The specialist groups responsible for work packages each submitted an interim report to the project board in April and May of 2004. These reports were used by the Scottish Executive to inform the Quality and Standards III consultation. It is important to highlight that only Scottish Water was involved in costing the required outputs.

The 'Investing in Water Services' consultation

'Investing in Water Services 2006-14 (The Quality and Standards III project)' set out the Scottish Executive's views on the likely costs of different levels and types of investment. The information was based on the costings for the required investment which Scottish Water had provided.

The consultation sought views on investment priorities and on whether or not bills should rise to pay for each type of investment. Responses to the consultation were used by the Scottish Executive to inform their February Guidance.

Principles

The consultation began by identifying the principles that would be applied when the Executive determined the investment programme that Scottish Water is required to deliver:

- Cost-effective – an investment programme that is founded on a proper assessment of investment needs for the industry and one that addresses these requirements in the most cost-effective way.

- Affordable – the Executive recognises that there is a need to limit the scale of increases in charges to a level that customers think is fair.

- Deliverable – this means limiting the size of the investment programme to ensure that it is possible to deliver it. Constraints on the size of the programme include civil engineering capacity, Scottish Water's ability to deliver investment efficiently and the level of disruption that communities can tolerate, for example, from roads being dug up.

- Sustainable – by this the Executive means a programme that delivers environmental improvements at a cost and pace that is fair and equitable for current and future generations.

The Executive invited stakeholders to comment on these principles.

Establishing future investment needs

The consultation document was based on interim reports from each of the work package groups. The Executive recognised that further detailed work was required to refine costs, assess risks and benefits, and pull investment requirements into an overall investment programme.

The Executive listed the following questions which it expected the work package groups to address to ensure that investment would be carried out at minimum cost to customers.

- Is it legitimate for customers alone to pay for the investment under consideration?

- Is the proposed investment option the most cost-effective available?

- Are the planning assumptions that lie behind the requirement reasonable?

- Is there any flexibility built into the requirement (either to meet a lower standard of compliance in the regulatory control period or to invest over a longer period), and, if not, should there be?

- What level of priority should be attached to the individual investment requirements?

The Executive then asked if these were the correct questions that each work package group should use to assess each individual investment.

Maintaining the current level of service to customers

The 'Investing in Water Services' consultation outlined the different approaches to assessing the appropriate level of investment in maintenance and suggested that a 'serviceability' approach should be used. The serviceability approach involves identifying levels of service to customers then determining how much it would cost to maintain this level of service over the period.

The consultation invited stakeholders' views on the importance of maintaining serviceability levels during Quality and Standards III. The Executive also sought views on which serviceability measures were most important; and, if it was appropriate to invest further in improving these measures, whether this should be funded from higher charges or by reduced investment in other areas.

Growth in the public water and sewerage networks

The 'Investing in Water Services' consultation split investment in growth into two categories: new development and first-time connection.

New business and housing developments create a demand for investment to connect to the public water and sewerage network. During the development of Quality and Standards III, Scottish Water asked local authorities to project the level of new housing development between 2006 and 2014. The 32 local authorities estimated that around 230,000 new houses would be built.

The Scottish Executive's estimate was much lower. It estimated that housing numbers might grow by around 15,000 per year, or a total of 120,000 over the 2006-14 period.

Scottish Water estimated that the cost of connecting 230,000 houses to the public water and sewerage network would be around £1 billion over the eight-year period. To some extent this cost would be met by a new charging regime for connections to the network.

The Scottish Executive indicated that it intended to include a provision within the investment programme to fund deep connection costs[79]. This was confirmed in the February Ministerial Guidance.

First-time connections occur when customers who previously had private water and/or sewerage services are connected to the public network. Scottish Water is only required to do this when the costs involved are deemed 'reasonable'.

Three of the work package groups (environmental, drinking water, and extending public water and sewerage networks) examined this issue. Based on costs from Scottish Water, they concluded that first-time water provision could cost some £200 million over the eight-year period and that first-time waste water provision could cost around £600 million over the eight years. None of these properties could be connected at reasonable cost. The work package group that examined environmental issues identified £260 million (again, based on Scottish Water's costing) of priority first-time provision which they believed would deliver important environmental benefits.

The Executive sought views on whether or not properties should be connected at beyond reasonable cost. It also asked whether, if an amount for first-time provision were included within the investment programme, it should be paid for by higher charges or lower investment elsewhere.

Environmental improvements

'Investing in Water Services' recognised that there will need to be significant investment in Scotland's aquatic environment well beyond 2014. The work package group identified more than 30 separate legal drivers of investment. Many of these drivers relate to European Union Directives.

The consultation included Scottish Water's estimate that £2.5 billion was required to ensure that it would meet mandatory standards. Scottish Water also estimated that a further £500 million would be required to demonstrate progress towards the guideline standards.

[79] Deeper elements of connection or 'deep' reinforcement relate to the elements of the network that are remote from the connection point but may still require uprating, eg developing water resources (including bulk mains and treatment plants), or increasing the capacity of sewage treatment works.

The Executive asked stakeholders what they believed the top environmental priorities should be. In addition, it asked whether stakeholders believed that additional environmental investment should be paid for through higher charges or through lower investment in other areas.

Drinking water quality and water resources

The water quality work package group identified that significant investment was required to remove harmful substances, such as trihalomethanes and lead, from the water supply. In practice there can be a difference between regulatory standards (required by the DWQR) and legal standards (required by law).

'Investing in Water Services' suggested that around £1.65 billion would allow Scottish Water to reach the regulatory minimum position by 2010. Around £30 million of this is due to regulatory standards being higher than legal standards.

The Scottish Executive sought views on the priorities for investment in drinking water and water resources. It also asked whether stakeholders believed that additional investment in drinking water should be paid for through higher charges or through lower investment in other areas.

Other priorities for customers

The consultation identified the following high priority customer issues:

- odour from waste water treatment works;
- water pressure; and
- sewer flooding.

Odour

Odour from waste water treatment works is becoming a higher profile issue for customers. This could either be because of a growing intolerance of odour or because housing is encroaching upon waste water treatment works. Current legislation[80] prevents waste water treatment works emitting an odour that could be considered a 'statutory nuisance'. Additionally, a few waste water treatment works are issued with odour consents by SEPA as part of the Integrated Pollution Prevention and Control regime[81].

The costs of reducing odour problems were not included within the consultation. The Scottish Executive has only recently issued a Code of Practice relating to odour. Nonetheless, the Executive sought views on whether investment to reduce odour should form part of the investment programme. It also asked customers to consider whether this should be paid for through higher charges or lower investment elsewhere.

Water pressure

Low water pressure can mean that some household appliances cannot be used. Scottish Water expects there to be 14,942 properties on its low water pressure register at the end of the Quality and Standards II programme. It estimates that it could remove 13,365 properties from this register, at a cost of £40 million. The consultation sought views on whether poor pressure should be included in the investment programme and, if so, whether this should be paid for from higher charges or lower investment elsewhere.

Sewer flooding

Sewer flooding is a relatively rare occurrence. However, when it does happen it is distressing and unpleasant for those customers affected. The consultation estimated that an additional £240 million would remove around 2,301 properties from the 'at risk' register[82].

Our response to 'Investing in Water Services'

Our response to the 'Investing in Water Services' consultation recognised that customers are not likely to agree fully on priorities and that our principal role is to ensure that customers receive the best possible value for money, on a sustainable basis.

80 The Environment Protection Act 1990.
81 The Integrated Pollution Prevention and Control regime is European Directive 96/61/EC which was enacted into UK law with the Pollution Prevention and Control Act 1999.
82 A register kept by Scottish Water of those properties that are deemed to be at risk of suffering a sewer flooding incident with a defined frequency.

Principles

We agreed with the four guiding principles outlined by the Scottish Executive for Quality and Standards III. Our main concern was that the investment programme should be properly defined, the inputs and the outputs measurable, and that the investment programme should be placed in the public domain. We believed that these steps were important to ensure that:

- stakeholders have a common understanding of what is included within the investment programme;
- customers' expectations can be met; and
- delivery of the Quality & Standards III investment programme can be monitored effectively.

Establishing future investment needs

We were pleased that the Executive identified important questions for further work to understand investment needs. Our view was that two additional questions needed to be asked:

- Is the investment defined at an asset level?
- Is all of the investment at each asset level understood so that the risk of overlap is minimised?

These questions were important as it may have been necessary to prioritise projects to ensure that the programme was deliverable. Defining the programme clearly should reduce the need for discussions about the content of the programme at a later date.

Maintaining service standards

We believe that the investment priority for Scottish Water should be to maintain the assets appropriately. The sustainability of the water industry in Scotland and its ability to deliver environmental, public health and customer service improvements depend on adequate maintenance on an ongoing basis. It is important that the outputs of capital maintenance are specified clearly and in detail. Wherever possible this should be at an asset level.

Growth in the public water and sewerage networks

We welcomed the proposal to charge developers for connections to the public water and sewerage network. We believe that this should ensure that the highest priority development constraints are identified and resolved.

We also believe that a well-managed water and sewerage company, with a good knowledge of its assets, should be able to provide clear and detailed information about areas that are open for development to local authorities. We suggest that a map should be made available, highlighting those areas where development can be accommodated without any significant investment from Scottish Water.

Investing in the environment, drinking water quality and water resources

We indicated that if the costings were correct customers would not be able to afford to deliver all of the desired investment requirements. In this case, we said that Ministers would need to balance:

- what customers say they want; and
- what customers 'ought to want'.

Customer preferences could be gleaned from market research and from responses to the consultation. It was important that Ministers listened carefully to these preferences. However, it was also important to recognise the expertise of the DWQR and SEPA and their understanding of important public health and environmental compliance issues.

We made it clear that it was not our role to comment on the level and type of quality investment. However, we did make it clear that any such investment should be clearly defined at an asset level and should take full account of the capital maintenance investment.

Other priorities for customers

We believed that market research and the responses to the consultation should allow Ministers to take decisions

about the appropriate level of investment in these areas. From a regulatory standpoint, the most important issue is that investment inputs and outputs are properly defined so that we can monitor the delivery of benefits to customers.

Scottish Water's first draft business plan (October 2004)

At the end of June 2004, we provided Scottish Water with detailed guidance to assist them in completing their first draft business plan. The business plan is an important opportunity for Scottish Water to set out its business strategy for the 2006-10 regulatory control period. We expected Scottish Water to highlight any factors which it considered we needed to take into account in setting maximum levels of charges.

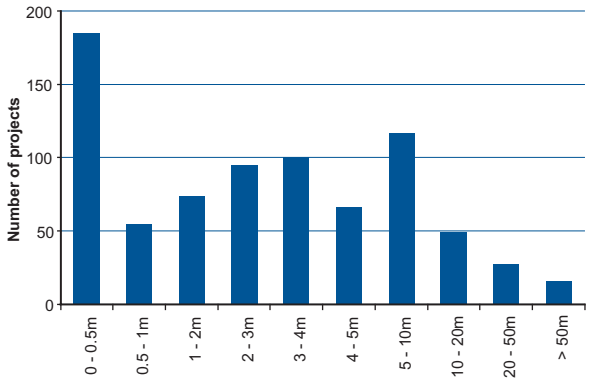
Scottish Water submitted its first draft business plan on 29 October 2004. The plan contained its initial investment proposals. We had expected the proposals to take account of Scottish Water's knowledge of the Quality and Standards III process, their assumptions on any likely overhang from Quality and Standards II, and their views on the size of investment programme that could be efficiently managed. We published our response to Scottish Water's first draft business plan in December 2004[83].

Size of the proposed investment programme

As part of the plan, Scottish Water provided details of its proposed investment programme in the Table C Appendix.[84] This table lists 790 projects that were planned to be completed over the Quality and Standards III period (2006-14). These projects have a total value of £4,891 million.[85] Scottish Water proposed to invest £2,199 million of this during the 2006-10 regulatory control period.[86] This equates to £550 million of investment per year and represents around £226 each year for every connected property in Scotland.

Figure 5.1 shows the distribution of investment projects for the Quality and Standards III period by size.

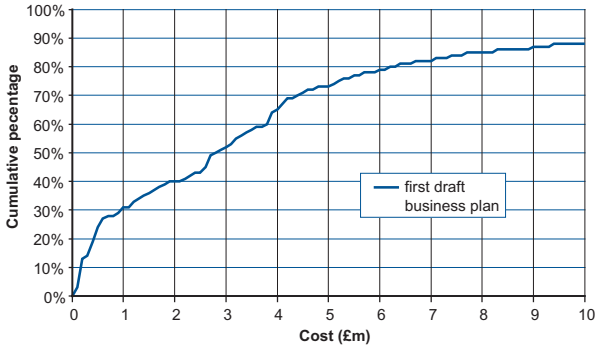
Figure 5.1: Number of projects by size (£)[87]



This analysis shows that the largest proportion of projects will cost up to £1 million.

As Figure 5.2 shows, more than 75% of the proposed projects will cost less than £6 million.

Figure 5.2: Cumulative percentage of projects with a value of between £0 and £10 million



[83] This is available on our website at www.watercommissioner.co.uk

[84] The first draft business plan, including Table C, was completed using 2005-06 prices. The second draft business plan was completed using 2003-04 prices. In order to ensure comparability throughout this chapter, we have unwound Scottish Water's inflation adjustment in the first draft business plan, and reported all investment in 2003-04 prices unless otherwise stated.

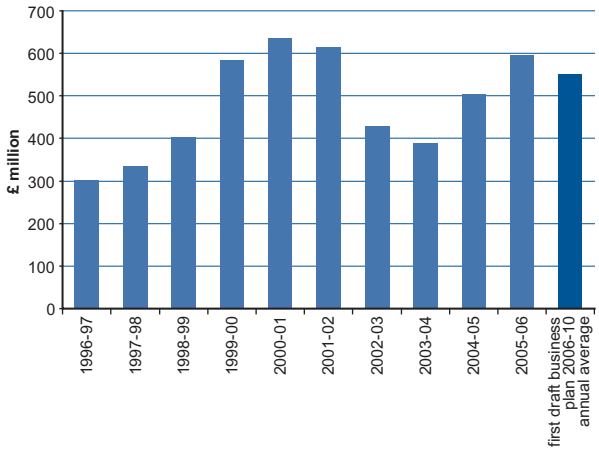
[85] Of the 790 projects listed in Table C, six had a negative value recorded against them. If these negative values were not taken into account, then the actual cost of the proposed investment programme would be £5,412 million in 2003-04 prices.

[86] In the main body of the business plan, Scottish Water actually proposed to invest £2,211 million, the equivalent of £553 million for each year of the 2006-10 period, or £229 per property per annum (in 2005-06 prices). This figure does not appear to be consistent with those reported in Table C. We have relied on Table C for the analysis in this section.

[87] This figure excludes the six projects with a negative value.

This proposed investment programme would have represented a significant delivery challenge. Figure 5.3 shows the level of investment (in 2003-04 prices)[88] that has been delivered each year since 1996-97. We compared this with the average annual investment of £550 million implied by Scottish Water's proposed total spend of £2.2 billion for the 2006-10 regulatory control period.

Figure 5.3: Total investment per year



Deliverability of the investment programme proposed in the first draft business plan

In the previous chapter we looked at the challenge that was posed by Quality and Standards II. We noted that there are five water and sewerage companies in England and Wales that are either broadly the same size as Scottish Water or larger. Thames Water, Severn Trent Water and United Utilities are larger, while Anglian Water and Yorkshire Water are similar in size to Scottish Water.

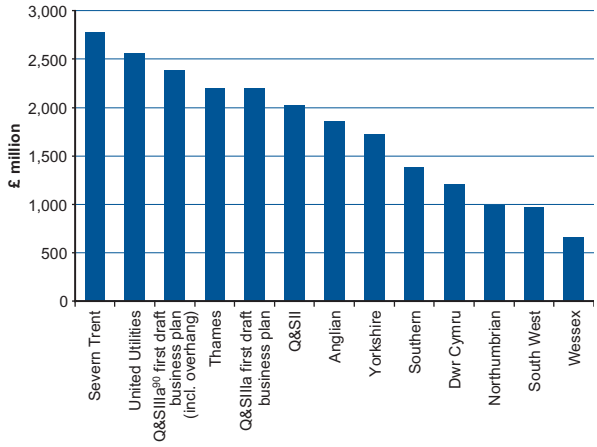
Table 5.1 shows the four-year total capital investment in England and Wales in the period 1990-2005. Figure 5.4 shows that Scottish Water's proposed programme for the 2006-10 regulatory control period would be comparable to the biggest programme so far delivered by Thames Water.

[88] This is the total cash cost of investment rebased to 2003-04 prices. We have not adjusted values to take account of the relative efficiency of the Scottish water industry in each year.

Table 5.1: Four-year total capital investment in England and Wales 1990-2005 [89]

Company	1990-94	1991-95	1992-96	1993-97	1994-98	1995-99	1996-00	1997-01	1998-02	1999-03	2000-04	2001-05
Anglian	£1,829.0m	£1,856.0m	£1,722.0m	£1,676.9m	£1,599.5m	£1,574.3m	£1,600.5m	£1,465.3m	£1,315.2m	£1,199.6m	£1,105.4m	£1,132.2m
Dwr Cymru	£981.0m	£998.9m	£1,009.4m	£1,043.9m	£1,129.2m	£1,197.3 m	£1,205.8m	£1,126.4m	£1,021.7m	£984.7m	£977.8m	£1,000.3m
Northumbrian	£523.6m	£482.3m	£470.7m	£525.6m	£705.9m	£815.9m	£958.1m	£989.9m	£905.7m	£912.3m	£831.8m	£762.7m
Severn Trent	£2,773.1m	£2,751.5m	£2,336.0m	£2,131.1m	£2,120.4m	£2,211.9m	£2,358.6m	£2,129.7m	£1,893.7m	£1,688.4m	£1,521.4m	£1,625.6m
South West	£944.8m	£975.3m	£870.7m	£789.8m	£713.5m	£631.1m	£645.6m	£618.2m	£604.1m	£673.5m	£666.1m	£660.7m
Southern	£749.6m	£759.9m	£713.3m	£787.5m	£918.6m	£1,099.8 m	£1,295.4m	£1,380.1m	£1,306.9m	£1,156.6m	£981.9m	£911.3m
Thames	£2,200.9m	£2,031.4m	£1,912.3m	£1,907.0m	£1,982.6m	£2,132.2 m	£2,197.6m	£2,049.1m	£1,915.9m	£1,911.5m	£1,992.1m	£2,091.0m
United Utilities	£2,439.0m	£2,331.2m	£2,174.3m	£2,133.1m	£2,160.4m	£2,274.3m	£2,270.7m	£2,070.9m	£1,927.6m	£1,953.3m	£2,286.3m	£2,554.1m
Wessex	£645.7m	£623.6m	£543.5m	£487.0m	£484.8m	£530.2m	£575.4m	£595.0m	£594.9m	£608.5m	£631.5m	£663.0m
Yorkshire	£1,411.5m	£1,294.5m	£1,183.4m	£1,207.3m	£1,322.4m	£1,517.4 m	£1,727.1m	£1,584.4m	£1,522.1m	£1,425.3m	£1,231.8m	£1,271.6m

Figure 5.4: Largest four-year investment total



This shows that the absolute size of the investment programme proposed by Scottish Water is larger than has been delivered by any similar sized company in England and Wales.

Further, the proposed investment programme did not include the expected £183 million[91] overhang from Quality and Standards II. Scottish Water therefore proposed to deliver a £2.38 billion investment programme over four years.

Scottish Water's proposed investment programme was, therefore, almost without precedent in the recent history of the water and sewerage industry in the UK. As shown in Table 5.2 below, the largest five privatised companies have delivered programmes of more than £2.4 billion on only four occasions, or 6.7% of all of the possible four-year periods. None of these larger investment programmes have been delivered recently.

Table 5.2: Delivery of four-year programmes of more than £1.1 billion by the largest five companies (1990-2005)[92]

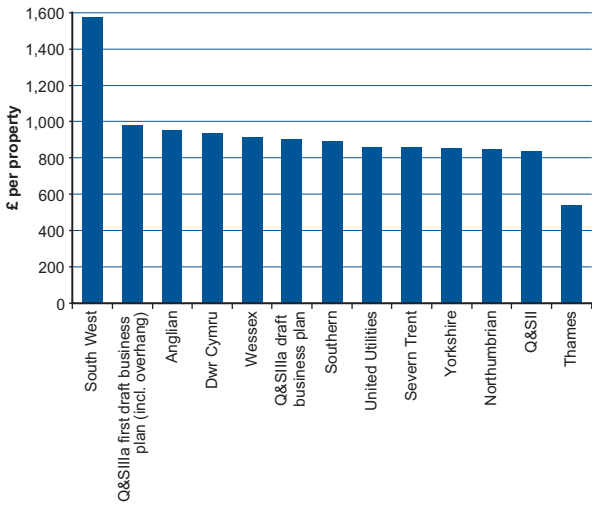
Size	Per year	Number of occasions	Cumulative %
Over £2.6 billion	£650m	2	3.3%
Over £2.5 billion	£625m	3	5.0%
Over £2.4 billion	£600m	4	6.7%
Over £2.3 billion	£575m	7	11.7%
Over £2.2 billion	£550m	12	20.0%
Over £2.1 billion	£525m	20	33.3%
Over £2.0 billion	£500m	24	40.0%
Over £1.9 billion	£475m	32	53.3%
Over £1.8 billion	£450m	35	58.3%
Over £1.7 billion	£425m	37	61.7%
Over £1.6 billion	£400m	41	68.3%
Over £1.5 billion	£375m	47	78.3%
Over £1.4 billion	£350m	50	83.3%
Over £1.3 billion	£325m	52	86.7%
Over £1.2 billion	£300m	56	93.3%
Over £1.1 billion	£275m	60	100.0%

We also analysed the largest investment programmes

89 All values have been adjusted to 2003-04 prices. Future forecasts are based on Ofwat's final determination for the 2005-10 price review period.
90 Q+S IIIa is the first half of Quality and Standards III, i.e. that part which must be delivered in the period 2006-10.
91 Scottish Water reported a Quality and Standards II overhang of £194 million at 2005-06 prices. This figure includes Quality and Standards II investment to be delivered after March 2006 (£154 million) and new obligations to be delivered post March 2006 (£40 million).
92 The number of occasions is cumulative. That is to say there were two occasions when a programme of more than £2.6 billion was delivered and one occasion when a programme of £2,5 billion to £2.6 billion was delivered. Accordingly, there were 3 occasions when a programme of more than £2.5 billion was delivered.

achieved by each company on a per connected property basis. We compared the results with the investment programme proposed by Scottish Water (including the Quality and Standards II overhang). Figure 5.5 shows that over a four-year period only one company, South West Water, has achieved a higher level of investment per property. South West Water is a relatively small company that serves the rural area of Devon and Cornwall.

Figure 5.5: Largest four-year investment per property (1990-2005)



Consistency with Quality and Standards III

The Quality and Standards III consultation process was designed to set priorities for investment that were consistent with a broad spectrum of views from stakeholders and customers. The first draft business plan contained a number of projects that did not appear to be consistent with likely Quality and Standards III priorities. They were referred to in the business plan as 'investment in other service areas'. Scottish Water included this investment to target other areas which, on the basis of its market research, were important to customers. Scottish Water's customer research did not seem to be consistent with either the research conducted for the Scottish Executive in 2004 or previous research projects north or south of the border.

The 'investment in other service areas' projects accounted for around £195 million of investment. The projects related to improving water pressure, reducing internal flooding from overloaded sewers, reducing external flooding by sewage on roads and open spaces, reducing odour from waste water treatment works, and improving customer service.

We also noted that Scottish Water had identified significant investment requirements at PPP sites. This involved 13 projects at a total cost of £185 million during the Quality and Standards III period. A primary driver behind the use of PPP schemes was to transfer risks away from Scottish Water to the PPP operators. We return to this issue in Chapters 8 and 11 of this volume.

Issues with costing the first draft business plan

The Reporter audited Scottish Water's first draft business plan. His views are presented in Chapter 13 of Volume 4 of this draft determination.

We were concerned by his comments about both the cost and the scope of projects in the investment programme. For example, he noted that there was significant over costing of quality enhancement projects at water treatment works because:

- solutions did not fully reflect site conditions;
- the use of minimum sizes did not reflect the generally smaller sizes of projects in Scotland; and
- there was an overlap with capital maintenance projects.

The Reporter also identified areas of capital maintenance expenditure where there were doubts about the cost and scope of projects. For example, he noted that at water treatment works:

- some items had been wrongly identified;
- there had been miscommunication of the necessary scope of the works between those specifying the work and those producing cost estimates; and
- there was overlap between the quality enhancement and capital maintenance expenditure programmes.

The opportunities for synergies between the capital maintenance and quality enhancement programmes which were identified by the Reporter were not unexpected. We had identified in the Quality and Standards III process that the work packages were identifying investment requirements without taking an integrated approach to the investment required at a specific site.

The Reporter discussed his findings with Scottish Water so that it could take account of these issues in its second draft business plan.

Our open letter to Ministers

Following our analysis of Scottish Water's first draft business plan we wrote to the Minister for the Environment and Rural Development, Ross Finnie MSP in December 2004[93]. In this open letter, we set out our assessment of the general prospects for the outcome of the Review. We also made a number of specific comments relating to the investment programme.

We informed the Minister that the Reporter had identified a number of areas where the cost and scope of projects within Scottish Water's capital programme had been overestimated.

We noted that Scottish Water should be set challenging but achievable objectives. In this regard, we emphasised the importance of defining a capital programme of a size that can be delivered efficiently. Significant capital expenditure to deliver environmental, public health and customer service improvements will be required for the foreseeable future. It is in customers' interests that these improvements are affordable and deliverable.

The letter also noted that Quality and Standards II was itself a substantial investment programme and it seemed increasingly likely that a large proportion of that programme would not be delivered during the current regulatory control period. This limited the opportunity for Quality and Standards III outputs to be delivered in the 2006-10 regulatory control period.

We suggested that we should be cautious about any further significant increase in the size of Scottish Water's capital programme. We cautioned that this actually reduced the outputs delivered by introducing a pressure to spend that could adversely impact on efficiency. The letter explained that the capital programme proposed in Scottish Water's first draft business plan was without precedent and that, in our view, it would be likely to lead to an even larger overhang at the end of the next review period. We noted that a large overhang is not in the interests of customers, the environment or public health.

Finally, we noted that it was essential that the delivery of the Quality and Standards III capital programme was monitored carefully throughout the next regulatory control period. Stakeholders would need to have a detailed, defined list of projects and their outputs. The list should include detailed descriptions of how Scottish Water will deliver the objectives of Quality and Standards III. We undertook to work closely with the DWQR and SEPA to provide regular updates about the progress of capital projects and to confirm that quality outputs had been delivered.

Ministerial Guidance

The Ministerial Guidance[94] published in February 2005 marked the completion of the Quality and Standards III process. The accompanying statements set out the objectives of the investment programme for Quality and Standards III. They also set out the detailed objectives for the period of the Strategic Review of Charges 2006-10.

The investment objectives in the Ministerial Guidance were divided into two categories: those that are essential and those that are desirable. Ministers have required Scottish Water to be funded to deliver all of the essential objectives for the 2006-10 Strategic Review. The essential objectives that Scottish Water must deliver by 2014 are as follows:

- maintain service standards for customers to the levels forecast for March 2006;
- contribute to improvement in the quality of water in 530 km of water bodies;

[93] This letter can be found on our website – www.watercommissioner.co.uk
[94] We discussed the Ministerial Guidance in more detail in Volume 4, Chapter 14

- improve drinking water quality for 1.5 million people in Scotland;
- provide sufficient strategic capacity to meet the requirements of all estimated new development;
- minimise odour nuisance at 35 waste water treatment works; and
- remove a net 1,140 properties at risk from internal sewer flooding.

These outputs were to be delivered irrespective of their impact on customers' bills.

Ministers also set out the following desirable objectives:

- increase the total length of water bodies improved to 590 km;
- accelerate the removal of lead communication pipes and improvements in the management of a further 11 water resource zones;
- further improve the total length of water bodies improved to 1,270 km;
- improve the water pressure provided to 5,625 properties; and
- secure a net reduction of 850 in the number of properties affected by unplanned interruptions of non-trunk mains, lasting longer than 12 hours.

Ministers required us to include the desirable objectives set out above in the draft determination as long as:

- it is reasonable to expect that they can be delivered efficiently; and
- projected charges to customers in the period to 2010 do not rise by more than the level of inflation.

Scottish Water's second draft business plan (April 2005)

Scottish Water submitted its second draft business plan to this Office on 20 April 2005. This plan sets out Scottish Water's investment plan for the period 2006-10. It provides detail of the costs involved in delivering the investment objectives set out in the Ministerial Guidance.

The second draft business plan suggests that even the 'essential' objectives set out in the Ministerial Guidance would lead to a significant increase in charges. Scottish Water put forward three alternative solutions to keep charges stable:

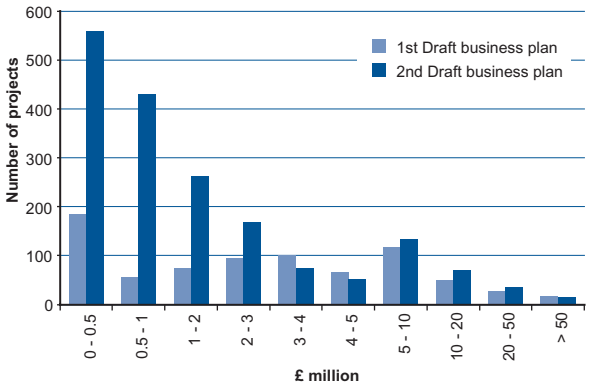
- a re-phasing of the investment objectives, with less being undertaken in 2006-10 and more in 2010-14;
- increasing the borrowing limits permitted to Scottish Water; or
- reducing the scope of the objectives.

Size of the proposed investment programme

In its first draft business plan, Scottish Water had suggested that it should invest some £2.2 billion, not including the overhang from Quality and Standards II, during the 2006-10 regulatory control period. In its second draft business plan, Scottish Water stated that it would need to invest £3.37 billion to meet the Ministers' 'essential' and 'desirable' objectives over the same period. Some £2.92 billion would be required to meet the Ministers' 'essential' objectives. The cost of meeting water quality objectives was the same for both 'essential' and 'desirable' versions of the programme.

There was also a significant increase in the number of projects to be delivered. This increase is set out in Figure 5.6.

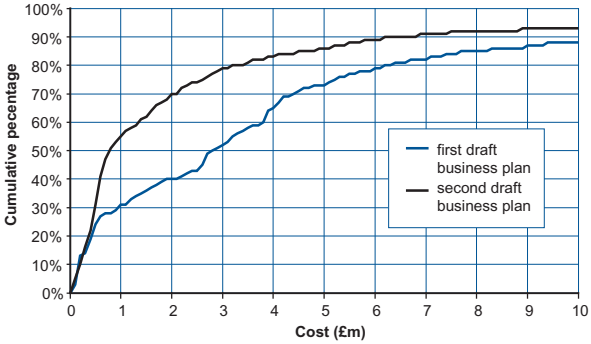
Figure 5.6: Number of projects by size, the first draft business plan compared with the second draft business plan



In the second draft business plan there were 1,797 projects for the 2006-14 period compared with 790 in the first draft business plan. Although this may appear to be a significant number of projects, it is significantly less well defined than Quality and Standards II. Quality and Standards II had a post efficiency value of £1,810 million and WIC 18 – the investment baseline – contained some 3,675 projects.[95]

We have also analysed the size of investment projects contained in the second draft business plan. The average size has decreased – but this may be due primarily to greater disaggregation of projects within the proposed investment programme. The results of our analysis are shown in Figure 5.7.

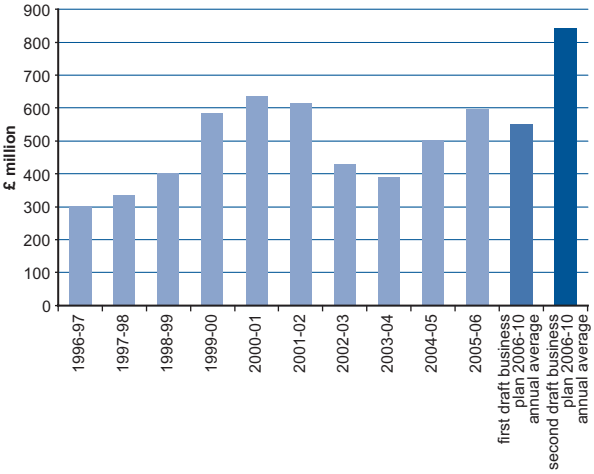
Figure 5.7: Cumulative percentage of projects with a value of between 0 and £10 million



This analysis shows that 89% of projects in the second draft business plan were expected to cost less than £6 million.

Our analysis of Scottish Water's proposed investment programme confirmed that it could not effectively be delivered during the 2006-10 regulatory control period unless there were significant reductions in cost available either because of efficiency or because the investment programme had been over-scoped. Figure 5.8 compares the total investment per year suggested by the first and second draft business plans with historic and actual spending.

Figure 5.8: Total investment per year – comparison of first draft business plan, the second draft business plan and historical performance.



We have, however, been able to identify significant cost reductions in the programme. We discuss these in detail in Chapters 13 and 14.

Summary

Quality and Standards III engaged a wider group of stakeholders throughout the process and set out a detailed list of outputs for the investment programme.

'Investing in Water Services 2006' set out the Scottish Executive's views on the likely costs of different levels and types of investment. The consultation sought views on investment priorities and on whether or not bills should rise to pay for each type of investment. In our response to the consultation we recognised that customers are unlikely to agree fully on priorities and that our principal role was to ensure that customers receive best value for money on a sustainable basis.

[95] WIC 18, Version 3.

The Reporter raised a number of concerns about the cost and scope of Scottish Water's first draft business plan. The proposed investment programme was almost without precedent in the UK water industry. We raised these issues in an open letter to the Minister in December 2004.

The Ministerial Guidance issued in February 2005 completed the Quality and Standards III process and set out in detail the investment objectives for the industry for 2006-14.

In its second draft business plan Scottish Water stated that it would cost £3.37 billion to deliver the Ministers' 'essential' and 'desirable' outputs. It proposed that outputs be delayed or reduced or, alternatively, that more public expenditure was made available. Our analysis confirmed that a capital programme of such a size would not be effectively delivered. However, as we outline in Chapters 13 and 14, we believe that all the outputs required by Ministers can be delivered at a much lower cost.

Section 2: Capital expenditure
Chapter 6: Transition from Quality and Standards II to Quality and Standards III

Introduction

In this chapter we discuss the overhang of investment projects that were due to be delivered in the Quality and Standards II period but which will now have to be completed during Quality and Standards III.

Continuity between investment periods and major investment projects means that projects may span two or more regulatory control periods. This is not, in itself, a particular issue for regulators, provided investment is being delivered efficiently. However, difficulties will arise if:

- inefficient investment in the current period means that insufficient funding remains to deliver all of the agreed outputs; and/or
- the overhang is very large and it displaces desirable project outputs from the agreed investment programme.

In Chapter 4 we showed that Quality and Standards II was a large and demanding investment programme. No company of a similar size to Scottish Water has successfully delivered a programme of this magnitude. It now appears likely that a significant proportion of Quality and Standards II will remain undelivered at the start of the next regulatory control period. There are three main reasons for this:

- Scottish Water believed that a radical approach to capital delivery was required to meet the efficiency targets set for Quality and Standards II. It responded by establishing a joint venture, Scottish Water Solutions. The formation of this joint venture significantly slowed progress in the first two years of the current regulatory control period.
- Additional outputs have been added to Quality and Standards II during the period, such as a response to the regulations on dangerous substances.
- Scottish Water has made less progress against efficiency targets than might have been hoped. This has reduced the amount of effective efficient investment delivered.

In this chapter we discuss how this investment overhang might be managed effectively. We then examine how to determine the extent of the overhang from Quality and Standards II and discuss how we have taken account of the overhang in this draft determination.

Monitoring capital investment

Scottish Water's investment programme comprises several thousand projects, ranging in value from a few thousand pounds to more than £80 million. In the Strategic Review of Charges 2002-06, we set the annual post-efficiency investment programme at approximately £450 million each year. Scottish Water is required to manage delivery of all of the investment outputs for the agreed budget. Our role is to monitor its performance in delivering the agreed programme and to ensure that customers receive value for money.

Effective monitoring of the delivery of outputs requires an agreed and clear definition of the output to be delivered at a project level. Although the Quality and Standards process defines the overall objectives of the investment programme, it is still necessary to make sure that outputs at a detailed project level are available. In the absence of such information, stakeholders will be unable to verify that the agreed outputs of the capital programme have been delivered.

In our guidance for Scottish Water's draft business plans, we included a comprehensive format for defining the baseline investment programme[96]. This definition includes the following:

- A unique name, code and geographical reference for each project in the programme.
- A description of the project.
- Information about the 'drivers' for the project. For capital maintenance projects the size, quantity and type of work proposed. For quality and supply/demand projects, information about which agreed 'drivers' are generating the project, such as environmental or water quality legislation.

[96] This format is provided in our publication 'Our work in regulating the Scottish water industry: The scope for capital investment efficiency', Volume 5, Chapter 9, Page 77.

- Project costs and, where there are multiple drivers, an allocation of the costs to each of the drivers.

- An appropriate measure of the output (for example, the length of main relined or the quality standard being met).

- The annual projected investment spend for each project.

- The project delivery profile, including key milestones and the expected completion date of the project.

This level of detail reflects the lessons we have learnt from Quality and Standards II. It is, however, no more information than that which Ofwat requires from the companies south of the border. Defining the programme in detail in this way will allow us to monitor delivery of the investment outputs and ensure that customers' money is being well spent. It will also be possible to determine which elements of the programme remain undelivered at the end of the next regulatory control period. Provided money has been spent efficiently, and the size of the overhang is relatively small, it should not be too difficult to manage any overhang from Quality and Standards III into the next regulatory control period.

Our move towards the regulatory capital value (RCV) method of charge setting[97] will also help ensure that Scottish Water does not benefit from delaying implementation of the capital programme. The next determination of charges will adjust the end-of-period RCV to reflect actual efficient delivery of investment. Scottish Water will only be allowed to earn a return once an investment output has been delivered.

Size of the overhang from Quality and Standards II

It now appears very likely that the Quality and Standards II investment programme will not have been delivered in full by April 2006. We first indicated our concern about the slow delivery of the programme in our Investment and Asset Management report in April 2004. Our analysis has consistently indicated the difficulties that Scottish Water faced in completing the Quality and Standards II investment programme on time[98].

We wrote to Scottish Water on 2 September 2004 to raise the following points:

- As work was already underway on the Strategic Review of Charges 2006-10, it was important to complete the audit trail of the process by which the baseline programme for Quality and Standards II is established.

- We required Scottish Water's current best forecast for the extent of delivery of Quality and Standards II as at 1 April 2006. To establish the starting position for the next Strategic Review, and to finalise our methodology for assessing the required capital investment for the period, we required information on the likely extent of delivery of Quality and Standards II.

We wrote to Scottish Water again on 10 September 2004, reiterating our request for this information. We did not receive a response from Scottish Water to either of these letters.

We wrote for a third time on 20 September 2004. This letter explained that we could not finalise our methodology for assessing capital efficiency in the Strategic Review of Charges 2006-10 until we had received a definitive statement from Scottish Water on the Quality and Standards II projects that would not be delivered on time. We advised Scottish Water that we would delay publication of our methodology for assessing capital efficiency until we had received a proper and complete response. We received no response to this letter.

In October 2004 we wrote a regulatory letter to Scottish Water, WIC 47[99], asking for a final version of the Quality and Standards II programme and a clear statement of the likely position in delivering the programme, at a project level, by the end of March 2006. We explained that it would be difficult to specify the baseline investment programme for the second draft business plan without this information.

97 See Chapter 12 of this volume
98 See also Chapter 6 of our publication 'Our work in regulating the Scottish water industry: The scope for capital investment efficiency', Volume 5.
99 This letter is available on our website at www.watercommissioner.co.uk

Scottish Water responded to our WIC 47 letter on 14 October. Scottish Water provided three possible scenarios (low, high and best estimate) for the likely capital investment position at the end of the Quality and Standards II period. Under these scenarios, estimates of the non-delivery of the Quality and Standards II baseline programme by 1 April 2006 ranged from £99 million to £180 million.

We responded on 15 October 2004, reiterating our requirement for a detailed estimate of the Quality and Standards II projects that would not have been delivered by the end of March 2006. We reminded Scottish Water that this information was essential if we were to finalise our proposals for establishing a baseline for the Strategic Review of Charges 2006-10. We also informed Scottish Water that, in the absence of a final definition of the current baseline and the expected outcome, we would not be able to agree to any request for an 'early start' programme for Quality and Standards III.

In its first draft business plan, Scottish Water indicated that its latest projection of non-delivery of Quality and Standards II had risen to £194 million. The lack of consistency in Scottish Water's estimates gave us further cause for concern.

In November 2004 we met with Scottish Water to discuss our concerns. In WIC 51[100] we outlined our analysis of the likely Quality and Standards II overhang. This analysis used information from the WIC 18 baseline and Scottish Water's quarterly investment return. This analysis suggested that the overhang could amount to more than £370 million.

Scottish Water's response indicated that it had been unable to replicate our analysis. We therefore provided more detailed analysis of the likely overhang. This analysis made it clear that the actual size of the overhang would depend on the outturn efficiency of the investment delivered before March 2006.

We agreed to work with Scottish Water to finalise a best estimate of the overhang. We discuss the final allowed overhang and how the figure was reached later in this chapter.

Factors contributing to the Quality and Standards II overhang

In preparing this draft determination, we were keen to understand the causes of the overhang. Scottish Water has offered the following explanations:

- An overhang of projects from Quality and Standards I.
- Limited definition of the baseline investment programme.
- Delays associated with Scottish Water's decision to establish Scottish Water Solutions.
- Additional outputs being added to the investment programme.
- Adverse public reaction to a number of the schemes proposed.

We believe that a further factor contributed to the overhang:

- A lack of efficiency in delivering early elements of the programme.

Each of these is examined briefly below.

Overhang of projects from Quality and Standards I

In our Investment and Asset Management Report 2000-02[101], we noted that the £888 million invested in the two years between April 2000 and March 2002 was consistent with the forecast expenditure of Quality and Standards I of £890 million[102]. We concluded, therefore, that[103]:

"Customers have the right to expect that the obligations of Quality and Standards I have been delivered in full."

Scottish Water, however, has indicated that this was not the case and that, at the start of the Quality and

[100] This letter, 'WIC 51: Potential for a Quality and Standards II overhang' was sent on 19 November 2004. It is available on our website at www.watercommissioner.co.uk
[101] This report covered North of Scotland Water Authority, West of Scotland Water Authority and East of Scotland Water Authority.
[102] See 'Investment and Asset Management Report 2000-02, Chapter 5, Section 5.2, page 24.
[103] See 'Investment and Asset Management Report 2000-02, Chapter 6, page 27.

Standards II period, there was a significant overhang of Quality and Standards I projects. Scottish Water's initial estimate of this overhang was £157 million[104].

Quality and Standards II contained some limited funding for completing delivery of Quality and Standards I obligations. We subsequently agreed to allow an additional £45 million to meet the remaining Quality and Standards I obligations[105].

Our requirement for definition of the Quality and Standards II overhang at a project level will ensure that we are able to monitor delivery of the overhang carefully.

Limited definition of the baseline investment programme

Our efforts to set a clear baseline for Quality and Standards II (WIC 18)[106] have taught us that a fully defined capital investment programme must be in place at the outset of the 2006-10 regulatory control period.

Throughout the Quality and Standards III process we have emphasised the need to define the baseline clearly. Customers have a right to know where their money is being spent, and capital projects such as upgrading treatment plants or renewing pipes can have a major impact on local communities.

Delays associated with establishing Scottish Water Solutions

Table 6.1 shows the levels of investment in the water industry in Scotland since 1996.

Table 6.1: Levels of investment 1996-97 to 2004-05

Year	1996-97	1997-98	1998-99	1999-00	2000-01	2001-02	2002-03	2003-04	2004-05
Direct capital investment	£252m	£277m	£346m	£397m	£428m	£460m	£353m	£389m	£520m
Investment delivered through PPP	£3m	£15m	£15m	£136m	£170m	£126m	£65m	-	-
Total investment	£255m	£292m	£361m	£533m	£598m	£586m	£418m	£389m	£520m

[104] Contained in Scottish Water's response to our WIC 32 regulatory letter, which is available on our website.
[105] This process is described in detail in our publication 'Our work in regulating the Scottish water industry: The scope for capital investment efficiency', Volume 5, Chapter 7, page 68.
[106] The issue relating to establishing the Quality and Standards II baseline investment programme was discussed in detail in our document 'Our work in regulating the Scottish water industry: The scope for capital investment efficiency', Volume 5, Chapter 7, page 66.

As Table 6.1 shows, investment increased between 1996 and 2002 but decreased in the first two years after Scottish Water was formed. Scottish Water has asserted that it was in customers' interests to establish Scottish Water Solutions, as this joint venture company would ultimately markedly improve the efficiency of capital expenditure. Inevitably, the time taken to establish Scottish Water Solutions led to a lower level of investment in the first two years of the 2002-06 regulatory control period.

Additional outputs added to the investment programme

Scottish Water has notified us that they have been required to deliver £110 million of additional outputs during Quality and Standards II. These relate to new obligations concerning site security, the removal of hazardous substances and a higher than expected level of contributions to developers.

Scottish Water has indicated that much of this expenditure will occur in the final year of the current investment period. We have asked the Reporter to scrutinise these additional costs and ensure that they are reasonable. This assessment is unlikely to be complete before the final determination in November 2005. Any issues arising would therefore need to be addressed through the logging up/down process in the Strategic Review of Charges 2010-14.

It is possible that the quality regulators' priorities will be subject to change during the regulatory control period. Normally these changes would be accommodated by substituting the new output for an output of similar value that has become a lower priority. In cases where this is not possible, such issues would be addressed either through an interim determination or the logging up/down process[107].

Adverse public reaction to schemes

We are aware of a number of Quality and Standards II schemes where there has been adverse public reaction to the works proposed. In many cases this has been caused by the lack of clearly defined outputs in the investment programme.

A typical example is planned improvements on the Isle of Arran. The former West of Scotland Water Authority made a number of statements about improvements to the waste water network on Arran, including its intention to provide 'secondary' (biological) waste water treatment. Scottish Water subsequently concluded that the required environmental standards could be met more effectively and efficiently through primary treatment, using longer sea outfalls. A number of residents in Arran are dissatisfied with the revised scheme, which they believe also limits the potential for development. In the absence of a defined investment programme, it has not proved possible to determine whether the original waste water scheme for Arran in Quality and Standards II included funding for growth.

The requirement on Scottish Water to provide a detailed investment programme, specifying outputs at a project level, should ensure clarity about exactly what will be delivered in Quality and Standards III. This will improve public understanding of the extent of works proposed and will help avoid issues which can arise if customer expectations are not met. Scottish Water will also need to ensure that, through appropriate consultation, it seeks to address customers' concerns in the investment delivery process.

Lack of efficiency in delivering early elements of the programme

Our analysis of Scottish Water's quarterly capital investment returns confirms that projects delivered in the early years of Quality and Standards II have not met the efficiency targets set in the Strategic Review of Charges 2002-06. It is, of course, still possible that the whole programme will be delivered to budget but this would require the remainder of the programme to be delivered below the targeted post-efficiency cost for those projects.

Treatment of the overhang in the Strategic Review of Charges 2006-10

The format for Scottish Water's second draft business plan requires project level definition of the overhang in

[107] These processes are explained in Chapter 11 of Volume 3 of our methodology consultation and in Volume 7, chapter 6 of this draft determination.

Table E and Quality and Standards III outputs in Table C. Unfortunately, Table E does not provide us with the level of detail that we require to monitor the delivery of the overhang.

We initially estimated that the size of the Quality and Standards II overhang that should be funded by customers was in the range of £140 million to £180 million[108]. This range was based on deducting the actual amount invested over the 2002-06 period from the total budget for Quality and Standards II. We adjusted the total budget for Quality and Standards II to take account of the unexpected effect of capital inflation in the period 2002-06. We explained the rationale behind our estimate to Scottish Water in a letter dated 16 May 2005. In this letter we asked Scottish Water to make any representations on this assessment by 20 May 2005.

Scottish Water responded on 20 May 2005. It forecast that the remaining value of Quality and Standards II investment after March 2006 would be £283 million. This is consistent with the figure reported in the tables attached to its second draft business plan.

We were not fully persuaded by Scottish Water's explanation of the need for £283 million to deliver the remainder of Quality and Standards II. In particular, we are concerned that Scottish Water again advanced the argument that it had inherited £157 million of Quality and Standards I liabilities. This claim has never been properly justified and, moreover, an agreement was reached in November 2004 that resolved this issue. This agreement should have had the effect that Quality and Standards I liabilities could not explain the overhang from Quality and Standards II.

Our analysis of Scottish Water's claimed allowance indicated that the £283 million included an allowance for likely inflation beyond 31 March 2006, the date when it was originally expected all Quality and Standards II outputs would have been delivered. We made two adjustments to this figure to take account of the effects of inflation:

- First, we removed the effect of inflation post 31 March 2006. This ensures that customers are not expected to fund the additional costs associated with late delivery. This reduced the overhang to £274.5 million (at 2005-06 prices).

- Second, we restated the £274.5 million to 2003-04 prices to ensure that it was presented on a consistent basis with the remainder of the capital expenditure funded in this draft determination. This reduced the £274.5 million to £253 million.

We had also previously agreed with Scottish Water an adjustment to the allowed level of capital expenditure for the 2006-10 regulatory control period to take account of the former East of Scotland Water Authority's claim for capital efficiencies prior to the 2002-06 regulatory control period. It was never possible to substantiate this claim of capital efficiency[109]. In the Strategic Review of Charges 2002-06, the capital efficiency targets for each of the three authorities were the same. However, we explained that the actual percentage targets that were set for the former East of Scotland Water Authority were lower. This reflected efficiencies of £114 million claimed by the authority in the definition of its investment needs during Quality and Standards II.

We wrote to the Board of Scottish Water proposing that the £114 million (£80.2 million post efficiency) should be amortised in five equal instalments of £16.04 million during the period from 2006-07 to 2010-11 by adding each instalment to the capital efficiency target applicable to that year. Scottish Water agreed to our proposal in February 2003.

In order to make this agreed adjustment in this draft determination, we have deducted the first four instalments from the allowed Quality and Standards II overhang. This has the effect of making Scottish Water's capital efficiency target larger. When restated at 2003-04 prices, the combined value of these four instalments is £54.9 million.

[108] Letter from the Commissioner to the Chief Executive of Scottish Water, 2 May 2005.
[109] This is also discussed in Volume 5 of our methodology consultation Our work in regulating the Scottish water industry: the scope for capital investment efficiency, p.67.

We have therefore deducted £54.9 million from the overhang of £253 million. This produced an allowed for overhang for Quality and Standards II of £198.1 million.

In Table 6.2 we summarise each step in assessing the appropriate value for the overhang.

Table 6.2: Summary of assessment of overhang that should be funded

	Value of adjustment	Adjusted overhang
Scottish Water's claimed overhang	-	£283m
Reduction for effects of inflation post 31 March 2006	- £8.5m	£274.5m
Restated at 2003-04 prices	- £21.5m	£253m
Reduction for unsubstantiated East of Scotland Water Authority's efficiency claims (at 2003-04 prices)	- £54.9m	£198.1m
Allowed Quality and Standards II overhang	-	£198.1m

It is important to all stakeholders that the outputs of the Quality and Standards II programme are delivered in full. We have allowed Scottish Water at least sufficient funding to ensure that it can deliver the remainder of the outputs efficiently in the 2006-10 regulatory control period.

Summary

Scottish Water is broadly the same size as Anglian Water and Yorkshire Water. Neither of these two companies has ever delivered as large a four-year programme of investment as Quality and Standards II. It now appears that a significant proportion of Quality and Standards II outputs will not have been delivered at the start of the next regulatory period. There appears to be three main reasons for this:

- Delays associated with the creation of Scottish Water Solutions.
- Scottish Water has been required to deliver additional investment outputs.
- Scottish Water has made slow progress in improving its capital efficiency.

In its second draft business plan Scottish Water claimed that it would require £283 million to complete the delivery of Quality and Standards II. This claim included inflation after the end of the current regulatory control period.

Our analysis suggested that we could reasonably have allowed between £140 million and £180 million for the completion of Quality and Standards II. This amount did not include the unsubstantiated claim for efficiency made by the former East of Scotland Water Authority in 2001.

We have, however, decided to accept Scottish Water's claim but have removed the post 2006 inflation allowance. We have also required Scottish Water to meet its obligations under our agreement to address the unsubstantiated efficiency claim by the former East of Scotland Water Authority.

Section 2: Capital expenditure
Chapter 7: Scope for capital efficiency

Introduction

In their February Guidance, the Scottish Ministers defined the investment outputs that Scottish Water had to deliver. In its second draft business plan, submitted in April 2005, Scottish Water set out the detailed investment that it considered would be necessary to meet these investment objectives. This investment was in excess of £3.3 billion in 2003-04 prices.

This chapter explains how we assess the allowed level of capital expenditure. Our analysis reviews the scope for capital efficiency in Scottish Water's investment proposals. Capital expenditure has a major impact on customers' bills. It is therefore important to ensure that investment is delivered as efficiently as possible.

Scottish Water's investment plan has been scrutinised in detail by the Reporter, the quality regulators (the Scottish Environment Protection Agency and the Drinking Water Quality Regulator) and this Office. The Reporter raised a number of concerns about the scope and composition of the proposed investment programme. We therefore asked two firms of engineering consultants and Ofwat to assist us in a more detailed review of the capital programme than we had originally planned.

Scottish Water was required to include[110] in its investment plan a detailed list of the Quality and Standards II projects that will not have been delivered by the end of March 2006. We had wanted to review the scope for any synergies between the projects that will not have been delivered in the 2002-06 regulatory control period. Unfortunately, Scottish Water did not provide a sufficiently detailed list to allow us to complete this analysis. We therefore propose to continue to monitor the delivery of our WIC 18 list of Quality and Standards II projects. These will be added to the investment programme for the 2006-10 regulatory control period until the delivery of the outputs is signed off by stakeholders.

Our review of the investment plan provided by Scottish Water established a baseline investment programme. This baseline investment programme lists all of the projects that are required in order to deliver the 'essential' and 'desirable' outputs specified in the Ministerial Guidance. However, we believe that more definition will be required in several areas before we will be able to monitor this plan effectively.

For capital maintenance, we have taken account of the various elements of the four-stage process that Ofwat used in its 2004 price review[111]. This approach considers both historic levels of capital maintenance expenditure and the changes in the future that are likely to affect the capital maintenance expenditure requirement. As there is no reliable record of historic capital maintenance expenditure in Scotland, we have used historic levels of expenditure in England and Wales combined with the characteristics of Scottish Water's asset and customer bases to assess a 'base' expenditure requirement.

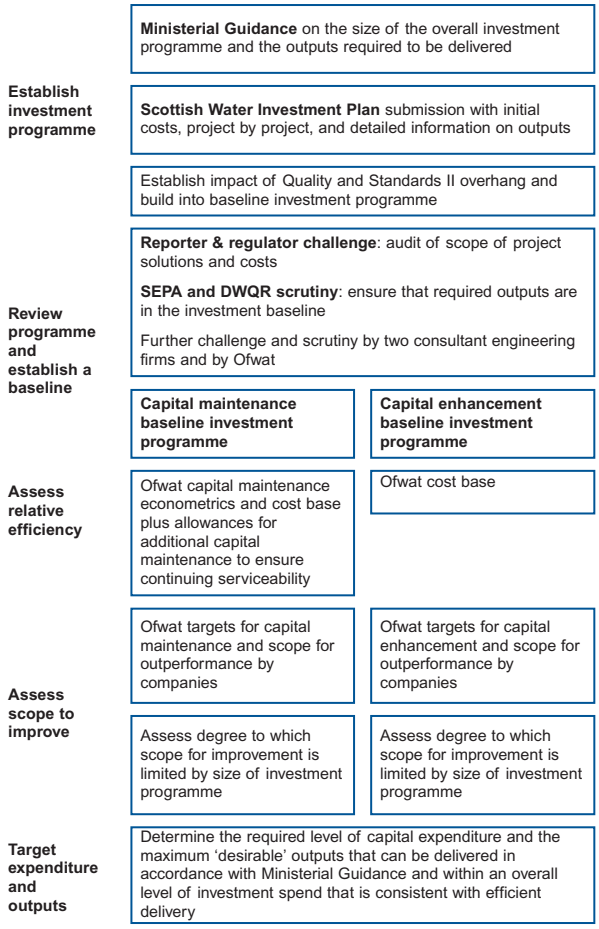
For future capital maintenance expenditure, there is only limited serviceability information available in Scotland. We have therefore taken into account the information available and the views of the Reporter and the quality regulators when assessing the need for additional capital maintenance. The resulting increases in allowed capital maintenance investment should ensure that Scottish Water's assets at least maintain their serviceability. It should be borne in mind that the on-going enhancement investment programme should lead to a significant increase in the serviceability of the overall asset base.

We have used the cost base approach to assess Scottish Water's relative efficiency in capital expenditure. The allowed level of capital maintenance and capital enhancement expenditure assumes that Scottish Water will improve its efficiency over the regulatory control period.

Figure 7.1 sets out the process we undertook in carrying out our analysis.

[110] See our publication, 'Guidance for the 2nd draft business plan', which is available on our website at www.watercommissioner.co.uk
[111] Ofwat's approach is described in the publications 'Maintaining water and sewerage systems in England and Wales: Our proposed approach for the 2004 periodic review' (May 2002) and 'Setting the price limits for 2005-10: Framework and approach – a consultation paper' (October 2002).

Figure 7.1: Framework for capital investment targets



Establishing the initial baseline investment programme

The baseline capital investment programme will contain the detailed list of capital projects that Scottish Water is required to deliver under its regulatory contract for 2006-10. Following this draft determination we will seek to gain a more detailed understanding of the capital maintenance, development constraints and malodour investment that is to be delivered. We discussed our requirements in the previous chapter.

Review of the baseline

All regulators review the draft investment programmes that regulated companies provide[112]. Our aim is to ensure that customers and stakeholders receive the maximum possible benefit from Scottish Water's capital investment.

We need to be sure that our efficiency analysis is appropriate and consistent with our goal of improving value for money to customers. There is clearly no point in delivering an ineffective investment plan efficiently.

We do not have detailed technical knowledge of the projects that comprise the investment programme, nor of their impact on water quality and the environment. We have therefore worked with the Reporter, SEPA and the DWQR to review Scottish Water's investment proposals.

We also sought assurances from both SEPA and the DWQR that the 'quality' element of Scottish Water's investment proposals met the objectives outlined in the February Ministerial Guidance.

Given the very high cost of the investment included in Scottish Water's second draft business plan and the concerns expressed by the Reporter, we contracted Black and Veatch and Faber Maunsell to conduct a more detailed review of the investment programme. We also asked Ofwat to assist us in reviewing the programme and in assessing the cost and scope of the proposed investment.

We asked both the Reporter and our independent consultants to use the following criteria in their review of the investment programme:

- Is the programme sufficiently well defined to allow customers and stakeholders to monitor delivery? In particular, does it meet the level of definition set out in our guidelines?
- If delivered in full, does the proposed programme meet the objectives set out in Ministerial Guidance? If not, what are the omissions? If so, does it exceed the requirements? In particular, do the quality regulators, SEPA and the DWQR, agree that the relevant quality objectives will be met by the proposed investment?
- Are there projects in the programme that do not contribute to the required objectives?

[112] A description of the reviews carried out by Ofwat and the Office of the Rail Regulator is provided in Volume 5 of our methodology consultation: 'Our work in regulating the Scottish water industry: The scope for capital investment efficiency', Chapter 10, Section 10.3.

- Are there errors in the programme; for example, in the identification of projects and the associated outputs?
- Is the programme properly costed?
- Are the solutions proposed by Scottish Water appropriate?
- Do they represent best practice?
- Are the proposed solutions supported by the DWQR and SEPA?
- Have measurable, defined outputs been allocated to the projects in the programme?
- Do the projects have clearly defined delivery dates?
- Are the delivery dates realistic, both in terms of individual project construction times and the overall capacity of the industry to deliver the programme efficiently?

The process of reviewing the investment programme has provided us with clear evidence of over-scoping within the second draft investment plan.

The output from this review is a properly (but not necessarily efficiently) costed, fully defined list of quality enhancement capital investment projects. The results of this detailed review are discussed in Chapter 14.

Establishing the scope for efficiency

In calculating the scope for efficiency in the baseline investment programme, our approach has been informed by Ofwat's analysis for the 2004 price review in England and Wales.

Ofwat makes separate assessments of efficiency for capital maintenance and capital enhancement investment. We have also made two separate assessments.

Assessing the efficient level of capital maintenance

Our methodology for determining the efficient level of capital maintenance expenditure included the following stages:

- An assessment of the level of capital maintenance expenditure required by Scottish Water, given its current asset base. This assessment was informed by Ofwat's capital maintenance econometric models.
- An adjustment to the required level of capital maintenance expenditure to take account of any circumstances specific to Scotland that could affect Scottish Water's costs.
- An adjustment to the required level of capital maintenance expenditure to take account of Scottish Water's current higher cost base relative to the companies in England and Wales. This adjustment helps to ensure that Scottish Water maintains the serviceability of its asset base. We discuss this in more detail in Chapter 13.

Validating the results of the econometric assessment

We are confident that our approach is robust. To validate the econometric assessment, we have carried out a separate series of high-level comparisons between our econometric assessment of capital maintenance requirements for Scottish Water and the historic and planned levels of capital maintenance expenditure in England and Wales. In these comparisons we took account of:

- the value of the asset base, and
- the number and type of assets.

Assessing efficiency for capital enhancement projects

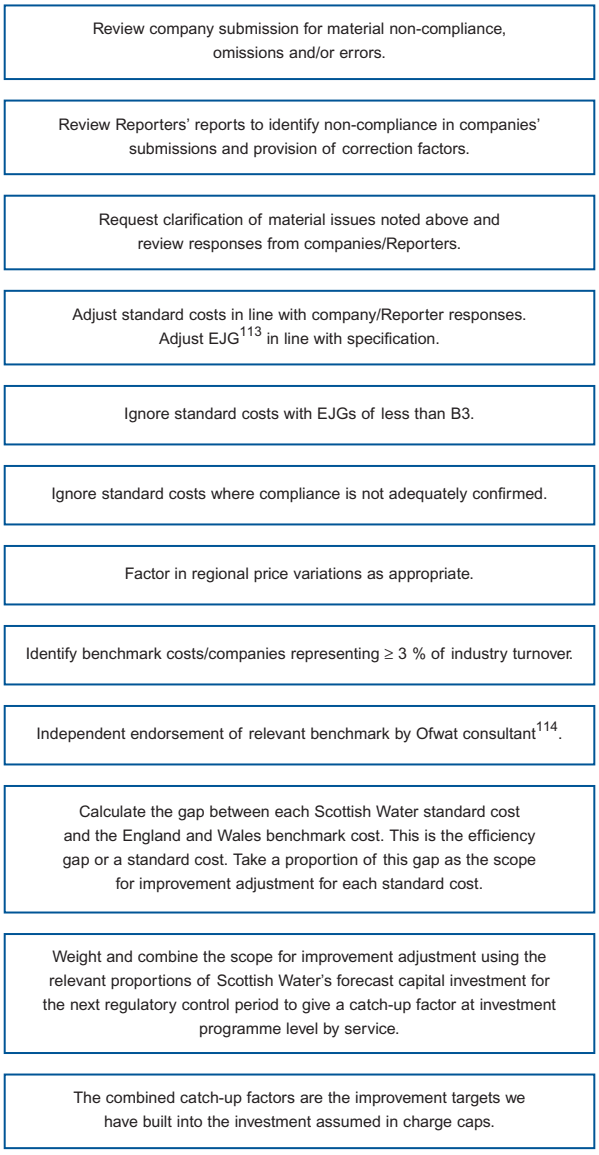
We used Ofwat's cost base approach to benchmark Scottish Water's efficiency in delivering capital

enhancement projects. We took account of special factors relating to the industry in Scotland.

We recognise that this analysis is particularly specialised. We therefore commissioned independent consultants, Faber Maunsell, to carry out the analysis of relative efficiency. The results of their work were reviewed by SMC (Strategic Management Consultants) and by Ofwat to ensure that our approach was consistent with that adopted south of the border.

We have adopted Ofwat's cost base model and approach, and applied this to the capital investment plan proposed by Scottish Water. This means that we have compared the standard costs prepared by Scottish Water to the basket of standard costs that Ofwat has received from the water and sewerage companies in England and Wales for the 2004 price determination. This comparison allows us to assess the relative capital efficiency of Scottish Water compared with the other companies. We have made this assessment by following the approach used by Ofwat in the 2004 determination, except that we have not adjusted any of the benchmark standard costs previously chosen by Ofwat. The key steps in the approach are illustrated in Figure 7.2.

Figure 7.2: Key stages in application of cost base efficiency assessment



The results of our assessment are outlined in Chapter 14.

The impact of operating in Scotland – special factors

We endeavoured to ensure that we had considered all of the factors that influence investment costs. We excluded factors that are within the control of management. We have, however, taken account of factors that are beyond management control. These could either increase or decrease the level of cost.

[113] Engineering Judgement Grades – these are 'confidence' grades assigned to the information contained in the submission.

[114] With completion of this step in the approach, Ofwat has derived robust benchmark costs. We have taken these benchmark costs and compared them with the standard costs submitted by Scottish Water, following the same approach that Ofwat has used. This assessment was carried out by our consultants with guidance from Ofwat.

We asked Scottish Water, as part of its business plan submissions, to draw to our attention all factors that either increase or decrease costs. We were keen to ensure that our efficiency targets neither unduly penalised nor rewarded Scottish Water.

Some commentators have argued that it is unfair to draw comparisons between Scottish Water's performance and that of the privatised water and sewerage companies in England and Wales. However, we analyse any special factors identified by Scottish Water and take account of this analysis in drawing conclusions about the relative efficiency of Scottish Water. We believe that such objective measurement of performance helps to ensure that customers receive value for money.

Commentators who question our benchmarking process cite the following differences between the industry in Scotland and that south of the border:

- Scotland's geography (size, remote islands, long coastline, topography).
- Its population settlement patterns (remote communities, concentrated dense urban areas).
- The extent of the assets required to serve customers in Scotland (long mains, small isolated treatment works).
- The quality of the assets inherited by Scottish Water (condition and performance of the mains, sewers, treatment works, pumps etc).
- The nature of the customer base.
- The fact that Scottish Water is in public ownership (political interest, Scottish Water's duty to Scotland, remit and freedom of management).
- The short time that Scottish Water has had to mature and improve.

Scottish Water had to provide evidence in the following areas to justify an adjustment to the assessed capital efficiency based on a special factor:

- What is the justification for the special factor? Scottish Water was required to set out whether the factors are the result of special obligations, the character of all or part of its customer base, or the result of historical development of the water and waste water systems in its area of supply.
- How do the special factors impact on Scottish Water's costs?
- How has Scottish Water sought to manage the additional costs arising from the special factors and to limit their impact?
- Are there other special factors that reduce costs? If so, have these been quantified and offset against the upward cost pressures?

In its first draft business plan, Scottish Water did not include any special factor claims relating to capital investment, although it did make a 'regional adjustment' to its costs.

In its second draft business plan, Scottish Water made two claims for special factors in capital expenditure. We review these claims in Chapter 13.

Applying the scope for efficiency

We assessed the scope for efficiency for both capital maintenance and capital enhancement at a programme level. We have not sought to review the relative efficiency of individual projects. The project costs contained in the baseline programme are therefore the pre-efficiency costs. It will be for Scottish Water to determine how these same projects will, at a programme level, be delivered within the overall post-efficiency budget.

We have taken account of the scope for efficiency in the funding that we have made available for delivering the baseline capital investment programme. This is the funding included in the regulatory contract between Scottish Water and its customers. It should be seen as the minimum acceptable level of performance. If Scottish Water fails to meet this minimum acceptable level of performance for investment delivery then

Ministers will have to decide how this should be managed. In our view, customers should not be expected to pay twice for the required investment outputs.

Conclusion

Scottish Water's investment plan contains a detailed list of projects and their associated outputs. We will, however, need to undertake further work to define aspects of the proposed investment in capital maintenance, odour and growth.

Scottish Water did not provide the detailed information that we would have liked on the Quality and Standards II projects that will not have been delivered by the end of March 2006. We will therefore simply add our WIC 18 list of Quality and Standards II projects to the investment programme for the 2006-10 regulatory control period.

We have worked with the Reporter and the quality regulators to check that this plan is consistent with the objectives set out by Ministers. We were concerned about the size of the investment that Scottish Water claimed to be necessary to meet the Ministers' objectives and about issues which the Reporter raised. As a result, we adapted the approach outlined in our methodology consultation and commissioned an additional detailed review of the proposed capital programme by two consultant engineering firms and by Ofwat.

This review of Scottish Water's investment plan has resulted in a baseline investment programme. This baseline lists the projects required to deliver the investment requirements for quality enhancement priorities.

We used both Ofwat's cost base approach and econometric models to assess an achievable, efficient level of capital maintenance expenditure. We used Ofwat's cost base approach in making our assessment of capital efficiency for enhancement investment. We have also reviewed the impact of special factors.

The scope for efficiency is assessed at a programme level. It is for Scottish Water to decide how best to deliver the detailed baseline within its regulatory contract.

Section 3: PPP contracts
Chapter 8: Background to PPP contracts

Introduction

In this section we discuss the role that Public Private Partnerships (PPP) play in delivering Scottish Water's capital programme. PPP accounts for some 11% of Scottish Water's current spending. It is therefore important to examine the experience of using PPP in the Scottish water industry. PPP should deliver value for money to customers and Scottish Water should be alert for any opportunities to reduce the costs associated with PPP contracts.

This chapter describes the background to PPP in the Scottish water industry. It also explains how PPP has been used as a mechanism by the three former water authorities to deliver capital investment. It discusses how the water authorities tendered PPP projects, and how these projects were, and continue to be, operated.

In the chapters that follow we discuss why we believe it is important to continue to monitor the benefits that PPP brings to customers. We go on to describe how we will monitor the costs and benefits of PPP and the prospects for PPP in the coming regulatory control period.

Background to PPP

Public Private Partnerships are a range of business structures and partnership arrangements between the private and public sectors. PPP is a mechanism to use private sector expertise and capital in the delivery of public sector services. An example of a PPP arrangement is where the private sector (the contractor) is contracted to construct and operate new facilities, for which the public sector (the authority) then pays an annual fee. This annual fee typically covers initial and ongoing capital expenditure, financing costs and the operating costs of the new facilities.

Delivering services remains the responsibility of the public sector organisation. PPP can have a variety of different applications. It is used by a number of different types of organisation to deliver a number of different services. The range of organisations that use PPP is diverse, from schools and hospitals to the water and sewerage industry in Scotland.

Until 1993, new capital assets in the public sector were funded by a combination of new loans and, where appropriate, customer revenue. In 1993, the Private Finance Initiative (PFI) was introduced as an alternative way to finance and deliver public services. The PFI was later developed further and renamed Public Private Partnerships. PPP placed emphasis on the partnerships that would need to exist between the private and public sectors if this method of service delivery were to be fully effective.

While the original aim of PPP was to reduce the demand for new loans from central government for capital investment, the main benefit from successful schemes appears to have been the timely delivery of, and innovative solutions for, building and operating new facilities. These benefits ensure that customers' bills are lower than they would otherwise have been and that customers receive a better service, more quickly.

Use of PPP in the Scottish water industry

By 1997, it had become clear that there needed to be a step change in the level of investment achieved by the water and sewerage industry if the industry was going to comply with pressing environmental deadlines. Little had been done to ensure compliance with the 1991 Urban Waste Water Treatment Directive (UWWTD) prior to the creation of the three water authorities in April 1996.

The extent of the investment required, and the exceptionally tight timescales, presented a challenge for traditional methods of public sector procurement. The PPP route appeared to offer an attractive alternative. It seemed likely that this route would deliver benefits more immediately, within the constraints of public expenditure, and would keep charge increases as low as possible. It is an essential criterion of PPP that value for money in delivering investment is demonstrated against traditional public sector delivery of equivalent outputs.

All nine of the PPP contracts were initiated by the three former water authorities. Each of the authorities assessed the improvement in waste water treatment that had to be delivered in order to comply with the

requirements of the UWWTD. One of the options that the authorities considered was to let a concession for a period of 25-30 years. This concession involved designing, building, operating, and financing the required improvement in waste water treatment.

Initial costs and external fees in preparing contracts, both for the authorities and the competing consortia, can be substantial. These initial expenses included legal, due diligence and capital commitment fees. These projects benefit from large scale in the collection and treatment of waste water and sludge. As a result, set-up costs were a reasonable proportion of the total cost. This high initial cost tends to mean that PPP is not appropriate for smaller projects.

The water authorities invited responses from the private sector, which were then compared with the best traditional public sector procurement option. The aim of this appraisal was to ensure that the authorities' service delivery and compliance criteria were met in the most effective manner and would provide best value. The appraisal process and subsequent negotiations with consortia of service providers, their advisors and financiers was sometimes protracted (being governed by EU and domestic procurement legislation and involving liaison with government).

A consortium usually consisted of a consultant engineering and design firm, a construction contractor and an operations company. These organisations formed a joint company to provide specific services to the authority. Consortium members also had to accept responsibility for maintenance over the contract period, as well as accepting the inherent risks of project delays, cost over-runs and volume changes caused by shifts in demand. The consortia were also required to deliver the service within tightly specified parameters.

The benefits for the partnership companies included:

- the long operating franchise, with a guaranteed return if the service level agreement is met; and
- the opportunity to establish or develop a presence in the Scottish marketplace.

The outcomes from the nine projects appear to have realised considerable tangible benefits in the short term. These benefits are further discussed below.

Operation of PPP

An essential element of PPP is the transfer of risk from the public to the private sector. This meant that the authority concerned did not have to record the assets or liabilities associated with delivering the project on its balance sheet. Once the PPP waste water treatment works were commissioned, the authority started to pay the partnership companies a fee that reflected the volumetric and qualitative services provided to the authority for that period. This fee was an operational expenditure item for the authority, although the charge reflected the operating, capital and financing costs of the consortium, that delivered the service.

The consortium's books and records were open to inspection so that the authority could verify the fees and ensure compliance with all contracted obligations. For the duration of the contract the consortium owns assets that have been adopted, or are constructed or modernised. At the end of the contract, all assets will revert to Scottish Water, and are required to be in a fully operable condition.

Each of the PPP contracts provides for the indexation of fees. These vary in line with annual inflation indices, but apply only to operating and capital maintenance costs. The consortium bears all existing risks for the agreed fee. However, if a tightening of environmental standards resulted in a requirement for significant new capital or operational expenditure, the fee would be renegotiated. There is also a provision which governs the sharing of net revenue arising from third party use of the treatment works.

To date there has been no indication of profit sharing with any of the authorities or with Scottish Water. The onus would be on Scottish Water to monitor closely the delivery of service and try to negotiate a share in the benefits of any additional efficiency.

Customer benefits

The principal benefits of these nine PPPs to customers should be:

- the provision of improved waste water treatment to secondary and tertiary levels fully compliant with EU standards, and in some cases to primary level where none existed before;
- quicker delivery of the service;
- more cost-effective construction and delivery of service; and
- charges that are variable and reflect the annualised costs of the service used.

The Transport & Environment Committee's 9th Report 2001 contains details of eight projects that were fully agreed up until June 2001. The report also presents the combined operational and capital cost efficiencies, compared with the public sector alternative, for each of these schemes. The largest savings achieved by each authority were reported as follows:

- North of Scotland Water Authority reported a 19% efficiency in the Aberdeen PPP scheme;
- West of Scotland Water Authority reported a 29% efficiency in the Meadowhead, Stevenston & Inverclyde PPP scheme; and
- East of Scotland Water Authority reported a 42% efficiency in the Almond Valley, Seafield & Esk Valley PPP scheme.

One of the major potential advantages, from the customer's perspective, of the PPP method of service delivery is that it ensures that the service is delivered before significant cost is incurred. It also brings with it the market disciplines of finance, management, construction and operation, and does so over the whole life of the agreed project. It is the more efficient whole life management of the project that principally differentiated PPP from the investment delivery of the three former water authorities.

The annual cost of the services provided represents a major component of Scottish Water's costs (around 11%) and therefore its future bills. In their evidence to the Transport & Environment Committee, the authorities claimed that the use of PPP to comply with EU standards, rather than the conventional procurement options, had reduced the increase in revenue required by the water industry by approximately £33 million each year[115]. This was equivalent to about 4% of customers' bills (or nearly £10 for the average household) at that time. Estimates of the savings achieved in each project are summarised in Table 8.1.

Table 8.1: Annual savings estimated by each authority

	No of schemes	Water authority estimate of annual savings
East of Scotland Water Authority	2	£20m
North of Scotland Water Authority	3	£6m
West of Scotland Water Authority	3	£7m
Total	8	£33m

Where conventional procurement and funding provided the same services at lower cost, the PPP route was not followed. The Montrose scheme, which North of Scotland Water Authority originally expected to complete by means of a PPP, proved to be better value if procured by traditional means.

PPP projects in progress

The nine PPP contracts represent a capital investment on behalf of customers of around £550 million, which contrasted with an estimated investment of more than £700 million under the conventional procurement route.

The contracted solutions for the collection, transmission and treatment of waste water and its resultant sludge were tailored to each project's particular location. The annual fees are therefore not comparable on an aggregate basis, but only when the actual service delivered and the construction of assets is taken into account.

The schemes were complex and involved developing and improving sewerage mains, pumping stations,

[115] Representing the claimed saving in annualised capital and operating costs, as submitted in the authorities' evidence to the Transport & Environment Committee.

storage facilities, treatment works, outfalls and sludge treatment facilities. The nine projects were in operation by the end of 2002-03. They currently process some 50% of Scotland's total waste water. They also process some 80% of Scottish Water's sludge. PPP projects account for virtually all of the waste water treatment in non-rural areas of Scotland. The sewerage needs of rural areas are likely to continue to be met by projects procured in the traditional way.

The nine projects are outlined in Table 8.2. This also shows the projected fee payable to each consortium.

Table 8.2: PPP contracts with Scottish Water

Project name: Company name	Contract signed	Duration years	Construction costs	Annual fee in 2003-04
Almond Valley, Seafield and Esk Valley: Stirling Water (Seafield) Ltd	1999	30	£100m	£21m
Levenmouth: Caledonian Environmental Services Ltd	2000	40	£46m	£9m
Highland (Fort William and Inverness): Catchment Ltd	1996	25	£33m	£7m
Tay: Catchment (Tay) Ltd	1999	30	£84m	£19m
Aberdeen: Aberdeen Environmental Services Ltd	2000	30	£64m	£13m
Moray: Catchment(Moray) Ltd	2001	30	£60m	£11m
Daldowie/Shieldhall: SMW Ltd	1999	25	£66m	£14m
Dalmuir: Scotia Water UK Ltd	1999	25	£37m	£7m
Meadowhead, Stevenston & Inverclyde: Ayr Environmental Services Ltd	2000	30	£59m	£12m
Scotland total			**£549m**	**£112m**[116]

There were important differences in what had been agreed between the contracting parties. The most obvious was that in the three projects contracted by the West of Scotland Water Authority, operational staff from the authority (now Scottish Water) work in the waste water treatment works and continue to be paid directly by Scottish Water. These costs are not included in the costs quoted above. Scottish Water also continues to pay local authority business rates, since there is no risk transfer benefit from the consortium paying this directly. Table 8.2 therefore does not include business rate costs that are still incurred by Scottish Water.

There are also costs that relate to insuring and maintaining the assets transferred to PPP schemes, which ceased to be direct costs to Scottish Water (East of Scotland Water Authority transferred £30 million of treatment works). Assets and equipment that become redundant as a result of the PPP may be closed and sold. This has two benefits: there is no longer a need to operate these assets and incur expense; and it may be possible to realise cash from the sale of associated land.

Conclusion

To date, PPP has played a significant role in delivering waste water services to customers in Scotland. The nine projects in operation process some 50% of Scotland's total waste water and 80% of its sludge. The projects have substituted the need for a large upfront capital payment with a series of annual operational payments. They also appear to have transferred the inherent risks of project delays and cost over-runs associated with the delivery of large capital investment from Scottish Water, and hence customers, to the contractors.

It is important, however, to consider the value for money that customers have received from the use of PPP. PPP currently represents around 11% of Scottish Water's expenditure and it is important that customers receive full benefit from the transfer of risks from the public to private sectors. In the next chapter we examine further the financial implications of PPP, whether it originally provided customers with value for money, and whether it still represents value for money.

[116] Totals may not sum exactly due to rounding.

Section 3: PPP contracts
Chapter 9: Why it is important to reassess the value for money represented by PPP

Introduction

In the previous chapter, we discussed how the then three water authorities entered into nine PPP contracts for construction and operation of waste water treatment works across Scotland. These contracts allowed the authorities to swap the initial capital, financing, maintenance and operating costs they would otherwise have incurred for a series of annual payments to contractors. These contracts transferred the risks associated with delivering capital investment to the private sector partners.

At the end of the PPP contracts (which will run for between 25 and 40 years) the waste water treatment works will pass into Scottish Water's ownership. Customers should have benefited from a value for money service and the private contractors should have earned a fair return on their investment.

In this chapter, we examine the financial implications of PPP, whether it originally provided value for money for customers, and whether it still represents value for money.

The financial and efficiency consequences of PPP

It is unfortunate that analysis of PPP projects often focuses on the benefits of substituting an operational payment for a large upfront capital payment. Similarly, some commentators focus on the relative merits of the public and private sectors in general. While it is true that the impact of meeting the UWWTD would have placed a very large burden on public spending over a short timescale, the key measure should be whether PPP achieved value for money for customers.

Our analysis of value for money of the PPP contracts must take into account all of the costs that are met by the private sector partner and the risks that are transferred. It is therefore important to understand that the annual charge that Scottish Water pays to contractors comprises four main components:

- initial capital investment (construction, refurbishment etc);
- maintenance during the contract;
- operating costs; and
- financing costs (these include both interest costs and the return on the consortium partners' equity).

We consider that if customers pay less for the service provided by the PPP contractor than they would have done if the output had been delivered by conventional procurement, then they have received value for money.

Has PPP provided value for money to date?

In 2001 we reviewed whether the PPP contracts undertaken by the then three authorities represented value for money for customers. The evidence suggested that these schemes were all delivered at a lower cost for customers than would have been achieved, at that time, by the three authorities under traditional procurement methods.

We outlined our analysis in the Strategic Review of Charges 2002-06:

"The annual charge for PPP schemes covers the capital financing costs, maintenance, and day-to-day running costs. Assuming an average weighted cost of capital of 7.5% before tax, the financing cost of an investment of £550 million, annuitised over 25 years, is around £48 million per year. On this assumption, the remaining annual costs of PPP, some £64 million, cover operating and capital maintenance costs. If I compare these costs with information from England and Wales and from the authorities, capital maintenance costs probably account for about half of this £64 million. This leaves £32 million to cover the pure operating costs of the consortium. This cost can be benchmarked against England and Wales, using my adapted version of Ofwat's econometric models.

The results of analysis using the econometric models are instructive. The benchmark costs for operating similar works to those provided in Scotland by the PPP in England is approximately £22 million. There may be some special factors that might very moderately

increase this allowance for efficient operation. This may be as much as £1 million, taking the allowable operating costs at the frontier of efficiency to £23 million […].

In general terms, my analysis shows that operating costs in Scotland are currently approximately double what they should be possible to achieve. On this basis my expectation would be that if the Scottish industry were to operate these works, the likely operating costs would be £46 million. The £32 million of operating cost included in the PPP contracts therefore compares favourably with the operating costs that would otherwise have been incurred. The 7.5% discount rate on the capital is also broadly equivalent to the 6% real rate that the public sector is required to use […].

It would appear (as would almost certainly be expected) that the value of the gap between the efficiency frontier and current Scottish authority performance has been shared. It is therefore possible to conclude that PPP to date in Scotland has delivered some quite significant benefits to customers. These benefits include more timely compliance with the UWWTD and the removal of operating cost and capital delivery risk. Most importantly, customers will actually pay less for the service provided by the PPP contractor than they would have done under traditional procurement[117]."

Since we undertook our analysis in 2001, however, a number of issues have arisen that have led us to believe that it is important to conduct a fresh assessment of the value for money represented by these PPP contracts.

Can PPP continue to provide value for money?

We have identified three reasons why we believe that it is important to undertake a fresh assessment of the PPP contracts:

- Scottish Water's improvement in its operating cost efficiency;
- the lower real costs of capital; and
- a potential need for further investment by Scottish Water.

[117] 'Strategic Review of Charges 2002-06', page 181.
[118] 'Strategic Review of Charges 2002-06', page 181.

We examine each of these issues below.

Operating costs

It appears likely that Scottish Water will deliver the improvement in operating cost efficiency that we included in the Strategic Review of Charges 2002-06. The net present value of operating costs during the concession is significant. It is therefore important to ensure that the price customers are paying for this element of service provided by the PPP consortia is fair. The level of operating costs implied by the PPP contracts (if the cost of capital is broadly consistent with Ofwat's assessment of the cost of capital for the water industry south of the border) appears high. The implied level of operating costs would be higher than the costs that Scottish Water would now incur to operate these waste water treatment works.

In the Strategic Review of Charges 2002-06 we noted that if Scottish Water were able to reach the operating efficiency targets set at the review (which it now looks likely to have done), then there may be some benefit in revisiting the PPP arrangements with the consortia. We noted that it might be possible to reduce the inefficiency share that went to the consortia, once the industry in Scotland can demonstrate that it could operate the assets more efficiently than the originally agreed operating cost[118]. We return to this issue in the next chapter.

The financing costs included in the annual PPP charges cover the interest charges on loans taken out by the consortia and the equity return required by the consortia partners on their initial investment. Typically, the equity funding of a PPP contract will be relatively small.

We have identified three reasons why we believe that it may be possible for the PPP consortia to reduce the cost of capital included in the annual charge they make to Scottish Water:

- over the last few years the real cost of long-term borrowing has declined quite significantly;
- some of the earlier contracts may have included an additional risk premium in the cost of capital to reflect the novelty of delivering waste water projects through PPPs; and

- since all of Scottish Water's PPP projects are now fully operational, any risk premium to reflect initial construction risks is no longer appropriate.

There may therefore be an opportunity to refinance loans that were taken out at the start of the construction of the waste water treatment works.

In our view, any benefits of refinancing should be shared between the PPP consortium and the public sector partner. We understand that most of Scottish Water's PPP contracts contain no mechanism to ensure that customers can share in any gains from the refinancing of debt. However, this should not preclude Scottish Water from proactively discussing refinancing opportunities with its PPP contractors.

Our analysis shows that the actual return on equity for the PPP consortia appears to be quite high. Some respondents to our methodology consultation asserted that this should be the contractual entitlement of the contracted consortium. We agree that companies deserve to earn a commercial return but this should reflect the operational risk transferred.

Potential need for further investment

PPP contracts normally specify the type and quality of service that the contracted consortium is required to deliver over the period of the concession. The nine PPP projects undertaken by Scottish Water were all designed to ensure compliance with the UWWTD. As such, we would expect the 21 waste water treatment works that the projects delivered to continue to comply with the standards set out in the UWWTD throughout their contracted lives.

Given the length of the PPP contracts, it is likely that it will become more challenging to achieve the standards of discharge required from a waste water treatment works. In many instances, operators of treatment works will know the likely timing of tighter environmental consents and will plan capital maintenance in such a way as to minimise whole life costs.

We consider that Scottish Water may appropriately question:

- why additional investment is needed at the PPP sites (for example, has the problem arisen because of a lack of capital maintenance?); and

- who, according to the PPP contracts, is liable for incurring the cost.

Given the possibility that it may be necessary to renegotiate some of the PPP contracts to deliver objectives set out in the February's Ministerial Guidance, there may perhaps be the opportunity to improve the value for money offered to customers. We discuss in Chapter 11 the extra PPP operating costs that we have made available to deliver the objectives set out by Ministers.

Conclusion

We remain convinced that the PPP contracts represented a reasonable deal for customers at the time that the contracts were first set up. However, the improvement in Scottish Water's operating cost efficiency and the reduction in the real cost of capital makes it less clear that these contracts still represent value for money. Given that the contracts will need to be renegotiated to ensure that the Ministers' objectives can be effectively met, there may be an opportunity to improve the value for money that these contracts offer to the customers of Scottish Water.

We examine the value for money offered by the PPP contracts in more detail in the next chapter.

Section 3: PPP contracts
Chapter 10: Our approach to analysing PPP

Introduction

This chapter looks at Scottish Water's PPP contracts in more detail. It assesses the extent to which these contracts represent value for money at the current time. In 2001, our Strategic Review of Charges 2002-06 concluded that the contracts represented reasonable value for money. However, we also cautioned that if the industry improved its efficiency in line with the targets that we set in that review, then it was likely that the contracts would no longer represent value for money. Scottish Water looks likely to have reduced its operating costs by more than 35% in real terms during the 2002-06 regulatory control period. It is therefore important to re-evaluate the value for money to customers of these contracts.

Approach to analysing PPP

Our analysis is based on two aspects of the PPP contracts:

- the annual fee that Scottish Water pays to the contractors; and
- the level of service provided.

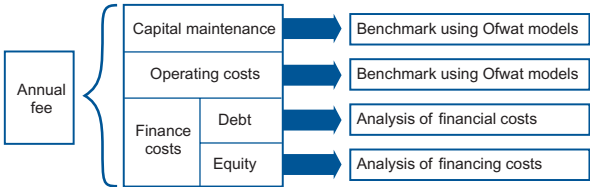
The annual fee

If the waste water plants had been built through a traditional procurement route, Scottish Water would have paid the initial capital costs, the interest charges on borrowing, ongoing capital maintenance and the annual operating costs. Under a PPP contract, the contractor meets all of these costs. Scottish Water pays an annual fee to the PPP contractor. This fee remunerates the contractor for building and operating the treatment works. We have looked at the expenses that have had to be met by the PPP contractors and compared this with the annual cost of the concessions. The PPP contractor has had to build or refurbish the waste water treatment works. The total capital cost of upgrading these waste water treatment works is estimated at £550 million. We have assumed that the upgrades were delivered for the expected capital cost. The annual fee therefore has to cover:

- capital maintenance;
- operating costs; and
- financing costs.

Figure 10.1 shows each component of the charge.

Figure 10.1: Approach to analysing the PPP annual fee



Capital maintenance

Capital maintenance costs are those that are required to maintain the operational performance of the assets.

We have used Ofwat's capital maintenance econometric models to assess how much it would cost a similar water and waste water company operating at an average level of efficiency to perform this capital maintenance. This would seem to provide a conservative estimate of current costs, particularly as the treatment works have only relatively recently been upgraded.

Operating costs

The PPP contractors incur day-to-day running costs such as employing staff and providing chemicals for the treatment of waste.

We have used Ofwat's operating cost econometric models to establish the level of operating cost that a water and waste water company of average efficiency would incur to operate broadly similar waste water treatment works south of the border. The assumption of average efficiency does not seem unreasonable given that the works are relatively new.

Financing costs

The financing costs should reflect the initial investment in building the works and any costs associated with the set-

up of the project. Such set-up costs may be quite significant and will include legal, finance arrangement and due diligence costs. The PPP contracts will use both debt and equity funding. The return on equity funding will be generated by any profit made by the PPP contractor. The contractor may face a taxation charge on this profit, although this is likely to be quite small.

The actual level of the financing costs will principally be a function of the capital costs of the waste water treatment works. The return on the equity portion of the project financing will be very sensitive to the actual initial capital cost of the project.

The outcome of our analysis

In 2003-04, Scottish Water paid the PPP contractors approximately £112 million. We have used Ofwat's capital maintenance and operating cost econometric models to review the likely capital maintenance and operating costs. The models suggest that capital maintenance costs at average efficiency would amount to around £20 million.

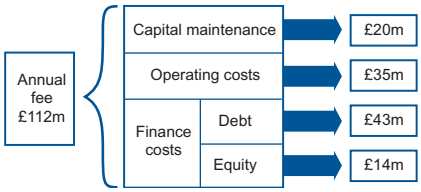
The Ofwat operating cost models suggest that operating costs at average efficiency would amount to approximately £35 million[119].

The remaining £57 million of the annual charge could be attributed to financing costs.

If 90% of the initial capital costs were funded through debt and 10% through equity, then we can estimate the annual interest and principal repayment costs at approximately £43 million[120]. This would leave £13 million as a return for the equity invested in the project by the PPP contractors. This would imply an equity return of under 20%[121].

Figure 10.2 shows the breakdown of the annual cost of the PPP contract.

Figure 10.2: Estimated value of the components of the annual fee 2003-04



This analysis is highly sensitive to the assumptions that underpin the analysis. Table 10.1 shows the sensitivity of the analysis to the initial capital cost of refurbishing the treatment works.

Table 10.1: Sensitivity of implied equity return to initial capital cost of asset refurbishment

Initial capital expenditure	Equity investment of £55 million (10% of budget)	Equity investment (10% of actual outturn capital expenditure)
£500 million	20.2%	20.7%
£550 million	16.1%	16.1%
£600 million	12.3%	12.2%
£650 million	8.7%	8.7%
£700 million	5.4%	5.6%

Table 10.2 shows the sensitivity of the equity return (under the 10% equity financing of initial capital expenditure) to the level of capital maintenance and operating costs.

Table 10.2: Sensitivity of the equity return to the level of capital maintenance and operating costs

		% of benchmarked average capital maintenance spend						
		0%	60%	80%	100%	120%	140%	160%
% of benchmarked average operating cost	80%	34.3%	26.7%	24.0%	21.2%	18.1%	14.9%	11.3%
	100%	30.1%	22.1%	19.1%	16.1%	12.7%	8.9%	4.4%
	120%	25.7%	17.2%	14.0%	10.5%	6.4%	1.2%	-9.0%
	140%	21.1%	11.8%	8.1%	3.7%	-2.8%	-48.3%	n.a.
	160%	16.3%	5.7%	0.6%	-8.3%	n.a.	n.a.	n.a.

[119] This figure comprises all operating costs, including charges paid to SEPA and local authority rates, where appropriate.
[120] This is based on a fixed annual percentage interest rate of 7.5%, with 27 equal payments made at the end of each year of the concession. The initial capital cost is assumed to be £550 million.
[121] This is the internal rate of return on the assumption that the interest charges are fixed and the operating costs and capital maintenance costs are at average efficiency. We have assumed that the equity and debt were committed two years before the treatment works were fully operational. We have also assumed that Scottish Water made a payment equal to the PPP contractors' interest and principal repayment cost in the year before full operation.

The equity return clearly diminishes rapidly when the project is delivered at less than average capital and operating cost efficiency. This demonstrates why the projects represented reasonable value for money at the time that they were concluded. It would appear, however, that since the treatment works are now operational and Scottish Water has significantly improved its operating cost efficiency, there could be scope for customers to share in the benefits that would appear to be available from refinancing.

The costs and benefits of PPP

The PPP contracts undoubtedly benefited customers of the Scottish water industry, enabling the three authorities to comply more quickly with the Urban Waste Water Treatment Directive (1991).

In the Strategic Review of Charges 2002-06, we noted that the cost of providing the required new treatment works using the PPP route was £550 million. The authorities estimated that the cost of these works would have been £700 million using traditional procurement. The three authorities also incurred operating and capital maintenance costs that were some 40-65% higher than the average south of the border. Our analysis shows that PPP offered a more efficient option than traditional procurement and operation of the same treatment works by the three authorities.

However, at the current time the PPP contractors would appear to be earning a relatively high return on their investment. In March 2004, AWG sold its stake in the Tay PFI to Henderson Private Capital[122] for approximately £10 million. According to its 2004 Annual Report, AWG made £4.9 million profit on the sale. This profit is consistent with our analysis of the equity return on the PPP contracts.

To an extent this equity return can be justified by the risk that the PPP contractors took in agreeing to build the treatment works for a much lower cost than the three authorities. The risks that the contractors absorbed include the following:

- **Meeting required standards** – the contractors had to produce a facility that is capable of meeting the specified quality outputs. If the facilities cannot provide the outputs specified in the contract, then the contractors are liable for any resulting costs.

- **Cost overruns during construction** – where a project or site is not delivered on time or to budget, the contractor incurs the associated costs.

- **Timely completion** – the contractor is paid only when the assets are fully operational.

The saving of £150 million is broadly equivalent to £9 million each year during the PPP contract. This reduces the equity return earned for operating the contracts from over 16%, to approximately 8.6%. This would represent a relatively low rate of return on equity.

The relatively high financing costs over the full life of the concession may have suggested a further material transfer of risk to the private sector partner. Our understanding is that the level of risk absorbed by the PPP contractors is no greater than the normal operating risks of Scottish Water or other water utilities. This would suggest that the adjusted rate of equity return (reflecting the delivery of an appropriate waste water treatment works) is high. Equity returns for the water and sewerage companies south of the border are typically just over 10%.

Refinancing

PPP contracts are complex and typically operate over an extended period. If there is significant initial capital expenditure the risk to the contractor is likely to be greater in the early part of the contract. The cost of borrowing will reflect this extra risk.

Most early PPP contracts did not share the benefits of any refinancing with the public sector partner. In October 2002, the Office of Government Commerce issued a Voluntary Code of Conduct. This code details how refinancing gains should be shared with the public sector partner if the contract does not specify the approach. The Code recommends that the public sector partner

[122] AWG inherited its 33% stake in the Tay PFI following its acquisition of Morrison Construction plc in 2000. Morrison Construction was one of the original members of the winning consortia.

should receive 30% of the gain from refinancing. The Code recommends that contracts signed after 2002 should allocate 50% of any gain from refinancing to the public sector partner.

Although all of the PPP contracts are now operational we are not aware of any attempt to refinance these contracts. We would hope that it may be possible for customers to share the benefits of a possible refinancing of the projects since construction risks have been managed and the cost of capital also appears to be lower than it was when these contracts were originally let.

Summary

Scottish Water's nine PPP schemes have benefited its customers. The contracts delivered timely and efficient compliance with the Urban Waste Water Treatment Directive.

Our analysis suggests that the equity returns of the private sector partners are high. This is in part justified by the timely and efficient delivery of the initial capital expenditure required to upgrade these waste water treatment works. We are not aware of any efforts to refinance these contracts. Given that the works are now operational and the market cost of capital has fallen, we would hope that some benefits could accrue to customers from any such refinancing through lower bills.

In the next chapter we discuss the extra operating costs for PPP that we have made available in this draft determination. These costs should ensure that the objectives set by the Minister (for improvements at the PPP sites) can be delivered. The renegotiation of the contracts would seem to be a useful opportunity to improve the value for money offered to customers.

Section 3: PPP contracts
Chapter 11: The way forward on PPP

Introduction

Previous chapters examined the background to Scottish Water's PPP contracts. We concluded that improved efficiency by the Scottish water industry has made the value for money provided to customers by these contracts less immediately obvious. We believe that Scottish Water takes every opportunity to improve value for money to customers of these contracts.

At the Strategic Review of Charges 2002-06 we noted that it might in future be appropriate to apply an efficiency target for PPP. We hoped that this would encourage Scottish Water to seek out, in a proactive way, any opportunities to reduce the costs associated with PPP.

In our methodology consultation[123] we again suggested that it might be appropriate to set an efficiency target for PPP. Scottish Water and some other industry stakeholders raised objections to the introduction of such a target. They claimed that it would not be possible to renegotiate the terms of the contracts. Other respondents indicated that they would support the introduction of measures that would put pressure on PPP contractors to continue to deliver value for money for customers.

We were somewhat disappointed by Scottish Water's response. There is no evidence that the lower market costs of capital, which currently apply, have been shared with Scottish Water's customers. However, we have decided not to include an efficiency target for PPP at this draft determination. Rather, we would encourage Scottish Water and the PPP contractors to improve the value for money of these contracts to Scottish customers over the next four years.

We have allowed additional investment at the PPP sites. We believe this could represent an important opportunity for Scottish Water to improve the value for money that these contracts represent[124]. We will monitor carefully the cost of delivery of the Ministers' objectives at the PPP sites in our annual Investment and Asset Management and Customer Service reports. If the contracts do not deliver improved value for money then the new Water Industry Commission may wish to establish an efficiency target at the next Strategic Review of Charges.

Consultation on the proposal to introduce an efficiency target

In our methodology consultation, we proposed to set an efficiency target for PPP by examining:

- the prices at which shares in the concessions are changing hands; and
- the operating and maintenance costs for the PPP projects, then using benchmarking techniques to assess the scope of any inefficiency.

In both instances we suggested that we should take account of the extent of the risk transfer that still remains with the PPP consortia.

We noted, however, that we would not apply an efficiency target to PPP if it could be demonstrated that it was not possible to renegotiate the existing contracts in any respect.

Stakeholder responses to our proposals

In line with our commitment to transparency, we posed a number of questions relating to this issue in our methodology consultation. The questions, and the responses we received, are summarised below.

1. **Do respondents believe that we should set an efficiency target on PPP if we can identify that it is currently a more expensive option for customers? If not, why should customers be asked to pay more?**

We received several responses to this question, presenting opposing opinions.

Some respondents said that the proposal to set an efficiency target for PPP contracts was an excellent initiative and would play an essential role in keeping PPP contractors under pressure to continue to deliver value for money for consumers.

[123] See our publication 'Our work in regulating the Scottish water industry: The scope for operating cost efficiency', Volume 4, Chapter 13.
[124] We discuss this in more detail in Chapter 14.

Scottish Water and Water UK criticised the proposal to set an efficiency target for PPP. In brief, they raised the following issues:

- The setting of an efficiency target could be considered as a breach of the Better Regulation Task Force principles of consistency and predictability.
- An attempt to renegotiate the PPP contracts could discourage potential suppliers from working with Scottish Water. This could increase the cost of any future PPP contracts.
- Setting an efficiency target could introduce regulatory risk, which would increase the cost of capital.
- If Scottish Water was unable to renegotiate the terms of the PPP contracts then extra out-performance of its regulatory contract would be required in order to compensate for the shortfall in this area.
- It would be unfair to ask Scottish Water to renegotiate the contracts because they were always intended to be long-term arrangements. The risks of the projects would have been averaged over the life of the projects.

We consider that these arguments have only limited merit.

In our view, it is possible to argue that we had not given sufficient notice of our intention to challenge the PPP contractors to deliver better value for money.

We have, therefore, decided to delay the decision about setting an efficiency target for PPP to the next regulatory control period. At the current time, we are minded to set such a target if Scottish Water and the PPP contractors cannot demonstrate that the contracts continue to represent good value for money to customers.

We do not believe that arguments relating to the future cost of PPP contracts are valid. Scottish Water should only enter into a PPP contract if it is cheaper than all alternative options or it is the only effective way of delivering the investment. If Scottish Water's own efficiency improves to the point where it is broadly similar to that of the companies south of the border, then customers can be assured that value for money is being achieved. It is likely that if a private company sees an opportunity to earn a reasonable return by providing a service more cheaply than Scottish Water is able to do for itself, then it is still likely to pursue this opportunity. Such opportunities may arise as a result of economies of scale or scope and through the use of leading edge technologies.

Scottish Water's cost of capital is set with reference to the cost of public debt. This reflects the decision by Scottish Ministers to make this cheap financing available to Scottish Water. An increase in 'regulatory risk' would not have an impact on Scottish Water's cost of capital since public borrowing rates are set with reference to risk-free government debt. If the PPP contractor has a higher cost of capital, this would simply reduce the attractiveness of PPP relative to an 'own build' option for Scottish Water.

Clearly, if it is not possible to renegotiate the contracts, then there is nothing that Scottish Water can do without the agreement of the concession holder. We recognised this in our methodology. However, we also believe that the customers of the Scottish industry ought to receive value for money. This will require Scottish Water to ensure that contractors deliver the best possible value for money.

2. Do respondents believe that our approach to looking at the value for money of PPP is appropriate?

It would appear that many industry stakeholders do not think that it is appropriate to assess the value for money of the PPP contracts. They argue that they are in effect 'sunk' costs that should not be revisited. We believe, however, that the contractor should be held to account for the level of service that he provides.

Other respondents to our consultation suggested that we should take any opportunity to ensure that customers receive value for money.

Monitoring the PPP contracts

Until relatively recently we were not concerned about the value for money provided by the PPP contracts. As a result we have not sought to monitor these contracts in detail. Efficiency improvement by Scottish Water and the need to invest additional capital at PPP sites makes it important that we monitor the performance of the PPP contracts much more closely. We will develop our annual return to collect detailed information on compliance, levels of service and the costs of PPP.

Why we have decided not to implement an efficiency target

We have decided not to introduce an efficiency target at this draft determination. As noted above, we believe that we may not have signalled our intentions sufficiently well in this regard.

The investment objectives set out by Ministers will require additional investment at some of the PPP sites. We believe that this may represent an opportunity for Scottish Water to improve the value for money of the PPP contracts.

Additional investment at PPP sites

In its second draft business plan, Scottish Water identified a total investment requirement of some £66 million (2003-04 prices) at 3 PPP waste water treatment sites. This investment appears to relate to odour and unsatisfactory discharges.

The total operating costs associated with this investment were £1.4 million (2003-04 prices) per year.

We have reviewed the proposed investment. We have reduced this investment to reflect the opportunity for efficiency. We have also reduced the scope of what is required to reflect the advice that we have had from the Reporter and our more detailed review of the capital programme.

We have calculated an annual PPP operating cost using the following assumptions:

- the weighted average cost of capital is the same as that allowed by Ofwat to the companies south of the border;
- the debt to capital value of the project is 90%;
- the contract length of the existing PPP is not changed;
- the total efficient operating costs are 2% of the assessed capital investment cost. This amounts to £1 million per year (2003-04 prices);
- the total capital costs are £50 million (2003-04 prices); and
- we have assumed that the output is delivered at the start of the fourth year of this regulatory control period.

The costs of the amendments to the PPP contract are set out in Table 11.1. These estimates do not assume that Scottish Water has been successful in reducing the underlying costs of its PPP contracts. There may therefore be an opportunity to deliver the Ministers' objectives for a lower cost.

Table 11.1: Allowed for additional PPP costs 2006-10

	2006-07	2007-08	2008-09	2009-10
Additional PPP costs allowed for	£1.0m	£1.0m	£3.2m	£7.0m

Summary

Scottish Water's improved operating cost efficiency, and a reduction in the real cost of capital, has made the value for money that is now provided by the PPP contracts less immediately obvious. Our analysis suggests that the return enjoyed by the consortia is higher than could reasonably have been expected when they were first set up. This reflects the overall operating cost improvement of the water and sewerage industry in Great Britain and the reduction in the real cost of capital.

Following our methodology consultation, we have decided not to apply an efficiency target to the PPP contracts in this draft determination. We believe that the additional investment that is required at PPP sites could

represent a useful opportunity for Scottish Water to improve the value for money to customers of these contracts. We have allowed for £7 million in annual operating costs from 2009-10 to cover the additional costs of the PPP consortia in delivering the Ministers' objectives. This allowance does not assume that Scottish Water is successful in negotiating a share of the lower finance costs of the PPP operators for its customers. As a result, there may be scope for out-performance in this area.

We also expect Scottish Water to manage the operation of the PPP contracts in such a way that maximises their value for money for customers. Our scrutiny and monitoring of the PPP projects will increase for the next regulatory control period and if we do not see an improvement in the value for money of these contracts we may seek to establish an efficiency target at the next Strategic Review of Charges.

Section 4: Funding capital expenditure
Chapter 12: An introduction to RCV

Introduction

In Chapter 2 we explained that we have moved towards the RCV method of price setting at this draft determination. We highlighted that we do not believe that the RCV approach to price setting will have any immediate material impact on the prices faced by customers, on the resources available to Scottish Water, or on the implications for public expenditure.

This chapter explains how the RCV method of price setting works. In Chapters 18 and 21 we discuss how we set the initial RCV and how we made sure that our conclusions were reasonable.

The RCV method of price setting

Scottish Water will receive an appropriate rate of return on its RCV. The RCV is a proxy for the current value-in-use of Scottish Water's above-ground asset base. This value will change over time to reflect the ageing (use) of assets (the cost of which is recognised by the infrastructure renewals and depreciation charges) and investment in new assets. The current below-ground assets (infrastructure) are considered to be assets that are required in perpetuity and are therefore not included in the RCV. The cost of maintaining and replacing these assets is met through the annual infrastructure renewals charge (IRC).

The revenue that Scottish Water should be allowed is calculated as follows:

Return allowed on the regulatory capital value
+
allowed for operating costs
+
depreciation on non-infrastructure assets
+
the infrastructure renewals charge
+
the costs of PPP contracts
+
tax
+
current cost working capital adjustment

Return allowed on the regulatory capital value

The level of the RCV does not, by itself, impact on the prices that customers pay. It is the cash return allowed on the RCV that determines the level of prices. When Scottish Water invests in new assets, the efficient value of that asset is added to the RCV and begins to earn a return. This increases prices to customers. At the same time, the annual depreciation charge will reduce the RCV. A return is paid only for the value of the non-depreciated portion of an asset included in the RCV. The value of the RCV is also adjusted annually to take account of inflation.

The second element of the calculation of the allowed return on the RCV is the rate of return. In the private sector model this is referred to either as the cost of capital or the weighted average cost of capital. We explain the factors that we have taken into account in setting an appropriate rate of return for Scottish Water in Chapter 19. Chapter 19 also explains why the rate of return that we allow to Scottish Water is lower than the cost of capital set by Ofwat for the water and sewerage industry south of the border.

We multiply the rate of return by the RCV (adjusted in future years to reflect investment and depreciation) to establish the cash return allowed on the RCV. This ensures that customers only contribute towards those assets that have been created and which are providing a benefit to customers. Only such assets are included in the regulatory capital value.

Allowable operating costs

The allowed level of revenue includes an appropriate allowance for operating costs. Our assessment of these costs takes into account inflation, the scope for efficiency and an allowance for efficient new operating costs. It is important to highlight that our assessment of efficiency includes a detailed comparison of both the relative level of cost incurred and the relative level of service delivered.

Operating costs comprise a significant proportion of a customer's bill and we pay particular attention to ensuring that these costs are no higher than they need to be.

Depreciation and the infrastructure renewals charge

Under the RCV approach we allow for asset costs in two ways; that is, (a) the allowed cash return on the RCV and (b) an allowance for depreciation and the infrastructure renewals charge (IRC). The allowance for depreciation and the IRC ensure that sufficient funds are available to replace assets that are at the end of their useful lives.

Depreciation is an accounting charge, rather than a cash cost. The cash cost is incurred when the asset (the use of which is recognised in the depreciation charge) is purchased. Scottish Water's depreciation charges are included as allowed costs in order to smooth the cost of replacing assets when their useful lives are over. The costs of replacing Scottish Water's assets are reflected in the IRC (for infrastructure assets) and as a separate depreciation charge (for non-infrastructure assets).

The IRC covers the cost of maintaining, refurbishing and replacing underground assets. Like the water industry in England and Wales, Scottish Water has adopted the accounting convention of infrastructure renewals. This means that the infrastructure network (mainly comprising underground pipes, sewers, etc) is treated as a single asset to be maintained in perpetuity, rather than a collection of assets each with its own life and maintenance requirements. It is reasonable to include the IRC in the price paid by customers as it reflects the cost of the current use of the underground infrastructure. We discuss this issue in detail in Chapter 13.

Current cost depreciation (CCD) of non-infrastructure assets (mainly those assets found above the ground) is based on Scottish Water's own estimate of its depreciated modern equivalent asset value. New assets installed during the period will be depreciated on the basis of a standard set of expected asset lives.

The costs of PPP contracts

Scottish Water provided us with detailed information about the PPP costs it expects to incur during the regulatory period. PPP contracts effectively swapped initial capital costs, financing and maintenance costs and operating costs over the life of an asset, for a series of annual payments. We have scrutinised these costs carefully. Our analysis of the appropriate level of these PPP costs was allowed for in our calculation of revenue. PPP contracts were discussed in Chapters 8 to 11.

Benefits from the RCV approach

Moving towards the RCV approach to price setting will have several key benefits. Firstly, it should provide a basis for incentives for management that will be transparent, published in advance and objectively measurable. These incentives should encourage management to deliver capital projects in a timely and efficient way, meeting efficiency targets and thus protecting customers. This is because Scottish Water will only earn a return once a project has been delivered and the efficient cost of that project is added to the RCV. If Scottish Water delivers projects more or less quickly than expected, then the allowed return would be adjusted in the next regulatory period. This should give customers more confidence that the benefits promised in the investment programme will be delivered on time.

A further benefit of our move towards the RCV approach is that it will allow us to compare financial ratios on a like-for-like basis with other regulated utilities, and so gain a better indication of financial sustainability. This approach will improve transparency when comparing the financial ratios of the water industry in Scotland with those in England and Wales.

There is also a clear incentive to deliver the capital programme efficiently, because only the agreed efficient cost is added to the RCV. This should ensure that customers are not asked to meet the costs of inefficiency. Inefficiency in the delivery of any project will have to be matched by out-performance of the regulatory contract in another area. If there is no corresponding out-performance, Scottish Water would have to increase its debt[125] or delay investment outputs. This could increase the proportion of debt to RCV. In subsequent years, either there is a matching out-performance of the earlier inefficiency (and the additional borrowing costs) or there would have to be a further increase in debt equivalent to the borrowing costs.

[125] Assuming that the Scottish Executive agreed to make contingency funds available.

Such inefficiency should not impact on customers. The price paid by customers would still be determined by the allowed cash return on the RCV, the depreciation and IRC allowances, and the operating costs (including PPP). This calculation is not changed by a failure to meet the terms of the regulatory contract. As we have explained previously, it would be a matter for the Scottish Executive to decide how to deal with any under-performance against the regulatory contract that is not outside the control of managers.

The onus is therefore on the management of Scottish Water and its owner, the Scottish Executive, to ensure that agreed levels of service and investment are delivered. We will be able to monitor progress by comparing the debt to RCV ratio that was expected at the start of the regulatory period relative to that which is reported at the end of each year. This should make assessments of performance much more transparent.

In the longer term, an important feature of the RCV method of price setting is that it does not require the regulator to determine how much Scottish Water should seek to borrow or how much the Scottish Executive should seek to lend.

If debt increases as a proportion of the RCV, future customers will face either higher prices or a service that is less able to absorb operational or legislative shocks. If Scottish Water is allowed to borrow more money, this will increase interest costs. The extra cash resources available may cause the regulatory contract to be breached, but this will not impact on current prices because they will take into account only an efficient allowance for costs. If the extra money were efficiently invested in new assets, then customers would start to pay for these improvements at the start of the next regulatory period. There would be an onus on Scottish Water to demonstrate that the extra spending was necessary, appropriately timed and efficient before customers would have to pay.

If debt decreases as a proportion of the RCV, customers in subsequent years will benefit. If Scottish Water is allowed to borrow less money, interest costs would fall but it would also be difficult to deliver all of the benefits of the investment programme. This would result in a lower RCV in future years and hence a lower allowed cash return. This would reduce the prices paid by customers in the future, but is also likely to mean a reduction in the level of service and environmental/public health compliance that customers currently enjoy.

Stakeholders can reasonably expect the RCV to increase in line with the profile that is established at the start of the regulatory period. As a result, monitoring the RCV and the ratio of total debt to RCV should provide stakeholders with a useful indicator of the financial performance of the water industry in Scotland.

Summary

We believe that our move towards the regulatory capital value method of price setting will improve the transparency of the price setting process. This will bring benefits to customers. However, our move towards the RCV method of price setting will not immediately or materially impact on the prices paid by customers, the resources available to Scottish Water or the amount of public expenditure required.

Section 4: Funding capital expenditure
Chapter 13: Setting the allowed level of capital maintenance and an appropriate infrastructure renewals charge

Introduction

Scottish Water's regulatory return in 2004 estimated that the replacement cost of its water and waste water assets was some £26.7 billion[126].

In this chapter we discuss our assessment of the capital maintenance that Scottish Water should require in order to maintain the serviceability[127] of its current asset base.

The water and waste water industry has two broad types of asset. These are termed infrastructure (essentially the water mains and sewers) and non-infrastructure (treatment plants, offices, vans, computers, etc). The diminishing value of these two categories of assets as they wear out is treated differently in the industry.

In this chapter we also set out our views on what is an appropriate level for the infrastructure renewals charge (IRC). The IRC should be the long run average cost of maintaining the underground network of water mains and sewers. In Chapter 16 we discuss the 'depreciation charge,' which recognises the value that has been received from the use of the non-infrastructure asset base in any one year.

The actual amount that Scottish Water spends on its infrastructure assets is termed infrastructure renewals expenditure (IRE). The amount of IRE in any one year may not be the same as the IRC.

This chapter covers the following issues:

- The Ofwat capital maintenance econometric models that we have used in our assessment of the level of capital maintenance that Scottish Water should require to maintain the serviceability of its assets. We divide this expenditure into above-ground and below-ground capital maintenance.
- The process that we have applied to determine an appropriate level of capital maintenance investment for Scottish Water.
- The infrastructure renewals charge and infrastructure renewals expenditure, and how these two concepts impact on the price that is paid by customers.
- The IRC that was claimed by Scottish Water in its business plan.

Due to the particularly technical nature of the use of capital maintenance econometrics, we asked Ofwat to review our description of our approach. This chapter includes their comments.

How Ofwat's operating expenditure econometric models developed

Ofwat uses econometric modelling in its assessment of the relative efficiency of the capital maintenance expenditure of the water and sewerage companies in England and Wales. This method uses statistical analysis to establish relationships between the capital maintenance expenditure undertaken by companies and a number of factors that might drive costs which are common to all companies. Once the relationships have been established, the models can be used to predict the appropriate level of expenditure for each company. This predicted expenditure can then be compared directly with the companies' actual expenditure. Information to allow this comparision is collected from each company in a systematic way.

The capital maintenance econometric models that are used by Ofwat were first used for its 1999 price review and were published in April 1998[128]. In 2003, Ofwat conducted a detailed review of the models, in consultation with industry representatives, in preparation for its 2004 price review. In the review, Ofwat worked with Professor Mark Stewart from the University of Warwick, who provided independent verification of the models. Ofwat published the final form of the capital maintenance econometric models for the 2004 price review in January 2005[129].

The capital maintenance models

Each of the nine capital maintenance models includes a relationship between the capital maintenance

[126] Scottish Water Annual Return, June 2004, Table H.
[127] The concept of serviceability in relation to Quality and Standards III is discussed in Chapter 5.
[128] 'Assessing the scope for future improvements in water company efficiency: a technical paper', Ofwat, 30 April 1998.
[129] 'Water and sewerage service unit costs and relative efficiency 2003-04 report', Ofwat, January 2005.

expenditure reported by the companies and the factors that might drive costs. The factors must have a clear impact on costs but should also be as far outside the discretionary control of the management of the company as possible.

The factors that might drive costs that are used within the econometric models are known as explanatory factors. Ofwat takes great care to define the potential explanatory factors that might prove to be useful in the econometric analysis. Information for a range of possible factors is systematically collected from each company to ensure that robust comparisons can be drawn. The process of establishing the econometric models looks at the correlation between expenditure and different combinations of explanatory factors, and selects the best explanatory factors for each model.

The models chosen by Ofwat for the 2004 price review were established using the potential explanatory factors from the England and Wales companies and did not include any data from Scottish Water or other sources.

When carrying out its econometric relative efficiency assessment, Ofwat provides each company with the opportunity to identify 'special factors' that apply to them and which might distort conclusions drawn from the comparison expenditures predicted by the model and the actual company expenditure in that area. The opportunity to assess and include special factors helps to reduce the scope for any potential inaccuracies in the process.

The models themselves take different forms. These are summarised in Table 13.1.

Table 13.1: Summary of econometric models and explanatory factors

Model	Model type	Explanatory factors
Water resources and treatment	Unit cost	Total connected properties
Water distribution infrastructure	Log linear	Length of main; total connected properties
Water distribution non-infrastructure	Log linear	Pumping station capacity; water service reservoir and water tower storage capacity
Water management and general	Log linear	Billed properties; proportion of billed properties that are non-household
Sewerage infrastructure	Log linear	Length of sewer; number of combined sewer overflows; proportion of critical sewers
Sewerage non-infrastructure	Unit cost	Number of pumping stations
Sewage treatment	Log linear	Total load; total number of works
Sludge treatment and disposal	Unit cost	Total weight of dry solids
Sewerage management and general	Unit cost	Billed properties

Each of these models is described in detail below.

Water resources and treatment

This model estimates the costs of maintaining those assets from which water is sourced (eg reservoirs, dams and aqueducts) and where water is treated (eg water treatment works and associated pumping stations). The model is based on the premise that capital maintenance expenditure increases uniformly with company size; that is, there are constant returns to scale. In the model, the number of connected properties is used as a surrogate for company size.

The model shown in Table 13.2 was published in January 2005 and was developed from 1997-98 explanatory variables and six-year average expenditure (1998-99 to 2003-04) for the water companies in England and Wales.

Table 13.2: Ofwat's model for water resources and treatment capital maintenance expenditure

Water resources and treatment	
This is a unit cost model. Each company's average annual water resources and treatment capital maintenance expenditure is divided by the total connected properties. This is then compared with the weighted average industry cost.	
£m/million connected properties	Weighted average industry cost = 8.854
Number of observations: 22	

Water distribution infrastructure

This model estimates the costs of maintaining the network of water mains. The main cost driver in this model is the log of connected properties per length of main.

The model shown in Table 13.3 was published in January 2005 and was developed from 1997-98 explanatory variables and six-year average expenditure (1998-99 to 2003-04) for the water companies in England and Wales.

Table 13.3: Ofwat's model for water distribution infrastructure capital maintenance expenditure

Water distribution infrastructure		
Modelled cost	Log to base e of (annual average water distribution infrastructure functional expenditure (£m), divided by length of main (km))	
Explanatory variables	**Coefficient**	**Standard error**
Constant	-5.104	0.608
Log to the base e of (total number of connected properties (000s) divided by total length of main (km))	0.762	0.225
Form of model	Log to base e of (annual average water distribution infrastructure functional expenditure (£m), divided by length of main (km)) = -5.104 + Log to the base e of (total number of connected properties (000s) divided by total length of main (km)) x 0.762	
Statistical indicators	Number of observations: 22	R^2: 0.364

Water distribution non-infrastructure

This model estimates the costs of maintaining the non-infrastructure assets related to water distribution, such as service reservoirs, pumping stations and meters. The model recognises that capital maintenance expenditure increases with pumping station capacity and water storage capacity.

The model shown in Table 13.4 was published in January 2005 and was developed from 1997-98 explanatory variables and six-year average expenditure (1998-99 to 2003-04) for the water companies in England and Wales.

Table 13.4: Ofwat's model for water distribution non-infrastructure capital maintenance expenditure

Water distribution non-infrastructure		
Modelled cost	Log to base e of (annual average water distribution non-infrastructure functional expenditure (£m), divided by pumping station capacity (kW))	
Explanatory variables	**Coefficient**	**Standard error**
Constant	-6.203	0.514
Log to the base e of (water service reservoir and water tower storage capacity (Ml/d)/ pumping station capacity (kW))	0.740	0.200
Form of model	Log to base e of (annual average water distribution non-infrastructure functional expenditure (£m), divided by pumping station capacity (kW)) = -6.203 + ln (water service reservoir and water tower storage capacity (Ml/d)/pumping station capacity (kW)) x 0.740	
Statistical indicators	Number of observations: 22	R^2: 0.407

Water management and general

This model estimates the costs of maintaining those assets that are used in the management function of the water business, such as IT equipment, buildings and vehicles. The model relates costs to the size of the company (using the number of billed properties as a surrogate for company size). It recognises that costs increase with a greater proportion of non-household customers.

The model shown in Table 13.5 was published in January 2005 and was developed from 1997-98 explanatory variables and six-year average expenditure (1998-99 to 2003-04) for the water companies in England and Wales.

Table 13.5: Ofwat's model for water management and general capital maintenance expenditure

Water management and general		
Modelled cost	Log to base e of (annual average water management and general expenditure (£m), divided by billed properties (000s))	
Explanatory variables	**Coefficient**	**Standard error**
Constant	-5.842	0.420
Proportion of billed properties that are non-household	12.766	5.513
Form of model	Log to base e of (annual average water management and general expenditure (£m), divided by billed properties (000s)) = -5.842 + proportion of properties that are non-household x 12.766	
Statistical indicators	Number of observations: 22	R^2: 0.211

Sewerage infrastructure

This model estimates the costs of maintaining the sewer network. The model recognises that capital maintenance expenditure on sewerage infrastructure increases with company size and uses sewer length as a surrogate for company size. Combined sewers are recognised as having higher maintenance costs than foul sewers; the number of combined sewer overflows is used in the model as a proxy for the length of combined sewers. In addition, the model takes account of the higher maintenance cost of critical sewers (relative to non-critical sewers).

The model shown in Table 13.6 was published in January 2005 and was developed from 1997-98 explanatory variables and six-year average expenditure (1998-99 to 2003-04) for the water companies in England and Wales.

Table 13.6: Ofwat's model for sewerage infrastructure capital maintenance expenditure

Sewerage infrastructure		
Modelled cost	Log to base e of (annual average sewerage infrastructure expenditure (£m), divided by the total length of sewer (km))	
Explanatory variables	**Coefficient**	**Standard error**
Constant	-5.606	0.356
Log to the base e of (the number of combined sewer overflows divided by the total length of sewer (km))	0.379	0.059
Log to the base e of (proportion of critical sewers)	0.441	0.210
Form of model	Log to base e of (annual average sewerage infrastructure expenditure (£m), divided by the total length of sewer (km)) = -5.606 + log to the base e of (the number of combined sewer overflows divided by the total length of sewer (km)) x 0.379 + log to the base e of (proportion of critical sewers) x 0.441	
Statistical indicators	Number of observations: 63	R^2: 0.427

Sewerage non-infrastructure

This model estimates the costs of maintaining the non-infrastructure assets of the sewerage service, largely sewage pumping stations. The model is based on the premise that capital maintenance expenditure increases uniformly with the number of pumping stations.

The model shown in Table 13.7 was published in January 2005 and was developed from 1997-98 explanatory variables and six-year average expenditure (1998-99 to 2003-04) for the water companies in England and Wales.

Table 13.7: Ofwat's model for sewerage non-infrastructure capital maintenance expenditure

Sewerage non-infrastructure	
This is a unit cost model. Each company's average annual sewerage non-infrastructure capital maintenance expenditure is divided by the total number of pumping stations. This is then compared with the weighted average industry cost.	
£m/number of pumping stations (000s)	Weighted average industry cost = 2.956
Number of observations: 10	

Sewage treatment

This model estimates the costs of maintaining sewage treatment works. The model recognises that maintenance costs increase with the volume of sewage that is treated. In addition, the model takes into account the economies of scale of maintaining a few large works relative to maintaining a large number of smaller works.

The model shown in Table 13.8 was published in January 2005 and was developed from 1997-98 explanatory variables and six-year average expenditure (1998-99 to 2003-04) for the water companies in England and Wales.

Table 13.8: Ofwat's model for sewage treatment capital maintenance expenditure

Sewage treatment		
Modelled cost	Log to base e of (annual average sewage treatment functional expenditure (£m), divided by the total load received at sewage treatment works (kg BOD5/day)	
Explanatory variables	**Coefficient**	**Standard error**
Constant	-8.270	0.282
Log to the base e of (the total number of works divided by total load received at sewage treatment works (kg BOD5/day))	0.165	0.041
Form of model	Log to base e of (annual average sewage treatment functional expenditure (£m), divided by the total load received at sewage treatment works) = -8.270 + log to the base e of (the total number of works divided by total load received at sewage treatment works) x 0.165	
Statistical indicators	Number of observations: 60	R^2: 0.214

Sludge treatment and disposal

This model estimates the costs of maintaining the assets that are used for sludge treatment and disposal. The model is based on the premise that capital maintenance expenditure increases uniformly with the total weight of dry solids disposed of.

The model shown in Table 13.9 was published in January 2005 and was developed from 1997-98 explanatory variables and six-year average expenditure (1998-99 to 2003-04) for the water companies in England and Wales.

Table 13.9: Ofwat's model for sludge treatment and disposal capital maintenance expenditure

Sludge treatment and disposal	
This is a unit cost model. Each company's average annual sludge treatment and disposal capital maintenance expenditure is divided by the total weight of dry solids disposed of. This is then compared with the weighted average industry cost.	
£000/weight of dry solids (ttds)	Weighted average industry cost = 67.894
Number of observations: 10	

Sewerage management and general

This model estimates the costs of maintaining those assets that are used in the management function of the sewerage business, such as IT equipment, buildings and vehicles. The model relates costs to the size of the company and uses the number of billed properties as a surrogate for company size.

The model shown in Table 13.10 was published in January 2005 and was developed from 1997-98 explanatory variables and six-year average expenditure (1998-99 to 2003-04) for the water companies in England and Wales.

Table 13.10: Ofwat's model for sewerage management and general capital maintenance expenditure

Sewerage management and general	
This is a unit cost model. Each company's average annual sewerage management and general capital maintenance expenditure per billed property is compared with the weighted average industry cost.	
£m/million billed properties	Weighted average industry cost = 7.619
Number of observations: 10	

Criticisms of the capital maintenance econometric models

As part of its first draft business plan, Scottish Water submitted a number of papers by academics and consultants which criticised the Ofwat econometric models. The majority of the papers submitted by Scottish Water were written for the water and sewerage companies in England and Wales or for Water UK, the industry trade body. The majority of the papers were also submitted to Ofwat, two of them at the 1999 price review[130] and the remainder in the run up to the 2004 price review. Only one paper specifically addressed the use of the econometric models in Scotland.

It is worth noting that although the papers are critical of the models used by Ofwat, none of them contains proposals for alternative ways to assess the appropriate level of capital maintenance.

The papers submitted by Scottish Water focus on the operating cost econometric models. We address these criticisms in Volume 6. However, Scottish Water also raised a number of issues that are relevant to our use of Ofwat's capital maintenance econometric models. These issues were as follows:

- the choice of explanatory factors and type of model;
- the poor explanatory power of the models;
- the susceptibility of the econometric models to inconsistencies in information;
- changes in the models' specification over time;
- the assumption that the residual represents inefficiency only and that this can then be used to set efficiency targets for the water and sewerage companies;
- the models are backward looking and reflect only historic maintenance levels; and
- the application of models to Scottish Water that were derived using information from the companies south of the border.

[130] Davidson, " Ofwat efficiency assessment using econmteric models: a comment" (1999) and Montgomery Watson "Water distribution cost drivers" (1999)

We address each of these issues in turn below.

The choice of explanatory factors and type of model

The most common criticism of the models is that they do not accurately reflect the true cost drivers in the water and sewerage industry. Scottish Water cites papers by NERA[131] and Professor John Cubbin[132] of City University, which argue that the capital maintenance models omit key cost drivers such as asset age and condition.

Ofwat consulted in 2003 with industry representatives through a liaison group set up with the water industry's trade body, Water UK. Ofwat explains[133] that it reviewed and tested the suggestions and alternative models put forward by the industry. It found that none of these suggestions or models improved the explanatory power of the models sufficiently to warrant a change.

Ofwat remains confident that its models are fit for purpose and that it is not misusing the information it collects. We note that in 2003-04, Ofwat allowed 19 company claims for special factors. We believe that this allows more explanatory factors, specific to individual companies, to be taken into account. We are therefore not persuaded by the views expressed by NERA and Professor Cubbin.

The poor explanatory power of the models

Scottish Water argued that the capital maintenance econometric models have been the subject of especially heavy criticism, as the statistical explanatory power of these models is particularly poor. Scottish Water cited comments made by the Competition Commission in its reviews of the price caps for Mid Kent Water and Sutton & East Surrey Water in August 2000, where it noted that it had: "some reservations concerning the consistency and reliability of the capital maintenance econometric models".

We note these concerns but it is important to recognise that the purpose of Ofwat's econometric models is to understand the impact of factors that are outside the control of management. The models therefore do not explicitly consider key factors that affect costs, such as the maintenance policy of the business, the extent to which the business accepts risk, its employment policies, choice of suppliers and so on. All of these factors are within management control. The models are based on explanatory factors that are as far outside the discretionary control of management as possible and only test the impact of these external factors.

The susceptibility of the models to inconsistencies in information

Scottish Water also argued that there is substantial scope for differences in cost allocation practices both for individual companies over time and between companies. This would affect the reported expenditure used in the modelling process. However, Scottish Water does recognise that there has been considerable progress in ensuring that cost allocation policies in England and Wales are consistent. Scottish Water also comments that the models do not appear to take account of trade-offs between, for example, different time periods or cost and quality. Scottish Water claims that this could artificially change or bias results.

Ofwat has carefully reviewed the companies' accounting and cost allocation practices, and has made specific adjustments where necessary to correct for differences between the companies' reported expenditure. Regulatory accounting guidelines have been in place for well over a decade in England and Wales, and the scope for material variations in accounting practice between the companies and over time is likely to be small. The Reporter for each company is required to review and report on the cost allocation policies and practices of the companies south of the border.

Trade-offs may indeed be useful ways in which companies can optimise overall 'whole life' costs. Ofwat's approach clearly defines the separate assessment of capital and operational cost efficiency and the optimisation for whole life costs is not a specific target of the assessment, since this should be built into the solutions that the company chooses to pursue. This is consistent with the selection of explanatory factors outside the control of management.

[131] NERA 'An investigation into the robustness of Ofwat's comparative efficiency analysis of capital maintenance expenditure', 1999, a report for Water UK.
[132] Professor John Cubbin 'Assessing Ofwat's efficiency econometrics', 2004.
[133] Ofwat, 'Future water and sewerage charges 2005-10: Final determinations', December 2004, page 250.

Changes in the models' specification over time

Scottish Water noted that Ofwat had recently changed a number of its capital maintenance models. Scottish Water argues that cost relationships in the water and sewerage sector can be expected to change only slowly over time unless exceptional technological progress takes place. Scottish Water considers that changes to the models would suggest that the statistical power of these models has weakened over time. It concludes that the former models must have been inaccurate.

We are not persuaded by this line of argument. We accept that technology in the water and sewerage industry may change only relatively slowly; however, there are a number of factors that are likely to change during a five-year regulatory control period. For example, priorities for maintenance investment are likely to change as companies understand more about the condition and performance of their assets over time. Companies are gaining greater knowledge about the impact of their assets on customer service and on compliance with drinking water and environmental standards. Moreover, the expectations of customers are becoming more demanding and quality standards are getting tighter. These changes are likely to affect how companies target investment, and may affect the level of investment they need to make. The companies' use of the UKWIR common framework approach may also change the cost structure of the industry for capital maintenance.

Interpretation of the residual[134]

Scottish Water argues that the residual from the econometric analysis should not be interpreted wholly as representing efficiency. In a report for Water UK[135], Professor Cubbin breaks the residual down between six factors: omitted variables, poor proxy, sampling error, measurement error, mathematical form and efficiency. The author carries out his analysis for each of the nine capital maintenance expenditure models. He concludes that for the capital maintenance expenditure models, efficiency accounts for between 14% and 28% of the residual on the water service, and for between 20% and 34% of the residual on the sewerage service.

Ofwat reviewed Professor Cubbin's paper and concluded that uncertainties of this scale are unlikely under normal operating circumstances[136]. Ofwat also pointed out that it employs other mechanisms and checks which ensure that potential distortion and uncertainty are allowed for. Ofwat has taken a number of steps to ensure that the models are used appropriately. It carefully adjusts the expenditure to allow for several identifiable distorting factors and makes an allowance for uncertainty. It also allowed 19 claims for company-specific special factors in 2003-04. These steps address any issues concerning omitted variables. Company-specific special factors may reduce the impact of the econometric assessment on a company by a significant amount. The use of special factors may significantly reduce the assessed efficiency gap.

Similarly, Ofwat does not set efficiency targets to close 100% of the assessed efficiency gap. At the 2004 price review, Ofwat assumed that companies could move at least 40% towards the benchmark company as established by the capital maintenance econometric relative efficiency assessment. The remaining 60% is viewed by Ofwat as being available to the company as an incentive to beat the target assumed in price limits. Incentive-based regulation seeks to reward a management that can out-perform its regulatory contract. There would be little opportunity to reward companies if targets were set at the theoretical maximum scope for improvement.

We have carefully reviewed Scottish Water's claims for special factors in capital maintenance. However, we are not persuaded that the evidence presented in the second draft business plan warrants an adjustment to the results of the econometric comparison. We have used the models to estimate an initial assessment of the level of funding that is likely to be required to maintain the asset base.

The models are backward looking and reflect only historic maintenance levels

Scottish Water states that the econometric models are backward looking, and therefore reflect historic

[134] The residual is the difference between a companies reported actual costs and the costs predicted by the econometric models.
[135] Professor John Cubbin, 'Assessing Ofwat's efficiency econometrics', March 2004.
[136] Ofwat, 'Future water and sewerage charges 2005-10: Final determinations', December 2004.

maintenance levels. It notes that Ofwat's price limits set in 2004 allowed significant increases in funding for capital maintenance. Ofwat allowed companies additional funding in price limits to the extent that companies could justify increases through their application of the UKWIR common framework approach. We have adopted an approach for assessing Scottish Water's application of the common framework that is consistent with Ofwat's. We discuss this approach later in this chapter.

The application of models derived from England and Wales information to Scottish Water

Only one of the papers submitted by Scottish Water specifically addresses our use of the Ofwat models in regulating Scottish Water. This paper[137], by Professor Cubbin, is an update of the earlier paper that he wrote for Water UK, which we discussed above. The author does not specifically address the use of the capital maintenance models in Scotland but concludes that using operating cost models to regulate Scottish Water could introduce errors into the results. He claims that this is because the models were developed specifically for the companies in England and Wales. His criticisms are largely addressed through our consideration of special factors.

Special factors claimed by Scottish Water

Scottish Water has presented claims for capital maintenance special factors relating to its large number of small water service assets. We are not persuaded that this puts Scottish Water at a disadvantage. Many of these smaller assets are likely to be more basic and to require considerably less maintenance.

Scottish Water claims that it is penalised in the econometric model for water distribution non-infrastructure because of its large number of small capacity service reservoirs and towers, relative to England and Wales. The model predicts costs as a function of pumping station capacity and water service reservoirs and water tower storage capacity. However, the evidence that Scottish Water presents to support its claim also shows that it is has significantly more service reservoirs and water tower storage capacity, relative to its customer base, than any company in England and Wales. Scottish Water has provided no justification of this greater storage capacity. Taking this into account, the model rewards Scottish Water rather than penalising it.

We would have liked to re-estimate the Ofwat capital maintenance models including explanatory variable and expenditure information from Scottish Water. We were not able to do this because the necessary historic information from Scottish Water does not exist or is not sufficiently reliable. In particular, we lack historic information on the asset base and on the amount of capital spending that is specifically directed at maintenance.

Scottish Water also argued that Scotland has a very different mix of assets from the companies in England and Wales, with more small assets, and an overall higher value of assets to maintain per customer. However, the Ofwat capital maintenance econometric models use information largely about the type and scale of the asset base as explanatory variables to determine predicted expenditure. None of the models use asset value as an explanatory variable. For example, the models take explicit account of the lengths of water mains and sewers maintained by Scottish Water. Mains and sewers comprise the majority of Scottish Water's asset values.

Scottish Water provided us with its analysis of capital maintenance requirements based on a comparison of total asset values with England and Wales. In our view, the values assigned by Scottish Water are not yet sufficiently reliable or consistent with England and Wales to support such analysis. It is highly unlikely that the inclusion of robust asset values from Scottish Water as possible explanatory variables will lead to the adoption of econometric models that include asset value. In any case, the requirements for maintenance investment will depend on the type of asset, rather than its total value, a factor that the models take into account.

Our view remains that the Ofwat models are robust and fit for our purpose. We believe that the fact that the Ofwat models have been successfully applied to companies as

[137] Professor John Cubbin, 'How appropriate are Ofwat's efficiency models for Scotland?', October 2004.

different as Severn Trent Water[138] and South West Water[139], and to both large[140] and small water only companies[141], confirms that the models can reasonably be applied in Scotland.

How we assessed capital maintenance investment requirements

In assessing Scottish Water's capital maintenance requirements in 2006-10 we have taken account of the various elements of the four-stage process that Ofwat used in its 2004 price review[142]:

- **Stage A** Maintaining serviceability to customers to date.

  We have made an assessment of the level of expenditure required to maintain current levels of service to customers and the environment as required by the Ministerial Guidance.

  In the approach used by Ofwat, this stage takes into account evidence of historic levels of capital maintenance expenditure, and current serviceability and asset performance information. For our assessment of Scottish Water's proposals, we have not been able to rely on information on historic expenditure, serviceability measures or asset performance. This is because the information available is not adequately robust to use in the manner that Ofwat's approach demands. We have therefore used an alternative approach based on the capital maintenance econometric models developed by Ofwat. We have used these models to derive the future expenditure we consider is appropriate at Stage A.

- **Stage B** Is the future period different?

  This stage examines the forward-looking element of capital maintenance expenditure. In essence, this step considers how much more (or less) capital maintenance expenditure (compared with the Stage A assumptions) should be required in the future due to changes (in, for instance, the rate of deterioration of assets, or changes in other risks to service failure) that have occurred, are occurring or are likely to occur. In the December 2004 determination, Ofwat used an assessment based on the principles set out in the UKWIR common framework and we have assessed Scottish Water's proposals in a similar manner.

- **Stage C** Scope for improvements in efficiency.

  Ofwat derives efficiency targets in Stage C that generally reduce the expenditure assumptions for price limits. As we have used an alternative methodology to derive the amount of expenditure at Stage A, we have also used a different approach in Stage C. We have, however, used Ofwat's cost base methodology to underpin our assumptions. We have assessed by how much Scottish Water can improve its efficiency in capital maintenance over the four-year period.

- **Stage D** Impact of the improvement programme.

  This stage takes into account the overlaps between the improvement programme and the base capital maintenance programme.

We discuss our approach in greater detail below.

Stage A assesses the level of expenditure required to maintain serviceability given the current level of expenditure and current asset performance.

Capital maintenance expenditure is influenced, in part, by the operating performance of the assets. Total annual expenditure can therefore change quite significantly from one year to the next. It would be desirable to consider expenditure over a number of years in order to smooth out any such variances when considering the influence of expenditure on serviceability trends. This approach is well established in England and Wales and Ofwat was able to average ten years of reliable historic actual expenditure

138 Severn Trent Water covers the West and East Midlands and a rural part of Wales.
139 South West Water covers Devon and Cornwall.
140 Thames Water has some 12 million customers.
141 For example, Bournemouth (and West Hampshire) Water which covers just the water service for the Bournemouth area.
142 Ofwat's approach is described in the publications 'Maintaining water and sewerage systems in England and Wales: Our proposed approach for the 2004 periodic review' (May 2002) and 'Setting the price limits for 2005-10: Framework and approach – a consultation paper' (October 2002).

information and compare this with a minimum of five years of robust serviceability information in reaching its Stage A conclusions at the 2004 price review.

Unfortunately, there is no equivalent record of actual capital maintenance expenditure and serviceability information in Scotland. Consequently, we have had to use a different approach to that used by Ofwat to complete our Stage A assessment.

Our approach involved two steps.

- **Step 1** Assess Scottish Water's current capital maintenance expenditure requirement.

  To estimate Scottish Water's requirement for capital maintenance, we used econometric models developed and used by Ofwat in its 2004 price review. These econometric models are built on the relationship between historic capital maintenance expenditure over the six years to 2003-04 and the asset and customer bases in England and Wales. We used Scottish Water's asset and customer base information as inputs to the Ofwat models in order to derive a predicted level of expenditure. The predicted expenditure given by this step is the level of expenditure that a company with the same asset and customer attributes as Scottish Water should need to maintain stable serviceability, this being the general current serviceability status in England and Wales[143].

  We have assumed therefore that this predicted expenditure, subject to the adjustments we set out below, is a robust assessment of the amount Scottish Water needs to keep its own levels of serviceability stable. We recognise that the level of service and serviceability for Scottish Water may well be different to the average status for the industry in England and Wales. Our Stage A assessment for Scottish Water is not designed to reduce these differences.

- **Step 2** Adjust for Scotland.

  This second step takes account of our view of any special factors that affect Scottish Water. We adjust the expenditure predicted at Step 1 for these differences.

Step 1 Assess the current expenditure requirement

We took the following steps in using the Ofwat capital maintenance econometric models:

1. Identify the explanatory factors.

   The information that Ofwat has collected from companies to provide the potential explanatory factors is all taken from the same base year. The models Ofwat uses therefore have explanatory factors from that year. We should use 1997-98 Scottish explanatory factors as inputs to our use of the Ofwat models in order to ensure that the prediction of expenditure for Scottish Water that we are making is on a like-for-like basis. However, the 1997-98 information on explanatory factors is not available for Scotland, although Scottish Water has provided the information for 2003-04.

   We therefore identified the mean change in each factor in England and Wales between 1997-98 and 2003-04, and applied that to Scottish Water's 2003-04 explanatory factors. We also removed Scottish Water's PPP assets at this stage.

   We used this method to estimate the equivalent 1997-98 asset and customer explanatory factors for Scottish Water for each of the Ofwat models.

2. Apply the calculated 1997-98 Scottish explanatory factors to the Ofwat models to determine the estimated level of capital maintenance expenditure for Scotland.

We have used the derived 1997-98 Scottish explanatory factors in each of the nine models to determine the appropriate level of capital maintenance expenditure for Scotland.

Step 2 Adjust for Scotland

The result of Step 1 is a predicted level of capital maintenance expenditure for Scottish Water. This expenditure is at an 'average' level of English and Welsh absolute efficiency and should allow Scottish Water to maintain stable serviceability. The second step of our

[143] See Ofwat's September 2004 Financial Performance and Expenditure Report.

analysis, therefore, was to recognise and, if required, adjust for material differences in capital maintenance efficiency and serviceability between Scotland and England and Wales.

From our analysis of Scottish Water's relative capital efficiency using Ofwat's cost base approach, we assessed Scottish Water's efficiency in capital maintenance relative to the companies in England and Wales. We describe our use of Ofwat's cost base approach in Chapters 7 and 14. This analysis demonstrated that, in 2003-04, Scottish Water was less efficient than the companies south of the border.

The Stage A assessment in Step 1 predicted a capital maintenance expenditure requirement for Scottish Water at equivalent levels of capital maintenance efficiency pertaining in England and Wales. We have therefore assumed that the efficiency gap identified by the cost base assessment should be added to this predicted expenditure. This gives a pre-efficiency level of capital maintenance expenditure that Scottish Water should require to maintain serviceability. This is prior to the application of any efficiency reduction.

Consequently, we adjusted Scottish Water's estimated required level of expenditure at Step 1 to reflect Scottish Water's level of relative capital efficiency in 2003-04.

Stage A relies on historic evidence to assess the appropriate level of capital maintenance. Stage B is forward looking and considers how much more (or less) capital maintenance expenditure (compared with the stage A assumptions) should be required in the future due to changes (in, for instance, the rate of deterioration of the assets, or changes in other risks to service failure) that have occurred, are occurring or are likely to occur.

We considered the forward look in three ways:

- **A review of Scottish Water's proposals informed by the principles of the Capital Maintenance Planning Common Framework**

  In recent years, the UK water industry has been working to develop a common framework in its approach to capital maintenance planning. This project involved wide consultation within the UK water industry and the active involvement and contribution of the economic and quality regulators. The results are published in Capital Maintenance Planning: A Common Framework[144] (CMPCF). The CMPCF is founded on risk-based principles so that in most cases capital maintenance will be justified on the current and future probability of asset failure and the resultant consequences for customers, the environment and water service providers, including the costs arising.

  The principles of the CMPCF have been widely accepted and are being progressively implemented by water service providers. Implementation is a substantial undertaking, requiring rigorous attention to all aspects of capital maintenance planning, and it cannot be expected to achieve perfection in a short period. This is especially so where the company has poor asset data and few systematic, consistent records of asset and service performance, and preventative and reactive maintenance costs.

  We have sought to measure Scottish Water's progress in applying the principles of the CMPCF. Both Ofwat and this Office assume that the progressive application of the common framework principles will ensure that the assessment of capital maintenance will become more robust, will result in the companies' ability to target capital maintenance to be significantly improved, and enable expenditure to be shifted from 're-active' to 'pro-active' programmes. These assumptions enabled Ofwat to develop an approach for Stage B, and the rationale behind this approach is described in more detail in 'Capital maintenance review: Independent assessment of Ofwat's, 2004 Price Review process (Initial review, May 2004)'[145].

  We asked Ofwat independently to assess Scottish Water's final business plan submission using its Stage B methodology, particularly the methodology for assessing the companies progress in implementing the principles of the CMPCF and using this to assess the expenditure justifications put forward. The CMPCF assessment involved

[144] Capital Maintenance Planning: A Common Framework, UKWIR/ Tynemarch Associates, May 2002.
[145] An independent review undertaken for Ofwat by Mott MacDonald, published in August 2004.

considering Scottish Water's proposals for each sub-service against 18 weighted criteria, in the broad areas of information quality, forward-looking analysis and approach to outputs.

Ofwat provided us with the results of this assessment. Ofwat's method assesses and scores each of the 18 criteria in each sub-service producing a score for each sub-service. Ofwat allocated the scores for each sub-service into five possible bands, from 'trailing' to 'leading'. In each of the four sub-services, while Scottish Water had addressed the principles set out in the common framework, it had not made effective progress and the results indicated that Scottish Water was in the lowest band. In the approach taken by Ofwat in the 2004 determination for England and Wales, such scores would not justify increased capital maintenance investment above the amount assessed in Ofwat's Stage A.

In the approach adopted by Ofwat for Stage B, specific items of proposed capital maintenance expenditure were identified and removed from the CMPCF assessment. These 'exceptional' items were assessed separately. We have used a similar approach.

- **A bottom-up review of individual projects in Quality & Standards III**

  The Reporter has also reviewed Scottish Water's application of the common framework approach. On non-infrastructure, the Reporter found that Scottish Water's application of the approach in the first draft business plan contained a number of deficiencies, for example for assessing capital maintenance needs at water treatment works. This caused him to conclude that the resulting programme may have been over-costed in some areas. While some of these issues were addressed for the second draft business plan, the Reporter noted that items of disagreement remained. He also highlighted deficiencies in Scottish Water's information in a number of areas and commented that substantial improvements are needed in the quality of its asset information.

  On waste water infrastructure, the Reporter raised concerns about the application of key assumptions and default views and how these might impact on the level of proposed investment. For water infrastructure he noted a number of areas where models may be subject to inaccuracy. He commented that, while the model that was used provided a logical framework to assess Scottish Water's future capital maintenance expenditure, its results should be viewed in relation to historic spend and information from other companies.

- **Advice from the quality regulators**

  We discussed capital maintenance with SEPA and the DWQR. Both expressed a view that it was important that capital maintenance was appropriately targeted.

From our analysis of Stage B we have drawn the following conclusions:

- Scottish Water's knowledge of the condition and performance of its assets is poor and it does not allow a sound, risk-based approach to capital maintenance planning to be adopted.

- Scottish Water is not yet applying the principles of the CMPCF in a sufficiently robust manner to allow it to plan capital maintenance activity and expenditure as efficiently and effectively as it should.

These two points also imply that Scottish Water has significant potential to improve asset performance and levels of serviceability for the level of expenditure that we have assumed in charge caps by improving its approach to capital maintenance planning through the next period and into the future.

- Synergies between the capital maintenance and quality programmes and between the capital maintenance programme and operating expenditure are not understood.

We have therefore allowed Scottish Water additional capital maintenance expenditure to ensure that it makes progress in improving its information and its use of the common framework. It should also retain sufficient flexibility to address the quality regulators' concerns. We have allowed seven exceptional items.

Exceptional item 1 Contingency to address public health concerns – up to £20 million

The advice we received from the quality regulators highlighted a potential concern relating to public health and environmental issues. To address this, we have allowed an exceptional item for unplanned capital maintenance expenditure. These funds should be used only in consultation with the DWQR. They will be subject to a separate reporting requirement to allow us to monitor and report on this item.

Exceptional item 2 Contingency to address environmental concerns – up to £20 million

We have also allowed an exceptional item for unplanned capital maintenance expenditure on the waste water side. These funds should be used only in consultation with SEPA. They will be subject to a separate reporting requirement to allow us to monitor and report on this item.

Exceptional item 3 To achieve CMPCF 'best practice' – up to £15 million

Our work for the price review has demonstrated that Scottish Water is some way behind the companies in England and Wales in its application of the principles of the CMPCF. To address this, we have allowed an exceptional item to ensure that Scottish Water improves its information and makes progress in its use of the CMPCF over the next four years. It is our intention to commission an independent review of the current situation in Scotland to make recommendations on how Scottish Water can achieve 'best practice'.

Exceptional item 4 To achieve progress towards economic levels of leakage - up to £40 million

Scottish Water acknowledges in its business plan that its level of leakage is higher than the economic level. However, information about current leakage levels seems to be unreliable, particularly at a local level. The impact of high leakage on capital and operating costs is also not well understood. Scottish Water is not yet able to assess the economic level of leakage, nor is it able to target efforts to reduce leakage in the most effective manner.

We have allowed a fourth exceptional item to ensure that Scottish Water identifies its economic level of leakage by December 2007 and that it reaches the economic level of leakage by 2014. We will require Scottish Water to agree the project priorities for this funding with the Quality Regulators[146].

Exceptional item 5 Transfer from quality investment programme, to meet iron and manganese drivers - £17.5 million (£22m transferred, less efficiencies).

We have also transferred some water main refurbishment work required to meet iron and manganese drivers to the capital maintenance budget. We believe that this is consistent with ensuring that a strategic approach to capital maintenance is adopted.

Exceptional item 6 Metering - up to £12 million

We have allowed this item to ensure that Scottish Water can meet the likely demand for meters from non-household customers. This is consistent with the Ministers' guidance on the principles of charging.

Exceptional item 7 Quality programme – up to £20 million

We have allowed this item to ensure that Scottish Water carries out appropriate capital maintenance at sites where it plans to upgrade treatment plant. This item is an addition to the normal capital maintenance that Scottish Water would undertake to maintain treatment plant.

Reallocation to operating costs

We have also reallocated £0.7 million per year (£2.8 million over the period 2006-10) to operating costs to reflect Scottish Water's cost allocation practice for its central laboratory. We have made a corresponding special factor allowance in operating costs.

Our view is that Scottish Water should not commit the resources made available to reduce leakage until it has agreed its economic level of leakage with the new Water Industry Commission. It should also agree with SEPA the priority areas for leakage reduction consistent with its economic level of leakage.

[146] SEPA and DWQR

The assessed level of capital maintenance for Scottish Water

We explained earlier that the Ofwat capital maintenance econometric models were developed using information covering the years 1998-99 to 2003-04 from the water and sewerage companies in England and Wales. We have input information from Scottish Water for 2003-04 only into these models.

Predicted capital maintenance costs using Ofwat's models

We set out the estimated required level of annual capital maintenance for Scottish Water in Table 13.11. We report our results for infrastructure and above-ground assets separately for the water and sewerage services. We do not report the results of each of the nine econometric models. This is for two reasons.

- Our assessments are high-level. We do not set targets for individual components of expenditure.
- Issues of cost allocation can arise at an individual model level, which would skew the results of individual models. Issues of cost allocation are not material at the higher, summary level. Any such problems are likely to balance out at a service level.

Table 13.11: Scottish Water's assessed capital maintenance requirements using Ofwat's models[147]

	Water service	Sewerage service	Combined total	Four year totals
Infrastructure assets	£29.3m	£24.1m	£53.4m	£213.6m
Above-ground	£50.0m	£43.0m	£93.0m	£372.0m
Service	£79.3m	£67.1m	£146.4m	£585.5m

These results reflect the average level of efficiency in England and Wales. The best performing company incurred capital maintenance costs that were around 8% lower than those predicted by the econometric models.

Overall allowance after adjustments and exceptional items

Table 13.12 sets out the adjustments we have made to the results of applying Ofwat's models, and the exceptional items that we have allowed. We have set a range for the allowed level of capital maintenance in this draft determination. The new Commission's final allowance for capital maintenance can only be determined once Scottish Water has had the opportunity to make representations on the draft determination. In this draft determination we believe that the maximum level of capital maintenance should be £780 million. It shows the total allowances over the four years 2006-07 to 2009-10.

Table 13.12: Overall capital maintenance investment allowance, after including adjustments and exceptional items[148]

	Water service	Sewerage service	Combined total
Service total from econometric models	£317.0m	£268.5m	£585.5m
Adjustment[149] to reflect Scottish Water's achievable procurement efficiency, relative to England and Wales historic average	£30.3m	£22.5m	£52.8m
Adjustment for application of common framework	£0.0m	£0.0m	£0.0m
Adjustment for reallocation of central laboratory costs	-£2.5m	-£0.3m	-£2.8m
Exceptional item 1: public health	£20.0m	-	£20.0m
Exceptional item 2: environment	-	£20.0m	£20.0m
Exceptional item 3: progress towards CMPCF best practice	£7.5m	£7.5m	£15.0m
Exceptional item 4: Leakage	£40.0m	-	£40.0m
Exceptional item 5: Iron and Manganese (DW5) water mains rehabilitation	£17.5m	-	£17.5m
Exceptional item 6: Metering	£12.0m		£12.0m
Exceptional item 7: Quality programme	£15.0m	£5.0m	£20.0m
Total allowance	£456.8m	£323.2m	£780.0m

This maximum level for capital maintenance is, we believe, more than adequate to maintain the serviceability of Scottish Water's current asset base. This level of funding would be 33% higher than the average company in England and Wales would have spent in recent years to maintain an equivalent asset base, according to the econometric models. In its 2004 price review, Ofwat assumed that companies would

147 Totals may not add due to rounding.
148 Totals may not add due to rounding.
149 This adjustment takes into account Scottish Water's current relative efficiency in capital maintenance from the cost base analysis. It assumes that Scottish Water will close 50% of this relative efficiency gap, phased equally over the three years 2007-08 to 2009-10. It also assumes that Scottish Water will achieve the continuing improvement targets for capital maintenance set by Ofwat in its 2004 price review. The adjustment is positive due to Scottish Water's relative inefficiency compared with average performance in England and Wales.

improve on their historic levels of efficiency by around 8% to 9% in 2005 to 2010. The total allowance is therefore around 45% higher than companies are expected to spend to match Ofwat's targets.

Ofwat did, however, allow companies additional capital expenditure to the extent that they could demonstrate a need through their application of CMPCF. For most water and sewerage companies, these increases ranged from around 15% to 25%. We noted earlier that the evidence put forward by Scottish Water on its application of CMPCF would not be sufficient to qualify for such an increase, using Ofwat's criteria. Nevertheless, even without such an increase, the level of capital maintenance that we have allowed Scottish Water is significantly higher (around 15% to 20%) than that which Ofwat would have allowed a company that had achieved a sufficiently robust application of CMPCF principles to justify its proposals for increased expenditure at the 2004 price determination.

The lower end of our proposed range for the allowed level of capital maintenance is £647 million. Even this lower allowed level of capital maintenance is higher than a company south of the border (in receipt of an upward adjustment for its use of the common framework) is likely to have required. The new Commission will set a final allowance for capital maintenance after it has had an opportunity to review representations from Scottish Water and other stakeholders.

Infrastructure renewals charge

Infrastructure assets are generally underground assets with long useful lives. These lives, however, tend to be difficult to assess accurately. The rate of wear will vary with a range of factors such as construction method, choice of material, soil type, climate and usage. This makes assessing the annual cost of use of the infrastructure problematic.

The underground network will never be replaced in its entirety. Instead, sections are renewed when their condition and performance deteriorates to the point where it is cost-effective to replace them (reducing repair costs, for example) or it is necessary to replace them in order to maintain customer service levels (to reduce interruptions, for example).

It is, therefore, not realistic or meaningful to assess an 'average life' for the infrastructure assets. This makes it difficult to use conventional accounting methods to calculate depreciation for infrastructure assets, as these methods rely on the concept of establishing an average asset life for each component of the asset base.

Instead, we treat the whole infrastructure network as a single system. The complete asset will never become obsolete or require replacement at any one time. It is replaced in parts as different elements come to the end of their useful lives. The IRC is intended to allow for this gradual replacement of the infrastructure asset over time.

The IRC is charged to Scottish Water's revenue each year. It is calculated as the average of the forecast capital expenditure required to maintain the infrastructure assets, without any loss of value, over the next 15 to 20 years. Over this period, the annual IRC should remain broadly unchanged from year to year, ignoring inflation. This is because the requirement for maintenance or renewals expenditure will be spread out over a reasonable period of time. This assumes, however, that the size of the network and the required standards of serviceability remain fairly stable.

Infrastructure renewals expenditure

In any one year the actual level of investment expended on the infrastructure assets is classed as the IRE. In its proposed investment plan, Scottish Water provided details of its proposed levels of IRE for each year of the regulatory control period. These are the amounts that Scottish Water considers necessary to spend on the infrastructure in order to maintain serviceability at existing levels.

If the amount that Scottish Water spends on infrastructure renewals exceeds the IRC, then this additional expenditure will be added to Scottish Water's regulated capital value. This is referred to as a prepayment.

If the amount that Scottish Water spends on infrastructure renewals is less than the amount envisaged in the IRC, then this 'shortfall' would be deducted from the RCV. This is referred to as an accrual. It is added to Scottish Water's accounts as a liability because Scottish Water has charged maintenance work to its revenue that it has not yet carried out.

The IRC will tend to remain generally stable from one year to the next. The actual IRE, on the other hand, is likely to vary due to planned and unplanned changes in the network investment requirements from year to year. Unplanned investment requirements can arise from factors such as system failures, extreme weather or the actions of a third party which require Scottish Water to undertake maintenance.

Over the course of the regulatory period, accruals and prepayments should tend to balance each other out. We seek to minimise any discrepancy between the respective figures for IRC and IRE. We do this by adjusting the IRC figure at each price review to take account of the long-term requirement for efficient and effective expenditure on infrastructure renewals.

The impact of the infrastructure renewals charge on prices

The IRC impacts on prices in two ways in the RCV method of price setting. First, the charge passes directly into prices as part of Scottish Water's assessed revenue requirement. Second, as discussed above, any difference between the IRC and the IRE will impact on the value of the RCV. As Scottish Water is allowed to earn a return on the RCV, the level of IRC and IRE, therefore, will also impact indirectly on prices.

It is important that the price setting mechanism we use is able to respond to changes in IRE so that Scottish Water receives appropriate funding through the IRC. At the outset of the regulatory control period, we estimate the IRC and IRE and any impact on the RCV:

- At the end of each year, we will deduct the IRC from Scottish Water's RCV as part of the 'rolling forward' process[150]. We do so because, as an explicit component of the revenue requirement, the IRC will have been funded through customer charges. Therefore, Scottish Water should not expect to earn a return on it.

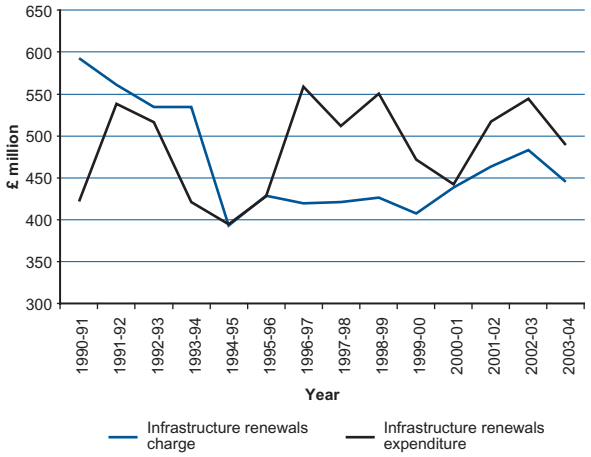
- However, the IRE is added to the RCV at the end of each year of the regulatory period. As IRE is actual expenditure on infrastructure, we regard it as an addition to the asset base. To the extent that the IRE exceeds the IRC, this is an addition that has not been funded elsewhere in the revenue requirement. Therefore, we would allow Scottish Water to earn a return on it through the RCV.

We have assumed that the IRE will equal the IRC during this regulatory control period.

The IRC and IRE in England and Wales

Figure 13.1 shows infrastructure renewals expenditure south of the border (2003-04 prices) and the infrastructure renewals charge.

Figure 13.1: Comparison of infrastructure renewals expenditure and charges for England and Wales 1991-2004



[150] Rolling forward is a process by which regulators recognise changes, or anticipated changes, in the RCV over the duration of the regulatory control period. A key element of this process is to recognise additions to the asset base by including them in the RCV, and the deterioration of assets over time by deducting depreciation.

In its final determinations, Ofwat funded companies, on average, for 22% more maintenance in the 2005-10 period[151] than in the 2000-05 period. It may therefore be expected that both the IRE and the IRC will rise in England and Wales over that period.

Implications of observed IRC in England and Wales for Scotland

It is useful to consider the IRC per property and per asset value in England and Wales. A corresponding value can then be implied for the water industry in Scotland.

We have assessed water and waste water separately in our analysis and used the following explanatory factors:

Water

- number of billed properties;
- number of connected properties; and
- length of water mains.

Waste water

- number of billed properties;
- household population equivalent; and
- length of sewers.

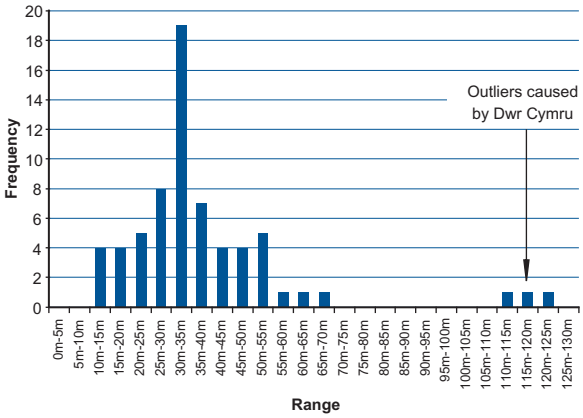
For each explanatory factor we have:

- Calculated the minimum, maximum, industry average and median values of the ratios between the IRC and the comparator through time.
- Assessed the extent of any relationship between the factor and the IRC.
- Established a range within which, based on observed ratios, we would expect Scottish Water's IRC to fall.

Our comparisons of the water IRC in England and Wales relative to potential explanatory factors suggest that, on average, the IRC for Scottish Water's water service should be in the range of £32 million to £49 million.

Figure 13.2 summarises the results of our comparisons. It shows that the most frequent result indicates an IRC for Scottish Water's water service in the range £30 million to £35 million. The overall average result is £38 million.

Figure 13.2: Frequency of comparisons between Scotland and England and Wales for IRC for the water service



Our analysis suggests that a reasonable implied IRC for Scottish Water for water services could be around £30 million to £50 million per year in 2003-04 (in 2003-04 prices).

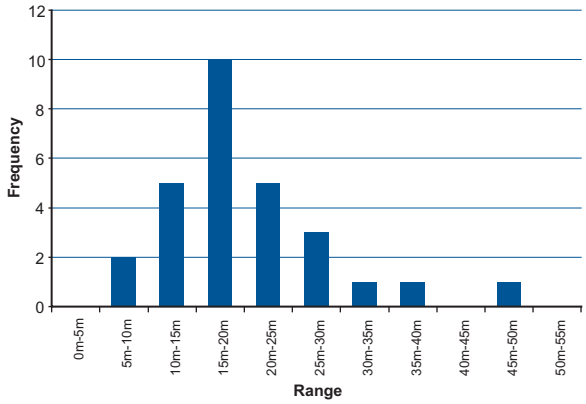
Waste water IRC

Our comparisons of the waste water IRC in England and Wales relative to potential explanatory factors indicates an IRC for Scottish Water's waste water service in the range of £15 million to £26 million.

Figure 13.3 summarises the results of our comparisons. It shows that the most frequent result indicates an IRC for Scottish Water's sewerage service in the range £15 million to £20 million. The overall average result is £19 million.

[151] This is the average increase in capital maintenance investment allowed by Ofwat in its 2004 price review following its assessment of companies' application of CMPCF. Ofwat, 'Future water and sewerage charges 2005-10: Final determinations', 2004.

Figure 13.3: Frequency of comparisons between Scotland and England and Wales for infrastructure renewals charge: waste water service



Total IRC

The total IRC for Scottish Water in 2003-04 should have been in the range £45 million to £75 million.

Scottish Water's actual IRC in 2003-04 was £143 million. This appears to be high compared with both the England and Wales average and the maxima.

If we assume that Ofwat's 22% increase in maintenance applies equally to both infrastructure and non-infrastructure assets, then we may expect an IRC of around £55 million to £90 million in 2003-04 prices. If outturn inflation is 2.5%, this would suggest that by 2009-10 the IRC could be as high as £65 million to £105 million.

Based on this evidence, we have allowed Scottish Water an IRC of £79 million per year in 2003-04 prices (£86 million in 2005-06 prices)

Conclusion

We have applied Ofwat's capital maintenance econometric models to assess the appropriate level of capital maintenance investment to allow Scottish Water in price limits. We have considered carefully Scottish Water's comments on the applicability of Ofwat's models. We have also considered, but not allowed, Scottish Water's claim for special factors.

To assess whether Scottish Water should be allowed additional funding over and above that predicted by the models, we have applied the approach developed by Ofwat for assessing the justifications to increase spending put forward by the England and Wales companies at the 2004 review. We conclude that Scottish Water should be allowed additional funds to enable it to address public health and environmental concerns expressed by the quality regulators. We have also allowed an amount to enable Scottish Water to begin to make progress towards an economic level of leakage, and to improve its ability to plan effective capital maintenance activity.

We have assessed Scottish Water's requirement for infrastructure renewals expenditure using Ofwat's capital maintenance econometric models. The infrastructure renewals charge should be in line with this expenditure, over time. We have examined the infrastructure renewals charges reported by companies in England and Wales in order to confirm the appropriate level of charge for Scottish Water.

Section 4: Funding capital expenditure
Chapter 14: Financing the quality, growth and customer service investment necessary to meet ministerial objectives

Introduction

In February 2005, the Scottish Ministers set out clear objectives[152] to improve water quality, environmental performance and customer service in the Scottish water industry. Meeting these objectives will require substantial investment to maintain the performance of existing assets, provide new treatment processes for both water and waste water, and remove constraints on development. Investment in improvements accounts for more than half of Scottish Water's capital expenditure. It is therefore essential that customers receive value for money from this investment.

In this chapter we look in detail at the investment programme that Scottish Water developed to meet the Ministers' objectives for improving water and waste water services. We have reviewed both the scope and design of the proposed programme and assessed the scope for more efficient delivery.

In reviewing Scottish Water's proposals, we have taken account of the views of the Reporter[153]. We have also used independent engineering consultants Black and Veatch, and Faber Maunsell to examine key aspects of the programme, such as the proposed investment of more than £900 million at water treatment works. We are also grateful to Ofwat for its assistance in ensuring that our approach was broadly consistent with that which is used south of the border.

We focus on the investment programme set out in detail in Table C of Scottish Water's second draft business plan. There are a number of apparent inconsistencies between Table C and other information contained in the business plan. Scottish Water has explained that this is a function of the timing of the preparation of Table C and the remainder of the draft business plan. It is important to note that Scottish Water submitted a business plan that would have delivered only the Ministers' essential objectives. However, in line with our business plan guidance, Table C lists all of the projects required to deliver both the essential and the desirable objectives outlined in the Ministerial Guidance.

All prices in this chapter are as at 2003-04 unless otherwise stated, and represent costs before efficiencies have been applied.

Scottish Water's investment proposals

Scottish Water submitted its second draft business plan on 20 April 2005. Table C of the plan provides a project level breakdown of the proposed investment programme. Table C also provides detailed information on the drivers and outputs associated with each project line in the programme.

Table 14.1 provides a breakdown of the 2006-10 expenditure in Table C for each of the major investment categories. Scottish Water estimated that the investment required to meet the Ministers' objectives was £3.37 billion. Such a programme would have been around £1 billion greater than that outlined in the first draft business plan. This plan would have required investment of £843 million per year, or around £360 each year for every connected property.

Table 14.1: Scottish Water second draft business plan investment proposals

£ million (October 2003 prices)	2006-10
Maintaining current water and waste water services[154]	£1,085m
Drinking water quality and resource enhancements	£1,064m
Environmental quality enhancements	£845m
Customer service improvements	£84m
Development constraints and growth	£221m
First time provision	£70m
Total Quality & Standards III essential plus desirable	**£3,369m**

In its second draft business plan[3], Scottish Water gives the following reasons for the increase in investment from the first draft business plan:

[152] Ministerial Statement on water services in Scotland, Wednesday 9 February 2005 by the Deputy Minister, Lewis MacDonald MSP.
[153] See Volume 4, Chapter 13 and 16 for the Reporter's views of Scottish Water's investment programme submissions.
[154] Scottish Water's second draft business plan submission, dated April 2005, Executive Summary, page A-12 Section A4.10.

- The appearance at a late stage of the Quality and Standards III process of significant new 'essential' objectives beyond those proposed in the first draft business plan.

- Differences in the timing of the 'essential' objectives between the two plans.

- Recently revised forecasts for capital inflation.

- A re-estimate of the costs required to complete Quality and Standards II[155].

We published Scottish Water's second draft business plan in full on 16 May 2005. We also published an open letter to the Scottish Ministers[156]. In that letter we commented that we remained confident that the ministerial objectives could be achieved at significantly lower costs than those contained in Scottish Water's business plan. We noted that regulators had often reduced very substantially the cost of capital investment programmes, without there being an impact on the outputs that are delivered.

Table 14.2 shows the cost of projects in Table C of the second draft business plan, split by driver: capital maintenance, customer service, drinking water quality, environmental, and others (such as development constraints).

[155] These costs are detailed in Table E of the investment plan, not Table C, and therefore do not appear in the figures in Table 14.2.
[156] Available in Appendix 10

Table 14.2: Cost of projects, by driver

Type	Driver	Description	2006-10	Subtotals	2010-14	Subtotals
CM	CM	Capital maintenance	£1,084.8m	£1,084.8m	£930.0m	£930.0m
Customer service drivers	CS1	Pressure	£5.7m	£84.1m	£8.6m	£88.9m
	CS2	Odour management	£19.1m		£28.6m	
	CS4	Business metering	£0.7m		£1.0m	
	CS11	Sewer flooding	£58.6m		£50.7m	
Drinking water quality drivers	DW1	Lead standard	£20.9m	£1,063.7m	£152.9m	£326.0m
	DW2	Trihalomethane standard	£28.8m		£0.3m	
	DW3	All other standards in the Drinking Water Directive	£298.4m		£0.0m	
	DW4	Cryptosporidium	£175.9m		£0.3m	
	DW5	Iron and manganese	£26.3m		£13.7m	
	DW7	The Birds/Habitats Directive	£56.2m		£14.4m	
	DW8	Security of supply	£0.0m		£8.5m	
	DW9	Additional physical security	£71.9m		£41.6m	
	DW10	Raw water	£0.0m		£0.9m	
	DW11	Water fittings byelaws	£4.1m		£4.1m	
	DW13	Water aesthetic quality	£277.5m		£8.2m	
	DW15	Compliance with recommendations	£3.1m		£3.1m	
	DW16	Water Safety Plans	£4.5m		£4.5m	
	DW17	Cross connections	£13.5m		£13.5m	
	DW20	Flood Estimation Handbook	£0.9m		£0.9m	
	WR1	UKTAG guideline	£60.6m		£15.3m	
	WR2	Operational practice at reservoirs	£8.0m		£40.6m	
	WR3	Protect water quality	£0.0m		£0.0m	
	WR4	Water Framework Directive ecological objective	£0.9m		£3.3m	
	WR5	Compliance with water quality licences	£12.5m		£0.0m	
Environmental drivers	EC01	Urban Waste Water Treatment Directive	£298.2m	£845.2m	£380.8m	£866.2m
	EC02	Bathing Water Directive	£146.7m		£2.6m	
	EC03	Shellfish Waters Directive	£14.3m		£37.8m	
	EC04	Freshwater for Fish Directive	£61.2m		£15.3m	
	EC06	Sludge use in Agriculture Directive	£0.0m		£74.6m	
	EC07	Birds Directive	£0.2m		£1.6m	
	EC08	Habitats Directive	£4.2m		£0.0m	
	EC09	Dangerous Substances Directive	£6.3m		£0.0m	
	EC10	Water Framework Directive	£240.9m		£345.5m	
	EC11	Landfill Directive	£3.5m		£0.0m	
	EC12	Integrated Pollution Prevention D	£9.4m		£0.0m	
	NH01	Section 54 WIA (Scotland) 2002	£4.5m		£4.3m	
	WA01	Definition of Waste	£1.6m		£3.3m	
	WQ01	Water Environment and Water Services Act	£42.2m		£0.4m	
	WQ02	Environmental Act 1995, Section 34	£12.0m		£0.0m	
FTP	FTP	First time provision	£70.0m	£291.4m	£13.7m	£242.8m
RDC	RDC	Development constraints	£221.4m		£229.0m	
			£3,369.3m		**£2,453.8**m	

Table C suggested that investment in drinking water quality and environmental improvement accounts for 57% of Scottish Water's estimated total programme cost. This reduces to 48% in the second half of the programme. Scottish Water noted in its second draft business plan that the balance of improvement investment was, in its view, skewed to the first regulatory control period.

Table 14.3 shows the cost and number of projects by subclass.

Table 14.3: Cost and number of projects, by subclass

Subclass	Cost 2006-10	Cost 2010-14	Cost Q&SIII	Number of projects 2006-10	Number of projects 2010-14
Cross connections	£ 13.5m	£ 13.5m	£ 26.9m	1	1
Combined sewer overflow CM[157]	£ 0.9m	£ 1.2m	£ 2.2m	4	4
Combined sewer overflow completion	£ 0.2m	£ 0m	£ 0.2m	1	0
Development constraints – Part 3	£ 66.9m	£ 74.6m	£ 141.4m	4	4
Development constraints – Part 4	£ 144.0m	£ 144.0m	£ 288.1m	4	4
Development constraints – water resources	£ 10.4m	£ 10.4m	£ 20.9m	1	1
First time provision – Part 3	£ 40.2m	£ 5.3m	£ 45.5m	3	3
First time provision – Part 4	£ 29.8m	£ 8.4m	£ 38.2m	3	3
Internal flooding	£ 58.6m	£ 73.1m	£ 131.7m	1	2
IPPC[158] schemes	£ 9.4m	£ 0.0m	£ 9.4m	1	0
Landfill Directive	£ 3.5m	£ 0.0m	£ 3.5m	1	0
Lead	£ 20.7m	£ 152.8m	£ 173.6m	1	2
Low pressure	£ 5.7m	£ 8.6m	£ 14.3m	1	1
M&G[159] – Asset intelligence	£ 81.6m	£ 44.5m	£ 126.1m	28	24
M&G – Health and safety	£ 49.5m	£ 21.2m	£ 70.7m	22	22
M&G – IT	£ 84.9 m	£ 53.8m	£ 138.7m	32	30
M&G – Logistics	£ 15.7m	£ 27.6m	£ 43.3m	24	24
M&G – Property	£ 29.8m	£ 18.4m	£ 48.1m	124	108
M&G – Scientific	£ 4.6m	£ 4.4m	£ 9.0m	8	8
M&G – Telemetry	£ 55.2m	£ 22.7m	£ 77.9m	122	78
Metering	£ 6.3m	£ 9.4m	£ 15.7m	2	2
Minor sewer collapse	£ 28.6m	£ 28.7m	£ 57.3m	4	4
Odour management	£ 19.1m	£ 28.6m	£ 47.7m	1	1
Outfall CM	£ 1.8 m	£ 2.9 m	£ 4.7m	4	4
Overlap removal	-£ 51.2 m	-£ 0.5m	-£ 51.8m	1	1
Septic tank CM	£ 5.3m	£ 5.3m	£ 10.7m	1	1
Septic tank upgrade	£ 12.0m	£ 3.6m	£ 15.7m	8	3
Service relocation	£ 6.6 m	£ 4.3 m	£ 10.8m	5	5
Sewage pumping station CM	£ 7.9m	£ 30.7 m	£ 38.6m	5	5
Sewage pumping station reactive	£ 1.8m	£ 1.8 m	£ 3.6m	1	1
Sewage pumping station refurbishment	£ 2.1m	£ 0.0m	£ 2.1m	5	0
Sewer rehabilitation	£ 104.8 m	£ 103.2m	£ 207.9 m	97	10
Sewer structures CM	£ 7.2m	£ 7.9m	£ 15.1m	4	4
Sludge CM	£ 2.1m	£ 21.7m	£ 23.8m	5	5
Sludge conditioning centre	£ 0.0m	£ 22.7m	£ 22.7m	0	11
Sludge digestion	£ 0.0m	£ 74.0m	£ 74.0m	0	6
Sludge treatment centre	£ 0.0m	£ 36.6m	£ 36.6m	0	4
Sludge centre – PFI	£ 8.3m	£ 23.7m	£ 32.0m	1	1
Sewage treatment works CM	£ 29.7m	£ 102.7m	£ 132.4m	5	6
Sewage treatment works completion	£ 2.5m	£ 0.0m	£ 2.5m	9	0
Sewage treatment works reactive	£ 6.7m	£ 6.7m	£ 13.3m	1	1
Sewage treatment works refurbishment	£ 19.7m	£ 0.0m	£ 19.7m	25	0
Sewage treatment works upgrade	£ 101.4m	£ 376.3m	£ 477.7m	39	112
Sewage treatment works – PFI	£ 28.0m	£ 31.8m	£ 59.8m	2	1
Sustainable urban drainage systems CM	£ 5.0m	£ 5.0m	£ 10.0m	4	4
Scottish Water Wide	£ 76.4 m	£ 54.5m	£ 130.9m	6	4
Unsatisfactory Intermittent Discharge – dual manhole	£ 0.6m	£ 0.0m	£ 0.6m	14	0
Unsatisfactory Intermittent Discharge – overflow	£ 624.7m	£ 271.4m	£ 896.1m	272	212
Unsatisfactory Intermittent Discharge – surface water outfall	£ 4.4m	£ 5.5m	£ 9.9m	5	14
Unsatisfactory Intermittent Discharge – PFI	£ 50.9m	£ 0.0m	£ 50.9m	3	0
Water infrastructure CM	£ 183.6m	£ 149.1m	£ 332.7m	20	15
Water mains rehabilitation	£ 175.8m	£ 108.4m	£ 284.2m	135	5
Water pumping station CM	£ 14.1m	£ 17.2m	£ 31.3m	1	1
Water pumping station refurbishment	£ 6.7m	£ 0.0m	£ 6.7m	7	0
Water resources	£ 134.7m	£ 74.0 m	£ 208.7m	6	4
Water resources CM	£ 15.3 m	£ 17.7m	£ 33.0m	3	3
Water storage	£ 15.7m	£ 15.7m	£ 31.3m	1	1
Water treatment works CM	£ 15.2m	£ 84.3m	£ 99.5m	1	1
Water treatment works completion	£ 12.0m	£ 0.0m	£ 12.0m	32	0
Water treatment works new	£ 6.7m	£ 0.0m	£ 6.7m	3	0
Water treatment works refurbishment	£ 3.2m	£ 0.0m	£ 3.2m	3	0
Water treatment works upgrade	£ 932.3m	£ 8.3m	£ 940.5m	229	39
Others	£ 16.3m	£ 36.1m	£ 52.4m	11	9
Total	**£ 3,369.3**m	**£ 2,453.8**m	**£ 5,823.1**m	**1,367**	**819**

[157] Integrated pollution Protection and Coastal.
[158] Management and General.
[159] Capital Maintenance.

This analysis highlights a number of areas where Scottish Water is proposing significant investment during the 2006-10 period. In this regard it is important to remember that the regulatory control period in Scotland is four years, whereas in England and Wales it is five.

Scottish Water plans to invest £932 million in upgrading water treatment works. This exceeds the total quality investment planned at water treatment works in the whole of England and Wales in the period 2005-10[160].

Similarly, Scottish Water claims that it needs to spend £625 million on improving unsatisfactory intermittent discharge (UID) projects. By comparison, the total spend of the ten water and waste water companies in England and Wales will be around £816 million[161] in the 2005-10 period.

Ensuring adequate programme definition

In setting out our guidance for Scottish Water's second draft business plan[162], we included the requirement to provide a detailed list of capital projects and their associated drivers and outputs. We saw this as essential to ensuring that customers receive value for money and that stakeholders can monitor Scottish Water's performance in delivering the investment programme.

Our initial assessment of Scottish Water's second draft plan submission indicated that the level of definition in its investment programme did not comply with our requirements. We wrote to Scottish Water[163] to ask it to provide information at a sufficiently detailed level for us to analyse the programme and for stakeholders to monitor programme delivery.

Scottish Water responded, saying that it was not possible, or in some cases desirable, to provide further detail on its proposed investment programme. It cited a current lack of clarity as to which projects would comprise the programme, as well as concerns about putting site-specific information into the public domain. Scottish Water did, however, offer to provide sight of the database from which it had developed its investment programme submission.

We wrote on two more occasions[164,165] to ask Scottish Water to submit the database. Scottish Water responded on 3 May 2005, providing its database but expressing concerns about the use and publication of this information.

We wrote again in early May. We requested further disaggregation of 14 project lines totalling some £322 million of expenditure and better definition of the investment required at or adjacent to PPP sites. Our continuing review had demonstrated that Table C had provided sufficient disaggregation of the water treatment works and UID programmes. We also agreed with Scottish Water that the ministerial investment requirements for the relief of development constraints and malodour abatement could not be determined in detail at this stage. In addition, we explained that we would use Ofwat's econometric models to define an appropriate level of capital maintenance. As such, further definition of the proposed capital maintenance investment programme would not be required.

Scottish Water provided the requested information on 12 May 2005.

There is now sufficient disaggregation of the investment programme for us to analyse the scope, design, efficiency and effectiveness of Scottish Water's proposed investment to meet the Ministers' objectives. We believe that some further work will be needed to define the programme in the period prior to publication of the final determination by the Water Industry Commission at the end of November 2005. Further definition will be required to ensure that the investment programme can be effectively monitored.

Technical review of the programme

We have worked closely with the Reporter, SEPA and the DWQR to review Scottish Water's proposals. We have

[160] In England and Wales the whole industry is proposing to deliver a £689 million (post-efficiencies) programme of drinking water quality treatment improvements (2002-03 prices) at 239 sites.
[161] In 2002-03 prices.
[162] This guidance is discussed in Chapter 7 of this volume.
[163] Regulatory letter WIC 62, 'Request for increased information on Scottish Water's 2nd draft business plan investment programme'.
[164] Regulatory letter WIC 62.1.
[165] Regulatory letter WIC 62.2.

sought assurances that the investment projects contained in Table C are consistent with the objectives set out in the Ministerial Guidance.

The Reporter's assessment of the investment programme is presented in Chapter 16 of Volume 4 of this draft determination. We met with both SEPA and the DWQR on several occasions during April and May 2005 to discuss the contents of the investment programme. They have provided formal confirmation[166] of the extent to which the investment proposals meet the Ministerial Guidance of February 2005.

We asked the Reporter[167] to highlight any areas where we might need to seek further advice on the appropriateness of proposed investment projects. It was clear both from early comments from the Reporter and from our own analysis that we would need more resources to review the detail of the investment programme. We engaged independent engineering consultants, Faber Maunsell and Black and Veatch[168], to review the projects contained in Table C. In particular, we asked the consultants to focus on the following issues:

- Errors and duplication

  A number of what appeared to be duplicate lines were immediately evident in Scottish Water's programme. The programme also included investment at PPP works, which we would not expect to be funded through direct capital investment.

- Water treatment works

  Investment on drinking water quality accounted for just under a third of Scottish Water's total £3.37 billion investment programme for 2006-10. The Reporter had identified concerns regarding the extent to which strategic solutions were being employed and the scope of the projects.

- UID programme

  Costs in this area totalled £681 million for the 2006-10 period. This comprises £676 million for unsatisfactory combined sewer overflows (CSOs) and emergency overflows, £4 million for unsatisfactory surface water outfalls and £0.6 million for dual manhole problems. Unit costs for the 275 unsatisfactory CSO projects in the scheme, at more than £2.4 million per project, appeared to be very high. There were also concerns about the extent to which the requirements in this area had been subject to proper modelling.

- Water Framework Directive investment

  Investment associated with the Water Framework Directive driver (EC10) reported in Scottish Water's programme amounted to some £241 million. Some of this investment related to the UID investment programme discussed above. Scottish Water's programme also contained a further £134 million of investment on projects relating to the Water Framework Directive with drinking water quality drivers. We were concerned to understand whether this investment was consistent with the Ministers' objectives.

- Development constraints and first time connection

  Scottish Water estimated investment to resolve development constraints and first time connections at £291 million. The scope and method of assessing the required level of investment appeared to be questionable.

We sought advice from the independent consultants on the extent to which there were:

- duplication or errors in the listing of projects and outputs in the programme;
- projects that did not meet the objectives set out in the Ministerial Guidance;
- over-scoping of requirements;
- inappropriate solutions;
- insufficient definition, leading to an inability to monitor delivery;

[166] See Appendices 8 and 9.
[167] See Volume 5 of our methodology document 'Our work in regulating the Scottish Water industry: The scope for capital investment efficiency', Chapter 10, Section 10.4, page 85.
[168] Black and Veatch were sub-contracted to Faber Maunsell

- inappropriate use of generic costings;
- incorrect interpretation of standards or of the requirements of the quality regulator;
- wrong sizing or inappropriate specification of requirements; and
- duplication of outputs from Quality and Standards II.

The consultants held a series of meetings with the Scottish Water staff who had been involved in developing the investment plan contained in Table C. They also carried out 37 site visits to water treatment works, undertook desk top assessments of a further five sites and reviewed a wide range of information provided by Scottish Water concerning the methodology employed in defining and costing the investment programme.

We discussed the results of the consultants' work at a series of workshops with SEPA (for the UID and Water Framework Directive programmes), DWQR (for the drinking water quality investment) and the Scottish Executive (for development constraints and first time provision). At these meetings we emphasised that our role was to ensure that the Ministers' objectives would be met at the lowest reasonable overall cost.

Faber Maunsell's thorough and independent assessment has confirmed many of the concerns identified by the Reporter. As such, it provides a strong evidence base for the adjustments that we have made to Scottish Water's proposed investment programme.

As noted earlier, Ofwat helped us to assess how Scottish Water's investment proposals compared with those of the companies in England and Wales. In particular, they helped us to ensure that a broadly consistent approach to assessing investment requirements has been applied north and south of the border[169].

The use of the Reporter and of independent engineering consultants is consistent with Ofwat's approach to assessing the investment proposals of the companies in England and Wales. Ofgem and the Office of Rail Regulation (ORR) have also used technical consultants to carry out detailed project level reviews of the investment proposals of regulated companies.

Impact of the investment programme review on the baseline

The technical review of the programme by the Reporter and Faber Maunsell highlighted a number of issues in relation to Scottish Water's proposed investment programme. These included:

- duplication of project lines in the programme;
- inclusion of projects which did not meet ministerial objectives;
- inclusion of investment targeted at PPP schemes;
- a lack of a strategic approach in a number of areas;
- over-scoping of project solutions;
- over reliance on the use of generic costing approaches; and
- duplication of outputs already required in Quality and Standards II.

Similarly, analysis of Scottish Water's project costs by both Ofwat and this Office indicated that, in certain areas of the programme, the costs per scheme proposed by Scottish Water significantly exceeded the costs put forward to Ofwat by the water companies in England and Wales at the 2004 price review. There was also evidence that the costs per scheme in certain areas were significantly higher than the outturn costs for similar schemes in the current Quality and Standards II programme.

We have made a number of adjustments to Scottish Water's investment proposals for quality enhancement and growth to reflect the conclusions of our independent experts. These relate to:

- the removal of duplications and errors in the programme (including schemes not meeting ministerial objectives);

[169] The role of Ofwat in challenging the scope of the investment programme is wider than the role of the new Water Industry Commission in Scotland.

- the removal of investment targeted at PPP schemes;
- a reduction in the cash investment required to meet drinking water quality objectives, primarily associated with investment at water treatment works and abstraction control measures for the Water Framework Directive;
- a reduction in the cash investment required to meet environmental objectives, primarily associated with investment on UIDs; and
- a reduction in the cash investment required to meet strategic development objectives associated with both the removal of development constraints and first time provision.

It is important to note that we have not reduced, delayed or otherwise amended the outputs required by Ministers. In the following sections we discuss the rationale for the changes we have made in more detail.

For each area of the programme we have estimated the highest level of spending (pre-efficiency) that we consider to be appropriate. We have also set the lowest level of investment that we believe, realistically, could be required.

Review of planned investment on drinking water quality

Scottish Water estimated that £1,064 million of investment is required to meet the Ministers' objectives for improvements to drinking water quality during the 2006-10 regulatory control period. This implied investment of £266 million a year, or around £113 each year for every connected customer. In comparison, the total investment in England and Wales in the period 2005-10 is £425[170] million a year, or around £18 each year per customer.

Scottish Water's second draft business plan indicated that the high levels of investment in drinking water quality were needed to meet increased water quality standards, particularly for trihalomethanes[171] and Cryptosporidium[172]. The DWQR has confirmed that the drinking water quality outputs delivered by Scottish Water's proposed investment programme meet the requirements set out by Ministers.

Scottish Water's proposals can be broken down into the sub-categories shown in Table 14.4. This includes a 'reduction for overlap' line with a negative value of £51 million. Scottish Water has indicated that this is associated with an adjustment for the overlap between quality investment and capital maintenance investment at water treatment works.

Table 14.4: Breakdown of Table C drinking water quality investment into sub-category

Sub-categories	Project cost totals 2006-10 (£m)
Water treatment works	£830.8m
Water mains rehabilitation (DW5 iron and manganese)	£22.2m
Water resources (Water Framework Directive)	£134.7m
Security enhancement at water treatment sites	£76.4m
Customer requested lead pipe removal	£20.7m
Other minor elements	£30.2m
Scottish Water reduction for 'Programme overlap'	-£51.2m
Total 2006-10	**£1063.7m**

Water treatment works

Table C includes investment in improved drinking water quality at 239 of the 371 water treatment works in Scotland[173]. At a total cost of £831 million, this comprises more than 80% of the total investment in improvements in drinking water quality. This cost is around one-third higher than the cost in England and Wales, again to upgrade 239 works (where the average size of the works will be considerably larger). Moreover, the Reporter identified a number of concerns about this area of the investment programme. It has, therefore, been an important focus of our investment programme review.

[170] This figure is from Ofwat's final determination of future water and sewerage charges 2005-10 and has been inflated by 5.46% to represent capital goods inflation between 2002-03 and 2003-04.
[171] Trihalomethanes are a by-product of disinfection linked to the presence of organic matter in raw water. Compliance with a trihalomethane standard of 100_g/l is required by 2008.
[172] The Cryptosporidium (Scottish Water) Directions 2003 place new requirements on Scottish Water, particularly relating to the treatment of recycled water used in the treatment process.
[173] Scottish Water's second draft business plan includes proposals to reduce the number of operational water treatment works to 301 by 2009-10.

The review process carried out by the Reporter and Faber Maunsell included:

- assessing the extent to which Scottish Water had correctly interpreted the drinking water quality requirements set out by Ministers;
- establishing the methodology by which Scottish Water had determined the investment required at each water treatment works;
- meeting with Scottish Water staff to discuss the assumptions underpinning this methodology; and
- carrying out site visits to determine whether Scottish Water's approach had correctly determined the scope of investment required at a representative sample of works.

The Reporter carried out site visits at a random sample of eight water treatment works. Faber Maunsell selected a further 36[174] water treatment works for site visits. They visited a representative range of works by size and by level of proposed investment. They also carried out desk top analysis of a further five sites.

We believe that the conclusions of the Reporter and Faber Maunsell have provided solid evidence for our assessment of Scottish Water's proposals.

Our assessment of the required investment in water treatment works

Our review indicated that there is considerable evidence that the investment required to meet the ministerial objectives had been scoped incorrectly. In particular, the use of generic solutions to establish investment needs at the smaller water treatment works appears to have led to a significant overestimate of the scope of the work required. Lack of strategic solutions also appears to have resulted in increased costs.

In assessing Scottish Water's drinking water quality proposals, the Reporter noted the following:

- The overlap of the water quality programme with work being carried out in Quality and Standards II, and in the capital maintenance programme in Quality and Standards III, had not been fully addressed.
- Generic solutions used for water treatment works did not take full account of site conditions.
- There appeared to be cases where significant engineering solutions were proposed at sites with relatively few water quality failures.
- For the smaller water treatment works, the form of the cost curve used had resulted in some marginal over-costing. The larger works were marginally under-costed, but the overall cost of the programme was inflated by around 2.7% as a result.

Following his assessment, the Reporter concluded that the issues identified in relation to project scoping at water treatment works resulted in Scottish Water's cost estimates being around 15% too high. This was based on the limited sample of eight sites, which were reviewed in detail.

The analysis carried out by Faber Maunsell concluded that there were significant issues concerning Scottish Water's methodology for assessing the scope of work required at water treatment works. At each of the sample water treatment works, Faber Maunsell assessed three key parameters:

- Need – whether the project met the requirements of the Ministerial Guidance.
- Strategy – to what extent the opportunity for strategic solutions had been assessed.
- Scope – to what extent the work proposed at the site was over-scoped.

Each of these parameters was scored for the sample sites. These scores were then translated, using a standard matrix, into an assessment of the extent of over-scoping in the representative sample of projects. These findings were then applied to the overall programme.

[174] In total, Faber Maunsell completed 37 site visits. However, one of these sites was also visited by the Reporter.

Faber Maunsell found evidence of significant over-scoping in each of the areas assessed. For example, when assessing 'need' they discovered sites in the representative sample where there was no clear requirement to carry out the proposed works. Examples included sites where Scottish Water proposed to fit a new 'membrane' treatment process where one already existed at the site.

They also found a number of sites where strategic solutions, such as rationalising the number of water treatment works, had not been taken into account.

Faber Maunsell also found that the use of generic solutions in the costing process had led to major over-scoping of requirements. Examples included the provision of new lamella separators at works where there were already existing alternative processes which were either adequate to meet the requirements or could be augmented at minimum cost. Other examples included costing for the installation of contact tanks where Scottish Water had costed new tanks of the total required volume rather than adding additional volume to existing tanks.

From their analysis, Faber Maunsell concluded that the degree of over-scoping in Scottish Water's proposals for water treatment works justified a pre-efficiency reduction in costs of between 45% and 55%.

We have reviewed the Reporter's and Faber Maunsell's findings in detail. Following this review we have concluded that there is significant opportunity to reduce the scope of investment at water treatment works. Our assessment is that this reduction lies within the range of 30% to 50% of Scottish Water's estimate. This would reduce the total cost of the quality investment at water treatment works from £831 million to a highest estimated cost of £582 million and a current lowest realistic cost of £415 million. We have also reduced Scottish Water's assessment of programme overlap in the same range, ie a reduction of 30% to 50%.

We have reassigned the water mains rehabilitation investment into the capital maintenance expenditure requirements. This should allow synergies within the water mains replacement programme to be realised. This reduces the investment in the drinking water quality category by £22 million and increases the investment that we have allowed in capital maintenance by £17.5 million (£22 million less the efficiency target).

Water resources

The Reporter and our engineering consultants have assessed Scottish Water's proposed investment of £135 million on water resources. This is primarily associated with the Water Framework Directive[175]. They both concluded that costs in this area are very uncertain.

The Reporter commented that Scottish Water had not yet identified and quantified new abstractions and that Scottish Water had therefore made significant assumptions in developing its proposals. The Reporter also noted that Scottish Water did not appear to have taken full account of the benefits available from leakage reduction.

The engineering consultants commented that further investigations (including the development of a water resources plan) are required to reduce uncertainties and that reducing leakage should be the preferred first choice for replacing lost supplies. They recommended that Scottish Water should establish economic levels of leakage in the water resource zones that are affected by the Water Framework Directive.

We have concluded that there is considerable uncertainty about costs in this area and there is a danger that customers' money will not be spent wisely. We therefore propose to reduce investment in this area in recognition of the investment that we have made available to Scottish Water to move towards the economic level of leakage.

We expect to have set an economic level of leakage no later than December 2007. The additional £40 million of capital maintenance investment that we have made available beyond that which would have been allowed by Ofwat should certainly be sufficient for Scottish Water to reach its economic level of leakage no later than the end of the 2010-14 regulatory control period. Companies in

[175] The Water Framework Directive element of the water resources expenditure amounts to £133.8 million. The remaining £0.9 million relates to flood studies to comply with the Reservoirs Act.

England and Wales were not allowed such significant investment to help them reach their economic levels of leakage.

Based on the Reporter's and Faber Maunsell's conclusions, we have reduced the proposed scope of investment in water resources by 30%. It is important to take account of the scope for leakage reduction in assessing the required scope for investment in water resources. This gives a highest estimated investment in this area of £94.3 million. If we were to take account of the £40 million allocation for leakage control in capital maintenance and reduce our estimate of over-scoping to 20%, this gives a current lowest realistic pre-efficiency cost estimate of £68 million.

Security enhancement

The Reporter reviewed Scottish Water's proposed investment of £76 million for security enhancement at water treatment works and other assets. He concluded that Scottish Water's estimates of the required scope of work appeared to be conservative in a number of areas. He has also suggested that the unit costs used in its assessment appear high.

We have concluded that a reduction of 20% in Scottish Water's assessment of the costs for security enhancement is appropriate. This reduces the assessed level of Scottish Water's investment requirements in this area from £76 million to £61 million.

We have not made any other adjustments to the scope of Scottish Water's proposals for drinking water quality investment.

The outcome of our review of the scope of the work required to meet the Ministers' objectives for drinking water quality is shown in Table 14.5.

Table 14.5: Outcome of our assessment of drinking water quality investment requirements (pre-efficiency)

Sub-categories	Original Table C project cost Total 2006-10	Highest estimated cost	Current lowest realistic cost
Water treatment works	£830.8m	£581.6m	£415.4m
Water mains rehabilitation (DW5 iron and manganese)	£22.2m	£0.0m	£0.0m
Water resources (Water Framework Directive)	£134.7m	£94.3m	£67.8m
Security enhancement at water treatment sites	£76.4m	£61.1m	£61.1m
Customer requested lead pipe removal	£20.7m	£20.7m	£20.7m
Other minor elements	£30.2m	£30.2m	£30.2m
Scottish Water reduction for 'Programme overlap'	£-51.2m	£-35.9m	£-25.6m
Total 2006-10	**£1063.7m**	**£752.0m**	**£569.6m**

Review of planned investment in environmental objectives

Scottish Water's second draft business plan proposes investment of £845.2 million to meet the environmental objectives set out in the Ministerial Guidance. The breakdown of this investment by sub-category is shown in Table 14.6.

Table 14.6: Breakdown of Table C environmental quality investment into sub-category

Sub-categories	Project cost totals 2006-10
Unsatisfactory Intermittent Discharges	£680.6m
Sewage treatment work	£127.8m
Septic tank upgrade	£12.0m
Sludge treatment centre	£8.3m
IPPC schemes	£9.4m
Landfill Directive	£3.5m
Other minor programme elements	£3.6m
Total 2006-10	**£845.2m**

Over three-quarters of this investment relates to 280[176] schemes to address UIDs. In Ofwat's 2004 final determination for the companies in England and Wales, the total investment in 'AMP4' UIDs amounted to £816 million[177] to deliver 1,932 schemes. The average cost of a UID scheme for Scottish Water's proposals is approximately £2.5 million. This is nearly six times the

[176] This number includes 275 unsatisfactory combined sewer overflow or emergency overflow projects and five unsatisfactory surface water outfalls. It excludes 14 dual manhole projects.
[177] In 2002-03 prices.

average proposed scheme cost of £0.45 million[178] in England and Wales.

Our review of the environmental quality investment in Table C has indicated that the scope of the investment included in the programme has significantly inflated the costs of meeting Ministers' objectives. This involves:

- duplicate projects appearing in the programme;
- inclusion of investment at PPP works; and
- major over-scoping of the requirements of the UID programme.

Removal of duplicate project entries

The Reporter has identified a number of project lines in Table C of the second draft business plan that relate to duplicate entries in the programme. The projects shown in Table 14.7 have been removed from the 2006-10 programme.

Table 14.7: Projects removed from Table C programme

Project autocode	Project title	Project cost totals 2006-10
31187	UID - Duke Street Glasgow	£0.5m
31224	UID - Cairndhu	£1.7m
31258	UID - Cumberland Avenue	£0.5m
31301	UID - Helensburgh	£1.6m
31302	UID - Helensburgh	£0.5m
31304	UID - Sinclair Street	£0.5m
31308	UID - Gallowgate	£0.6m
31337	UID - Helensburgh No 5	£0.6m
31338	UID - Helensburgh No 6	£0.6m
31387	UID - Ladywell School	£0.5m
31393	UID - Barassie	£5.4m
31410	UID - Meadowhead	£15.9m
31457	UID - Helensburgh outfall No 4	£0.7m
31534	UID - Skellyton	£0.5m
31535	UID - Skellyton	£8.0m
31536	UID - Skellyton	£0.5m
31566	UID - Helensburgh	£0.8m
31570	UID - The Pavillion	£10.4m
	Total 2006-10	**£49.8m**

Removal of PPP schemes

Scottish Water has included capital investment at PPP waste water treatment schemes in its investment programme. We have sought legal advice on the contractual arrangements for these schemes. This advice indicated that, while contractual arrangements vary between sites, there may be scope to investigate whether or not Scottish Water is responsible for meeting the costs of the required improvements at these sites. It is also likely that, for both legal and practical reasons, it would not be possible for Scottish Water to own assets at PPP sites.

We have therefore concluded that the requirements for additional outputs at PPP sites would either be funded by the PPP contractors through existing contractual arrangements or through extensions of the existing contracts. We have therefore removed this funding from the baseline investment programme and allowed Scottish Water additional PPP operating costs. The PPP projects that have been removed and their associated costs are shown in Table 14.8.

Table 14.8: PPP projects removed from the investment programme[179]

Category/ autocode	Project title	Table C 2006-10 project cost
Waste water treatment		
30515	Meadowhead W.W.T. Service	£15.1m
30905	Stevenston WWT Service (PFI STW) Upgrade	£12.9m
UIDs		
31411	Meadowhead Treatment Works Irvine	£21.2m
31551	Stevenston WWTP PFI F.F.T CSO	£8.6m
Sludge treatment		
30516	Meadowhead/Stevenson/Inverclyde - STC	£8.3m
	Total	**£66.0m**

In assessing the appropriate level of operating costs to allow Scottish Water, we have made a generous provision of just under £50 million of capital expenditure[180] and assumed operating costs of 2% of the capital cost. We have used the Ofwat allowed rate of return for the private sector water industry south of the border.

[178] In 2003-04 prices, assuming capital inflation of 5.46% from 2002-03 to 2003-04.
[179] Project 31410 (Meadowhead UID) also comprises investment at a PPP works that has already been removed as duplication.
[180] In setting the £50 million allowance for capital expenditure, we have taken account of both the scope for efficiency (see later in this chapter) and a small allowance to reflect the likely over-scoping of the required investment.

Scottish Water's proposed environmental quality programme, after removal of duplications and PPP schemes, is shown in Table 14.9.

Table 14.9: Environmental quality investment after removal of duplications and PPP schemes

Sub-categories	Project cost totals 2006-10
Unsatisfactory Intermittent Discharges	£601.0m
Sewage treatment work	£99.9m
Septic tank upgrade	£12.0m
Sludge treatment centre	£0.0m
IPPC schemes	£9.4m
Landfill Directive	£3.5m
Other minor programme elements	£3.6m
Total 2006-10	**£729.3m**

UID programme

The Reporter's review of Scottish Water's proposed investment in UIDs indicated a number of significant concerns relating to the scoping and costing of the programme. These included:

- the use of a generic approach to develop solutions, with no allowance for the possible development of integrated catchment solutions;
- insufficient modelling work being carried out accurately to size the required solution – this was particularly the case for the three major catchments that impact on the programme for Quality & Standards IIIa;
- a particular concern regarding the algorithm that was used to generate storage volumes for CSOs impacting on bathing and shellfish waters;
- high unit costs for schemes;
- concerns about the assessment of interconnecting pipework costs; and
- concerns about the percentage of on-costs applied to the UID programme.

We also analysed the cost of remedying UIDs south of the border and concluded that the proposed investment programme in Scotland seemed unduly large. The views of the Reporter and our own analysis led us to ask our independent engineering consultants to carry out a detailed review of the proposals. They undertook a comprehensive study of a representative sample of 40 of the UID schemes. They concluded that there was evidence of very significant over-scoping of the UID requirements. In particular, they found that:

- the use of a generic approach to costing was resulting in significant over-scoping of requirements;
- the assumptions underpinning the costing methodology resulted in significant over-scoping;
- inconsistent base information was used in the calculations;
- the formula for costing schemes with a bathing water driver was statistically flawed – this had led to oversized storage and compensation volumes; and
- there was no strategic approach to determining the investment requirements.

Examples of over-scoping of requirements included the following:

- The proposed solution for one UID project with an estimated cost of over £10 million was to fit a 1,120m^3 storm tank and screen. Faber Maunsell concluded that the scheme as presented did not require a storage solution.
- An allowance at every site for a 50 metre x 4.5 metre access road and hard standing of 25m^2. In many cases the sites are on or adjacent to existing sites and roads.
- An assessed cost of £2.4 million for a storage volume of 70m^3, equivalent to a standard double garage.

Examples of issues concerning base information included a project with a reported 'pass forward flow'[181] of 0.001litres/second. This flow would take five minutes to fill a soft drink can. Such a low flow would seem to be unlikely and is either an error in information or of measurement.

[181] This is the flow which passes downstream in the continuation pipe. Excess flows will be spilled over the weir and discharged to the receiving water body. The pass-forward flow at the point of first spill is referred to as the 'setting'.

Faber Maunsell identified concerns about Scottish Water's technical information at an early stage of their assessment. We sought to confirm the accuracy of the information with Scottish Water. In its initial response[182], Scottish Water stated that:

"Through each stage in the development of the UID programme, Scottish Water has subjected the data to checks. This has included checks back to drainage area studies where appropriate. In several instances apparent anomalies from high-level checks have been investigated further and retained in the data set. Whilst it is never possible to state that there are no errors, we believe that we have undertaken appropriate checks."

We responded with a detailed enquiry pointing out the information about which we had concerns. Scottish Water later responded to confirm that there were, indeed, a number of issues with its information submission. This would appear to confirm the view that the UID programme assessment had suffered from poor quality information.

As an example of the lack of a strategic approach to determining the investment requirements in this area, Faber Maunsell commented on a scheme in Penicuik that:

"There is a desperate need for an overall strategy in respect to storage and screening requirements in view of the fact that there are many combined sewer overflows within the general locality. No such strategy has been demonstrated."

The lack of a strategic approach was evident throughout the programme and particularly for the three large catchments at Irvine (Meadowhead), Stevenston and Portobello, which make up around 65% of the Quality & Standards IIIa UID programme.

In assessing the representative sample of projects, Faber Maunsell used broadly similar scoring system to that described above for water treatment works. They assessed the sites on the basis of the need for the project, the extent of strategic assessment of options and the extent of over-scoping of requirements. Based on their representative sample, Faber Maunsell concluded that the extent of over-scoping in the programme was sufficient to justify a reduction in the estimated costs of 58%.

We therefore concluded that the investment required on UIDs to meet the Ministers' environmental objectives is significantly lower than Scottish Water's assessment of £601 million[183].

Scottish Water is also fixing many UIDs during Quality and Standards II. A review of the Quality and Standards II baseline investment programme would suggest that a current unit cost of £0.42 million would be appropriate. This estimate includes an adjustment of the pre-efficiency amount that was made available to the three authorities for both the scope for efficiency and the impact of capital expenditure inflation since 2000-01. In England and Wales, the average pre-efficiency cost of 'AMP4' UID schemes in company submissions was £0.45[184] million. This would give a total programme cost of £126 million[185]. We consider that this represents the current lowest realistic pre-efficiency cost of the UID programme. Based on their assessment of a representative sample of Scottish Water's UID programme, our engineering consultants have estimated the cost of Scottish Water's programme, properly scoped, to be around £252 million[186]. This represents the highest estimated pre-efficiency cost for the UID programme.

Both the Reporter and our independent engineering consultants identified that effective delivery of the UID programme would require detailed modelling to demonstrate the interaction of discharges from the waste water systems and the receiving waters. This was particularly the case for the three major catchments that dominate the programme. The Reporter proposed that addressing the problems in these catchments should be

182 Email from Scottish Water to this Office, 20 May 2005.
183 After removal of duplications and PPP works.
184 Inflated to 2003-04 prices.
185 After removal of duplications and PPP works and assuming 280 UID schemes.
186 Based on the assessed reduction of 58% of the total UID programme cost, after the removal of duplications and PPP works.

postponed until the next regulatory control period.

After consultation with SEPA, we have allowed a further provision of £6 million for Scottish Water to carry out detailed modelling and study work to identify the optimum solutions for these catchments. We will require Scottish Water to demonstrate that this work has been completed to the satisfaction of SEPA and the Reporter, before investment in these catchments proceeds. Investment of £83 million to £167 million, representing the proportion of UIDs to be fixed in the three catchments of Meadowhead, Stevenston and Portobello, may only be committed after these studies have been agreed and completed.

In the event that the strategic studies indicate that extensive re-sewering is required in the catchment, this would be addressed either in an interim determination or in the next Strategic Review of Charges. Accordingly, our investment allowance for the catchments of Meadowhead, Stevenston and Portobello is a notified item for this review.

We have also noted that the projects associated with the Glasgow Strategic Drainage Plan (GSDP) are subject to strategic modelling. We will require Scottish Water to identify and present to the GSDP partners all of the Quality and Standards III schemes that exist within the Glasgow and Greater Glasgow drainage catchment areas, in order that key strategic drainage schemes are developed in a sustainable and cost efficient basis

Outcome of our assessment

Our conclusion on the appropriate scope of investment to meet the Ministers' objectives for improvements in environmental compliance is shown in Table 14.10.

We have accepted the Reporter's overall views on other aspects of the environmental quality programme and have decided that there is no need for a scoping adjustment to the proposed investment at sewage treatment works, septic tanks, surface water outfalls, IPPC schemes, landfill directive investment or other minor elements of the programme.

Table 14.10: Outcome of our assessment of environmental quality investment requirements (pre-efficiency)

Sub-categories	Adjusted Table C project cost totals 2006-10	Highest estimated cost	Current lowest realistic cost
Unsatisfactory Intermittent Discharges	£601.0m	£252.4m	£126.0m
Study work		£6.0m	£6.0m
UID sub-total		£258.4m	£132.0m
Sewage treatment work upgrade	£99.9m	£99.9m	£99.9m
Septic tank upgrade	£12.0m	£12.0m	£12.0m
IPPC schemes	£9.4m	£9.4m	£9.4m
Landfill Directive	£3.5m	£3.5m	£3.5m
Other minor programme elements	£3.6m	£3.6m	£3.6m
Total 2006-10	**£729.3m**	**£386.8m**	**£260.4m**

Review of planned investment on development constraints and first time connection

Scottish Water's second draft business plan proposes investment of £221 million to meet demand for new network capacity from new housing and businesses. It also proposes £70 million for the first time connection of existing properties to the public water and waste water networks. This is set out in Table 14.11.

Table 14.11: Breakdown of Table C development constraints and first time connections investment

Sub-categories	Project cost totals 2006-10
Development constraints Part 3	£66.9m
Development constraints Part 4	£144.0m
Development constraints water resources	£10.4m
Total development constraints[187]	**£221.4m**
First time provision Part 3	£40.2m
First time provision Part 4	£29.9m
Total first time provision[188]	**£70.0m**

Development constraints

Ministers set an objective that sufficient strategic capacity should be made available to accommodate 60,000 new homes and 2,025 hectares of new

[187] Totals do not add due to rounding.
[188] Totals do not add due to rounding.

commercial land to be connected to the public water and waste water networks.

Costs in this area have been split between 'Part 3' and 'Part 4' assets for both water and waste water. There is also an element for additional water resources to meet perceived increased demand. Part 3 assets relate to local network reinforcement costs associated with new development, such as increased capacity on water mains, sewers, service reservoirs or pumping stations. Part 4 assets include treatment works, reservoirs or outfalls.

The Scottish Executive is developing regulations in line with the requirements set out in the Water Environment and Water Services Act 2003. These regulations will require Scottish Water to be responsible for funding all Part 4 costs and providing a 'reasonable cost' contribution to Part 3 costs. Although the exact level of the reasonable cost contribution has yet to be determined, it is likely to be based on an assessment of the future income generated by the new connection and to be broadly in line with the situation in England and Wales.

The Reporter and our engineering consultants conducted a detailed review of the methodology employed by Scottish Water to estimate the investment required to release development constraints. Particular comments included the following:

Part 4 expenditure

- Current levels of leakage have been assumed. No allowance has been made for leakage reduction to meet increasing demand. We have allowed an additional £40 million[189] for improved leakage control in this draft determination.

- Scottish Water's estimate of water demand from industrial/commercial properties appears high and is inconsistent with comments in its business plans about the revenue base.

- Particularly for its smaller waste water treatment works, Scottish Water does not have good quality flow and load data on which to determine whether works are overloaded or not.

- Scottish Water has included PPP works in its assessment of upgrade costs.

- Due to the methodology employed, the levels of expenditure requirement generated by relatively small developments are high.

- Scottish Water's projections of capacity restrictions are being made against a background of a forecast decline in population in Scotland.

Part 3 expenditure

- Scottish Water has calculated the reasonable contribution to Part 3 household costs as a 12-year net present value calculation based on the average charge for customers. A real discount rate of 0.72% was used, based on the proposed WICS rate of return on the regulatory capital value.

- For industrial/commercial properties a contribution of £23,600 per hectare has been used. The basis for this contribution is uncertain. Scottish Water has assumed that the full contribution would be payable whenever the site is constrained.

- A constraint has been defined as a service reservoir having less than 12 hours storage time or a CSO that has either been deemed as unsatisfactory or has been subject to a sewer flooding incident.

- No account has been taken of the CSOs being upgraded or improved under other categories of the investment programme or of the internal flooding issues being addressed in Quality and Standards II and III.

Resources

- Scottish Water has not related actual identified development constraint areas to constrained water resource zones. It is not possible, therefore, to identify whether or not water resource issues will arise in practice. Scottish Water has assumed that

[189] See Chapter 13 of this volume.

75% of the new development will be in water resource areas with potential deficiencies, whereas only 50% of water resource areas are in deficit against Scottish Water's desired standard.

- Scottish Water has assumed that 50% of domestic developments and 90% of industrial/commercial developments will provide new demand within the zone. These figures appear very high, particularly given the current trends in overall population and economic growth. It is not clear whether these figures are consistent with the revenue base projections that are contained in Scottish Water's draft business plans.

The Reporter concluded that Scottish Water's estimates of the nature of (and the cost of resolving) development constraints were very uncertain.

Our assessment of funding requirements for development constraints

Scottish Water's proposed investment in this area appears to be high. In particular we note the following:

- Part 4 costs included investment relating to capacity at PPP works. We consider that if such investment is required, it should be met either under the existing contract or through a contractual amendment[190].
- Scottish Water's modelling of the actual requirements has been limited. This is likely to result in over-scoping of requirements.
- Scottish Water's assessment appears not to have taken account of synergies with other parts of the investment programme, such as leakage control, water treatment works upgrades and the UID programme.
- The assessment of costs appears to use 'worst case' scenarios in areas such as the likely level of reasonable cost contributions and the extent of water resource upgrades that are required.
- The Scottish Executive has also commented that it is expected that a recently agreed Memorandum of Understanding between SEPA and Scottish Water should reduce the level of constraint at a number of waste water treatment works.

Scottish Water has assumed a very low discount rate (0.72%) in its assessment of the value of a new customer. This has resulted in the value of the customer being exaggerated and therefore the reasonable cost contribution overstated. This discount rate is consistent with the post-tax real discount rate that we have allowed Scottish Water in this draft determination (before our increased allowance for embedded debt). However, it is not clear that this rate should be used in the calculation of the value of a customer. Using a rate of 0.72% gives the connecting customer the benefit of both the public sector cost of capital and the benefit of the tax shield on Scottish Water's borrowing. We consider that this significantly overvalues the future value of revenues from new customers.

We have therefore decided that the discount rate should be in the range 2.1%, which is the real pre-tax cost of capital, and 4.25% which is based on the methodology applied in England and Wales (6.75% cost of capital minus 2.5% for inflation). This reduces the contributions payable under Part 3 by between 8.3% and 19.3%.

In its methodology for assessing Part 3 costs, Scottish Water has used the approach that is currently adopted south of the border to assess the likely level of the contribution. However, it has not included the infrastructure charge that is normally paid for connecting to the water and sewerage system south of the border. To be properly consistent with an approach that uses the England and Wales model, the contribution to Part 3 costs should be stated net of the infrastructure charge that would be payable. This net amount is the cost that has to be met by the existing customer base. If we assume the average England and Wales charge of £250 for both water and waste water, this equates to a £30 million contribution for 60,000 houses. We have not included an infrastructure charge for commercial property. Such a charge would further reduce the net contribution that has to be made by existing customers.

We have not sought to challenge Scottish Water's assumptions on the extent to which contributions will be required.

[190] Our understanding is that most PPP contractors would earn more if they treated more effluent.

If, in practice, Scottish Water's efficiently incurred level of reasonable cost contributions is higher than our estimate, we would expect Scottish Water to seek an interim determination. The regulations relating to connection costs are a notified item in this draft determination.

Based on the comments provided by the Reporter and our independent engineering consultants, we consider that the allowance for Part 4 costs for both water and waste water, and for water resources, should be reduced by between 15% and 25%. Our view is that the investment identified by Scottish Water has taken insufficient account of opportunities for leakage reduction and the benefits of both Quality and Standards II investment and that proposed elsewhere under this programme. Moreover, the investment includes investment at PPP sites and appears in many instances to be over-scoped.

These changes give a highest estimated cost for development constraints (pre-efficiency) of £193 million and a current lowest realistic cost of £170 million[191].

First time provision

We have reviewed the Reporter's and our independent engineering consultant's comments on Scottish Water's proposed investment for first time provision of water and waste water services to existing houses.

We have noted similar concerns to those expressed for development constraints above. In particular, the assessment of the Part 3 reasonable cost contribution has been carried out on a similar basis. We therefore propose to reduce the investment requirement to compensate for the contribution from the infrastructure charge and a more appropriate discount rate. In the absence of information on the likely number of properties to be involved, we have assessed the likely level of infrastructure charge contribution on a pro-rata basis from the development constraint funding proposals[192].

We have also reduced the investment required for Part 4 constraints by between 15% and 25%, consistent with our approach for development constraints and for the same reasons. We note, however, that first time provision for water does not appear to form part of the Ministerial Guidance of February 2005. We will therefore require confirmation from Scottish Water that this investment is associated with meeting the Ministers' objectives.

The highest estimated cost for first time provision then becomes £62 million and the current lowest realistic cost £55 million[193].

A summary of our assessment of the pre-efficiency baseline investment programme for expenditure on development constraints and first time provision is shown in Table 14.12.

[191] Both costs include a £30 million contribution from connecting customers through the infrastructure charge.
[192] Scottish Water has proposed a total of £211 million for development constraints and £70 million for first time provision. On a pro-rata basis, the £30 million infrastructure charge income for development constraints becomes £10 million for first time provision.
[193] Both costs include a £10 million contribution from connecting customers through the infrastructure charge.

Table 14.12: Outcome of our assessment of development constraints and first time connections investment requirements (pre-efficiency)

Sub-categories	Original Table C project cost totals 2006-10	Highest estimated cost	Current lowest realistic cost	Contribution from connecting customers (infrastructure charge)	Highest estimated cost - contribution from customer base	Currrent lowest realistic cost - contribution from customer base
Development constraints Part 3	£66.9m	£61.4m	£54.0m	£30.0m	£31.4m	£24.0m
Development constraints Part 4	£144.0m	£122.4m	£108.0m		£122.4m	£108.0m
Development constraints water resources	£10.4m	£8.9m	£7.8m		£8.9m	£7.8m
Total development constraints	**£221.4m**	**£192.7m**	**£169.9m**	**£30.0m**	**£162.7m**	**£139.9m**
First time provision Part 3	£40.2m	£36.9m	£32.4m	£10.0m	£26.9m	£22.5m
First time provision Part 4	£29.9m	£25.4m	£22.4m		£25.4m	£22.4m
Total first time provision	**£70.0m**	**£62.2m**	**£54.8m**	**£10.0m**	**£52.3m**	**£44.9m**
Total for growth investment	**£291.4m**	**£254.9m**	**£224.7m**	**£40.0m**	**£214.9m**	**£184.7m**

Review of planned investment on customer service

Scottish Water's second draft business plan proposes £84.1 million of investment to meet Ministers' objectives for improvements to customer service, as shown in Table 14.13.

Table 14.13: Breakdown of Table C customer service investment

Sub-categories	Project cost totals 2006-10
Pressure management	£5.7m
Odour management	£19.1m
Business metering	£0.7m
Sewer flooding	£58.6m
Total 2006-10	**£84.1m**

Our review of costs for pressure management and sewer flooding indicates that they are broadly consistent with pre-efficiency costs in England and Wales. Odour management costs are subject to some uncertainty given that the process for identifying the 35 sites to be addressed under Quality and Standards III is still underway. We have therefore concluded that we will not make any reductions to the scope of investment in these areas.

Business metering costs have been excluded because we have separately allowed metering costs and capital costs relating to the separation of retail activities. We have added £15 million to cover the capital cost of establishing a separate retail entity and facilitating non-household competition in accordance with the requirements of the Water Services etc. (Scotland) Act 2005.

Table 14.14 summarises our assessment of the customer service investment necessary to meet the Ministers' objectives.

Table 14.14: Outcome of our assessment of customer service investment requirements (pre-efficiency)

Sub-categories	Project cost totals 2006-10	Highest estimated cost	Current lowest realistic cost
Pressure management	£5.7m	£5.7m	£5.7m
Odour management	£19.1m	£19.1m	£19.1m
Business metering	£0.7m	£0.0m	£0.0m
Sewer flooding	£58.6m	£58.6m	£58.6m
Introduction of competition	£0.0m	£15.0m	£15.0m
Total 2006-10	**£84.1m**	**£98.4m**	**£98.4m**

Summary of changes to the scope of the investment programme

A summary of the changes to the baseline investment programme resulting from our review process is shown in Table 14.15.

Table 14.15: Summary of the proposed changes to the baseline investment programme

Investment category	Project cost totals 2006-10	Highest estimated cost	Current lowest realistic cost
Drinking water quality	£1063.7m	£752.0m	£569.6m
Environmental	£845.2m	£386.8m	£260.4m
Customer service + initial retail investment	£84.1m	£98.4m	£98.4m
Growth (Contribution from customer base)	£291.4m	£214.9m	£184.7m
Total 2006-10	**£2,284.4m**	**£1,452.2m**	**£1,113.1m**

Efficient delivery of the baseline programme

In the previous sections we established the cost of delivering the required scope of investment in improved quality, network growth and customer service at Scottish Water's current level of efficiency. The next stage in our assessment process is to establish the impact of efficiency improvements on this level of investment.

In Chapter 7, we explained how we use Ofwat's cost base approach to determine the scope for efficiency in the enhancement programme.

Ofwat's approach uses capital works standard costs, or the 'cost base', to assess the relative efficiency of water companies in procuring and implementing capital projects. The cost base is a database of costs, termed 'standard costs' for a wide range of standardised projects, or units of work. These standardised projects are typical of investment in the water industry. There are standardised projects for the water and sewerage services. The standard costs represent the work required to complete the investment programme. Ofwat can compare the standard costs submitted by the water and sewerage companies to assess relative procurement efficiency.

We needed to be sure that the cost estimates in Scottish Water's investment programme were fully consistent with the information contained in Scottish Water's cost base. The detailed list of investment projects and their costs allowed the Reporter and Faber Maunsell to ensure that the cost base is consistent with the costs for the projects in the investment programme.

We commissioned Faber Maunsell to assist with our analysis of relative capital cost efficiency using the cost base approach. Faber Maunsell reviewed the standard costs submitted by Scottish Water to ensure that they were consistent with Scottish Water's investment programme and Ofwat's benchmark costs. When Faber Maunsell were satisfied with the cost information, we assessed the procurement efficiency gap, expressed as a percentage of total investment separated by water and sewerage, infrastructure and non-infrastructure. The cost base factors that resulted from this analysis are shown in column 1 of Table 14.16[194]. Chapter 7 explains how we have calculated the efficiency gap.

[194] Cost base efficiency gap (%).

Table 14.16: Capital efficiency factors applied to the quality, growth and customer service investment for the highest estimated cost investment programme

	Cost base efficiency gap	Reduction required to close 75% of gap	Additional reduction required to match 'continuing improvement' by water companies	Total reduction required
Water				
Infrastructure	23.5%	17.6%	3.7%	20.7%
Non-infrastructure	25.7%	19.3%	3.7%	22.3%
Weighted average	25.6%	19.2%	3.7%	22.2%
Sewerage				
Infrastructure	17.2%	12.9%	4.4%	16.7%
Non-infrastructure	29.8%	22.4%	4.4%	25.8%
Weighted average	22.4%	16.8%	4.4%	20.5%
Combined				
Infrastructure	17.9%	13.4%	4.3%	17.2%
Non-infrastructure	26.7%	20.0%	3.9%	23.1%
Weighted average	**24.2%**	**18.2%**	**4.0%**	**21.4%**

In line with the recommendations of the Competition Commission[195], we have phased the efficiency challenge for Scottish Water over three years. Tables 14.17 and 14.18 set out the impact of the phased reductions on the highest estimated cost investment programme.

Table 14.17: Reductions in the allowed level of capital expenditure (%) for the highest estimated cost investment programme

	% reduction required to achieve efficiency target:			
	2006-07 (25% gap closure)	2007-08 (50% gap closure)	2008-09 (75% gap closure)	2009-10 (75% gap closure)
Water	7.2%	14.4%	21.4%	22.0%
Sewerage	6.6%	13.1%	19.5%	20.3%
Weighted average	**7.0%**	**13.8%**	**20.6%**	**21.2%**

Table 14.18: Reductions in the allowed level of capital expenditure (£m) for the highest estimated cost investment programme

	£m reduction required to achieve efficiency target:			
	2006-07 (25% gap closure)	2007-08 (50% gap closure)	2008-09 (75% gap closure)	2009-10 (75% gap closure)
Water	£7.8m	£29.1m	£47.5m	£51.5m
Sewerage	£5.4m	£20.1m	£32.7m	£35.8m
Total	**£13.2m**	**£49.2m**	**£80.2m**	**£87.2m**

[195] The Competition Commission's consideration of the price limits for Mid Kent Water and Sutton & East Surrey Water Services in 2000.

The cost base factors and their impact on investment depend on the composition of the investment programme. Tables 14.19 to 14.21 repeat the cost base analysis shown in Tables 14.16 to 14.18, this time for the current lowest realistic cost programme.

Table 14.19: Capital efficiency factors applied to the quality, growth and customer service investment for the lowest realistic cost investment programme

	Cost base efficiency gap	Reduction required to close 75% of gap	Additional reduction required to match 'continuing improvement' by water companies	Total reduction required
Water				
Infrastructure	23.5%	17.6%	3.7%	20.7%
Non-infrastructure	25.3%	19.0%	3.7%	22.0%
Weighted average	25.2%	18.9%	3.7%	21.9%
Sewerage				
Infrastructure	18.2%	13.7%	4.4%	17.4%
Non-infrastructure	29.7%	22.3%	4.4%	25.7%
Weighted average	24.2%	18.2%	4.4%	21.8%
Combined				
Infrastructure	19.1%	14.3%	4.3%	18.0%
Non-infrastructure	26.7%	20.0%	3.9%	23.1%
Weighted average	**24.7%**	**18.6%**	**4.0%**	**21.8%**

Table 14.20: Reductions in the allowed level of capital expenditure (%) for the lowest realistic cost investment programme

	% reduction required to achieve efficiency target:			
	2006-07 (25% gap closure)	**2007-08 (50% gap closure)**	**2008-09 (75% gap closure)**	**2009-10 (75% gap closure)**
Water	7.1%	14.2%	21.1%	21.7%
Sewerage	7.1%	14.0%	20.9%	21.6%
Weighted average	**7.1%**	**14.1%**	**21.0%**	**21.6%**

Table 14.21: Reductions in the allowed level of capital expenditure (£m) for the lowest realistic cost investment programme

	£m reduction required to achieve efficiency target:			
	2006-07 (25% gap closure)	**2007-08 (50% gap closure)**	**2008-09 (75% gap closure)**	**2009-10 (75% gap closure)**
Water	£5.6m	£20.8m	£33.9m	£36.8m
Sewerage	£4.4m	£16.3m	£26.5m	£28.9m
Total	**£9.9m**	**£37.1m**	**£60.4m**	**£65.7m**

The lowest estimated efficiency gap averaged over the phased programme is 15.4%. The highest realistic efficiency gap calculated over the entire programme is 20.8%.

As discussed in Chapter 7, the results of the engineering consultants work were reviewed by SMC (Strategic Management Consultants) and by Ofwat. SMC reported that, following Faber Maunsell's review, Scottish Water's cost base coverage and consistency was in line with England and Wales and that our Office had properly carried out all of Ofwat's cost base activities. SMC also commented that the Faber Maunsell audit trails were clear and concise and directed to achieve compliance with Ofwat's guidelines. SMC was satisfied that the level of scrutiny was equivalent to that applied in England and Wales.

We have applied these cost base factors to our range of pre-efficiency baseline investment programme estimates in Table 14.15. We do not, of course, apply these reductions to the Part 3 costs for development constraints and first time provision. These Part 3 costs are payments of reasonable cost to customers and it would not be appropriate to apply an efficiency reduction to them.

Assessment of the level of investment included in the financial model

Scottish Water's investment plan, as outlined in its draft business plans, was significantly larger than we had expected. In our view the Ministers' objectives were clear and consistent with the results of the Quality and Standards III process. It has therefore been important to examine in detail the capital programme that Scottish Water put forward in order to understand why it was so much larger than we expected. We are grateful to Black and Veatch, Faber Maunsell, Ofwat and John Banyard[196] for their comments on the proposed capital programme. Around eight man months[197] of effort have been dedicated to the review of this capital programme. However, it is likely that we will seek to undertake further work on the proposed programme during the next few weeks.

Our initial conclusions are that Scottish Water took a particularly conservative view of what was required, with the result that both the scope and the unit cost of the proposed programme were significantly inflated. However, we are continuing to review the evidence provided by the Reporter and our independent consultants. Likewise, our work with Ofwat on the costing and scoping of the investment programme is on-going.

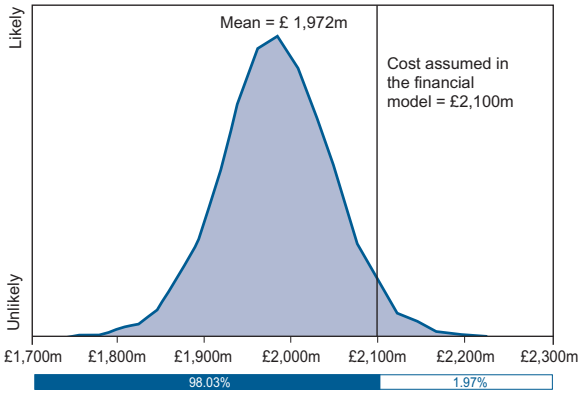
Unless significant new information becomes available, we expect that our assessment of the final level of investment required to meet all of the 'essential' and 'desirable' objectives set by Ministers could be materially lower than the top end of the ranges that we have outlined above.

In setting a level of capital investment for the financial model, we have taken account of the scope for efficiency and the range of investment we believe could be required. We examined each category of capital investment where we had identified a range of possible costs. We assumed that there was only a 5% chance of costs being lower than the minimum values that we identified, and a 5% chance of costs being higher than the maximum values. Where no range was identified, we assumed that the cost value was firm. We carried out a risk analysis that combined the ranges that we had estimated. The result of this analysis was a probability distribution for the cost of the entire capital programme. Figure 14.1 shows this.

[196] John Banyard OBE is an expert in asset management and has advised this Office in the preparation of this draft determination. He was formerly a member of the Board of Severn Trent plc.

[197] A man month is the equivalent of one person working for one month. This does not include work carried out by this Office, the Reporter or Ofwat. Nor does it include work on the cost base.

Figure 14.1: Results of risk analysis on capital investment costs 2006-10



This analysis suggests that, given the ranges we described above, there is less than a 2% chance that the required capital programme will exceed our estimate of £2,100 million (2003-04 prices). This includes Scottish Water's full claim for the Quality and Standards II overhang[198]. We have also taken account of the unsubstantiated claim for capital expenditure efficiency made by the former East of Scotland Water Authority in 2001[199].

We have conducted a thorough review of the proposed capital programme so that customers can benefit from delivery of the objectives set out in the Ministerial Guidance of February 2005 at the lowest reasonable overall cost.

Phasing of the investment

In the financial model we have phased this investment as set out in Table 14.22.

Table 14.22: Phasing of capital investment in the financial model

	2006-07	2007-08	2008-09	2009-10	Total
Capital investment in 2003-04 prices	£484.6m	£516.7m	£534.1m	£564.5m	£2,100.0m
Capital Investment in estimated outturn	£534.3m	£593.0m	£633.3m	£689.5m	£2,450.1m

We believe that this phasing is realistic. Most of the water quality objectives have to be met by the end of year 3 of the regulatory control period. In the absence of this deadline, it is likely that the phasing could have been more skewed towards the latter half of the regulatory control period. This skewing towards the

[198] Adjusted only for inflation in the next regulatory control period. It would not, in our view, be reasonable to ask customers to pay more because of the late delivery of the Quality and Standards II investment programme.
[199] See background in Chapter 6.

latter half of the regulatory control period reflects the need for significant work to define the optimum investment strategy in several areas of the capital programme. By providing targeted funding to carry out study work on the UID programme and address leakage issues, we have sought to compensate for the lack of a skewing towards the latter half of the period.

Summary

Scottish Ministers set Scottish Water clear objectives to improve drinking water quality, environmental performance and customer service over the next regulatory control period. They set both essential objectives (to be delivered irrespective of the implications for customers' bills) and desirable objectives (to be delivered subject to the scope for efficient delivery and subject to prices remaining stable). Customers will wish to be assured that the significant investment required to deliver these objectives is delivering value for money.

Our detailed review of Scottish Water's investment proposals for improved quality, network growth and customer service has identified significant scope for reduction in Scottish Water's assessed cost. This primarily relates to over-scoping of requirements for investment in water treatment works, unsatisfactory intermittent discharges and tackling development constraints. Based on the advice of the Reporter and our independent engineering consultants, we have identified that the quality investment programme may have been over-scoped by up to £1,171 million. In our judgement, based on all of the evidence available to us, it is unlikely that the extent of this over-scoping is less than £832 million.

We have also assessed the scope for Scottish Water to improve the efficiency of its capital delivery. The scope for efficiency is obviously dependent on the make-up of the capital programme. However, our analysis has shown that the scope for improvement is up to 20.8%. The minimum scope for improvement given our analysis of the capital programme is 15.4%.

In this draft determination, we have proposed charge caps that reflect a capital programme of £2,100 million. This includes Scottish Water's claim for the overhang from Quality and Standards II and the unsubstantiated efficiency claim of the former East of Scotland Water Authority. Our analysis has suggested that there is less than a 2% chance that this figure will need to increase – unless significant new information from Scottish Water becomes available.

The result is that this draft determination has financed the delivery of both the essential and desirable objectives that were outlined in February's Ministerial Guidance.

Section 4: Funding capital expenditure
Chapter 15: Summary of capital expenditure allowed to deliver the Ministers' objectives

Introduction

In Chapter 7 we explained our approach to reviewing the capital programme and ensuring that the programme would deliver the Ministers' objectives for the water industry in Scotland. In Chapters 13 and 14 we explained in detail how we have set the level of expenditure that we have included in this draft determination. Our analysis took account of both the scope for efficiency and the initial conclusions of our detailed programme review. It is important to emphasise that we have not amended or limited the Ministers' objectives for the industry. We have allowed sufficient capital expenditure to meet all of the essential and desirable objectives set out in February's Ministerial Guidance.

This chapter summarises the results of the previous two chapters. It draws together detailed information about what Scottish Water included in the investment plan contained in its second draft business plan and the allowed level of capital expenditure that we have included in this draft determination.

Capital maintenance

In its second draft business plan, Scottish Water said that it needed total capital maintenance of £1,085 million. A proportion of this capital maintenance was required to facilitate the delivery of the quality and growth programme. We have assessed the highest estimated level of capital maintenance required as £780 million and the current lowest realistic level as £647 million.

In setting capital maintenance at this level we have been conscious of the need for Scottish Water to improve its understanding of its assets. We have also taken account of the spend to save allowance that we made available to Scottish Water in the Strategic Review of Charges 2002-06. One of the purposes of allowing spend to save was to finance the required improvement in asset knowledge.

In Table 15.1 we have set out the capital maintenance that Scottish Water included in its second draft business plan. We have also set out the level of capital maintenance that we have allowed.

Table 15.1: Allowed level of capital maintenance 2006-10

	2006-07	2007-08	2008-09	2009-10	Total
Scottish Water Business plan					
Water Service	£145.8m	£168.8m	£215.8m	£164.8m	**£695.2m**
Wastewater Service	£94.4m	£91.1m	£99.5m	£104.5m	**£389.6m**
Total	£240.3m	£259.9m	£315.3m	£269.3m	**£1,084.8m**
Draft Determination					
Capital Maintenance current lowest realistic	£90.9m	£171.1m	£187.3m	£197.6m	**£646.9m**
Capital Maintenance highest estimated	£109.6m	£206.3m	£225.9m	£238.3m	**£780.01m**

Water quality investment

In its second draft business plan, Scottish Water said that it needed to invest £1,064 million to meet the water quality standards set out in the Ministerial Guidance. This amount was sufficient to deliver both the essential and the desirable objectives set by the Ministers. We have established the highest estimated cost of water quality investment as £636 million and the current lowest realistic cost as £451 million.

In Table 15.2 we set out the water quality investment that Scottish Water included in its second draft business plan. We also set out the level of water quality investment that we have allowed.

Table 15.2: Allowed level of water quality investment 2006-10

	2006-07	2007-08	2008-09	2009-10	Total
Scottish Water Business plan					
Water quality	£100.6m	£244.6m	£549.0m	£169.5m	**£1,063.7 m**
Draft Determination					
Currrent lowest realistic cost	£63.4m	£119.3m	£130.6m	£137.8m	**£451.1m**
Highest estimated cost	£89.4m	£168.3m	£184.2m	£194.3m	**£636.2m**

Waste water quality investment

In its second draft business plan, Scottish Water said that it needed to invest £845 million to meet the waste water quality improvement objectives that were set by the Ministers. These investment objectives can be divided into addressing unsatisfactory intermittent discharges (UIDs), investment in improving sewage treatment works and other waste water activities. We have assessed the highest estimated cost of this investment at £327 million and the current lowest realistic cost at £206 million.

In Table 15.3 we set out the investment in waste water improvements that Scottish Water included in its second draft business plan. We also set out the level of waste water investment that we have allowed.

Table 15.3: Allowed level of waste water improvement investment 2006-10

	2006-07	2007-08	2008-09	2009-10	Total
Scottish Water Business plan					
UIDs	£11.1m	£23.5m	£211.5m	£434.5m	£680.6m
Sewage treatment works	£4.0m	£10.1m	£56.4m	£57.3m	£127.8m
Other	£4.9m	£6.6m	£14.6m	£10.8m	£36.8m
Waste water quality total	**£19.9m**	**£40.2m**	**£282.5m**	**£502.6m**	**£845.2m**
Draft Determination					
Waste water quality current lowest realistic	£29.0m	£54.5m	£59.7m	£63.0m	**£206.2m**
Waste water quality highest estimated	£46.0m	£86.5m	£94.8m	£99.9m	**£327.2m**

This includes a provision of £6 million (pre-efficiency) for Scottish Water to carry out modelling work for three large UID catchments around Meadowhead, Stevenston and Portobello. Investment at these catchments may only proceed after these studies have been agreed and completed.

Customer service investment

In its second draft business plan, Scottish Water said that it needed to invest £84 million to meet customer service investment objectives set by the Ministers. These objectives relate primarily to issues such as addressing odour concerns, improving water pressure and tackling sewer flooding We have assessed the highest estimate of this investment at £83 million and the lowest realistic cost at £78 million. This includes an additional £15 million to address the investment requirements, which result from the introduction of the Water Services etc. (Scotland) Act 2005.

In Table 15.4 we set out the investment in customer service outputs that Scottish Water included in its second draft business plan. We also set out the level of investment that we have allowed.

Table 15.4: Allowed level of customer service investment 2006-10

	2006-07	2007-08	2008-09	2009-10	Total
Scottish Water Business plan					
Customer service	£9.4m	£29.6m	£25.8m	£19.3m	**£84.1m**
Draft Determination					
Currrent lowest realistic cost	£17.8m	£19.9m	£19.6m	£20.6m	**£78.0m**
Highest estimated cost	£19.0m	£21.3m	£20.9m	£22.1m	**£83.3m**

Investment in growth and relieving development constraints

In its second draft business plan, Scottish Water said that it needed to invest £291 million in relieving development constraints and providing first time connections to the network. We have assessed the highest estimated cost of this investment at £191 million and the lowest realistic cost at £156 million. This is a larger proportion of any capital programme than is currently funded south of the border.

In Table 15.5 we set out the investment in relieving development constraints and providing first time connections to the network that Scottish Water included in its second draft business plan. We also set out the level of investment that we have allowed. 'Part 3' contributions have been set to reflect the requirements of the statutory instrument that the Scottish Executive will introduce in due course and have not been subject to an efficiency challenge.

Table 15.5: Allowed level of investment in relieving development constraints 2006-10

	2006-07	2007-08	2008-09	2009-10	Total
Scottish Water Business plan					
Development Constraints 'Part 3'	£6.4m	£19.7m	£20.1m	£20.7m	£66.9m
Development Constraints 'Part 4'	£14.4m	£43.2m	£43.2m	£43.2m	£144.0m
Development Constraints Water Resources	£1.0m	£3.1m	£3.1m	£3.1m	£10.4m
Total Development Constraints	**£21.9m**	**£66.0m**	**£66.5m**	**£67.1m**	**£221.4m**
First Time Provision 'Part 3'	£4.0m	£12.0m	£12.1m	£12.1m	£40.2m
First Time Provision 'Part 4'	£3.0m	£9.0m	£9.0m	£9.0m	£29.8m
Total First Time Provision	**£7.0m**	**£21.0m**	**£21.0m**	**£21.0m**	**£70.0m**
Total growth	**£28.9m**	**£87.0m**	**£87.5m**	**£88.1m**	**£291.4 m**
Draft Determination					
Total growth current lowest realistic	£21.9m	£41.2m	£45.2m	£47.6m	**£156.0m**
Total growth highest estimated	£26.8m	£50.5m	£55.3m	£58.3m	**£190.8m**

Our assessment of 'Part 3' costs does not include an extra contribution from connectees of £40 million. Investment in meeting development constraints should be agreed with the Capital Monitoring Group.

Investment at PPP sites

In its second draft business plan, Scottish Water said that it needed to invest some £66 million at or adjacent to PPP sites in order to meet the objectives set by the Minister. We have allowed this investment after adjustments for efficiency and taking account of the scope for funding through amendments to the existing PPP contracts. This has been funded through an increase in the allowed level of PPP operating costs.

Conclusion

In its second draft business plan, Scottish Water said that it needed to invest £3,369 million over four years. This would have been more than 20% larger than the largest four-year investment programme ever delivered in the water and sewerage industry in the UK. We have identified significant over-costing and over-scoping of the investment programme. In addition, analysis of Scottish Water's cost base suggests that there is significant scope to improve its efficiency.

We have taken these factors into account in setting an appropriate level of capital expenditure. We have established the highest estimated total allowable capital expenditure as £2,216 million and we have also established the current lowest realistic allowable capital expenditure as £1,736.2 million. These figures include an allowance of £198.1 million for the completion of Quality and Standards II as discussed in Chapter 6.

We summarise the allowed investment in Table 15.6.

Table 15.6: Allowed level of capital expenditure 2006-10

	2006-07	2007-08	2008-09	2009-10	Total
Draft Determination					
Capital Maintenance current lowest realistic	£90.9m	£171.1m	£187.3m	£197.6m	£646.9m
Capital Maintenance highest estimated	£109.6m	£206.3m	£225.9m	£238.3m	£780.0m
Water Quality current lowest realistic	£63.4m	£119.3m	£130.6m	£137.8m	£451.1m
Water Quality highest estimated	£89.4m	£168.3m	£184.2m	£194.3m	£636.2m
Waste Water Quality current lowest realistic	£29.0m	£54.5m	£59.7m	£63.0m	£206.2m
Waste Water Quality highest estimated	£46.0m	£86.5m	£94.8m	£99.9m	£327.2m
Customer Service current lowest realistic	£9.3m	£17.5m	£19.1m	£20.2m	£66.1m
Customer Service highest estimated	£9.9m	£18.7m	£20.4m	£21.6m	£70.6m
Growth current lowest realistic	£21.9m	£41.2m	£45.2m	£47.6m	£156.0m
Growth highest estimated	£26.8m	£50.5m	£55.3m	£58.3m	£190.8m
Introduction to competition lowest estimated	£8.5m	£2.4m	£0.5m	£0.5m	£11.9m
Introduction to competition highest estimated	£9.1m	£2.6m	£0.5m	£0.5m	£12.7m
Total Quality and Standards III current lowest realistic	£222.9m	£406.1m	£4,42.4m	£466.7m	£1,538.2m
Total Quality and Standards III highest estimated	£290.8m	£532.8m	£5,81.1m	£612.9m	£2,017.5m
Overhang from Quality and Standards II	£224.6m	£28.4m	-	-	£253.0m
ESWA unsubstantiated efficiency adjustment	-£14.4m	-£13.9m	-£13.5m	-£13.1m	-£54.9m
Grand Total current lowest realistic	**£433.2m**	**£420.6m**	**£428.9m**	**£453.5m**	**£1,736.2m**
Grand Total highest estimated	**£501.0m**	**£547.3m**	**£567.5m**	**£599.8m**	**£2,215.6m**

Section 4: Funding capital expenditure
Chapter 16: Depreciation

Introduction

Depreciation is the mechanism by which we recognise that the effectiveness and value of assets declines over time. This is a cost that should be borne by customers as they receive the benefit from use of the assets. Although effective asset management can help to reduce asset replacement costs, depreciation will continue to have a major impact on customers' bills.

From a regulatory point of view, the depreciation policy of the water and waste water business has to strike a balance between current and future customers. We therefore allow for an appropriate depreciation charge to be recovered from customers' charges.

There are two types of depreciation charge:

- a standard depreciation charge on the non-infrastructure assets (treatment plants, offices, vans, computers etc); and
- an infrastructure renewals charge for infrastructure assets (essentially the water mains and sewers).

In Chapter 13, we explained how we have established the infrastructure renewals charge for this draft determination. In this chapter we explain how we have established the depreciation charge for non-infrastructure assets. We have used the same approach to non-infrastructure depreciation as Ofwat uses for the water and waste water companies in England and Wales.

The depreciation charge has a direct impact on the prices that customers pay. The higher the charge, the higher the price to customers; the lower the charge, the lower the price to customers. The charge should reflect the cost of maintaining the above ground assets in a sustainable and serviceable manner. It is, therefore, important that Scottish Water's depreciation policy accurately reflects the diminishing value of the assets over time.

In this chapter we first discuss the importance of setting an accurate depreciation charge. We then look at different approaches to establishing the depreciation charge and the resulting range of values for Scottish Water. Finally we explain our view of the appropriate depreciation charge for Scottish Water.

The importance of depreciation in this Strategic Review

In our methodology consultation[200], we explained why an accurate understanding of the cost of asset use is vital to setting charges under the RCV approach.

In the Strategic Review of Charges 2002-06 we used a 'cash balancing' method to establish a revenue cap. Since the depreciation charge is not a cash item, it had no overall effect on the final revenue cap. As we move towards the RCV approach to charge setting, the level of depreciation will influence the calculation of the required level of revenue.

Depreciation influences Scottish Water's revenue requirement in two main ways:

- It is deducted from the RCV as it represents the amount by which the value of the assets has fallen. Assuming a constant rate of return, a reduction in the RCV reduces Scottish Water's revenue requirement.
- The depreciation charge is one component of the revenue requirement. It is added to the cash return on the RCV, PPP and operating costs to determine the revenue requirement.

Calculating the depreciation charge

Establishing the appropriate depreciation charge for an asset involves three critical elements:

- estimating the asset's useful life;
- the choice of depreciation method; and
- valuing the asset.

Estimating the asset's useful life.

This is the expected number of years that an asset will last. The estimated useful life of an asset in the water

[200] See Volume 3 of our methodology 'Our work in regulating the Scottish water industry: The calculation of prices', Chapters 3 and 10.

industry can range from a few years to several decades.

Determining the estimated useful life of an asset is not an exact science and is often based on an engineering judgement. Most organisations are able to draw on benchmarks from within their own industries and this provides a degree of consistency.

The choice of depreciation method

There are a number of different depreciation methods[201]. The two most commonly used are 'straight-line' and 'reducing balance'. The straight-line depreciation method spreads the cost of using the asset evenly throughout its life. The reducing balance depreciation method assumes that the cost of use is higher in the initial years of the asset's life.

In many industries, the choice of depreciation profile is important. The water and waste water industry has very many assets, and new assets are being built each year. The range of asset types and ages will tend to smooth out the impact of the choice of depreciation method. This is known as the portfolio effect. Let us assume, for example, that a service provider has 30 treatment works, each of which is valued at £100 million and is expected to have a useful life of 30 years. If one works is built each year, the annual depreciation charge will be the same whether the company chooses to use the straight-line depreciation method or the reducing balance depreciation method.

As Scottish Water has nearly 400 water treatment works and around 1,900 waste water treatment works, the portfolio effect should minimise the risk that the method of depreciation that is chosen for an individual asset might have a significant impact on the total depreciation charge for Scottish Water.

Valuing the asset

There are two principal ways to value a fixed asset – based on its current or historic (purchase) cost. Current cost revalues the asset each year such that its gross (undepreciated) value should be broadly equivalent to the current price of replacing the asset. The historic cost simply considers the acquisition cost of the asset to be its value throughout its life. The method chosen has a significant impact when assessing depreciation.

Current cost accounting principally involves establishing the current value of the asset to the business. This can be obtained in one of three ways:

- **Modern Equivalent Asset (MEA) valuation**

  Ofwat defines the gross MEA value as representing the cost to replace an old asset with the same service capability, allowing for any difference both in the quality of the output and in operating costs. Net MEA value is the gross value net of accumulated depreciation[202].

  MEA valuation is most suited for industries that use long-lived assets where the technology behind these assets is steadily evolving. In such industries, using the acquisition cost of the asset could inflate its value as, through time, technology advancements will provide lower cost and higher quality solutions.

- **Net realisable value (NRV)**

  If the proceeds obtained through disposing of the asset are higher than the MEA value, the NRV should be used to value the asset. The water industry is, however, required to provide a service even where the customers served are very high cost. The industry does not have the discretion to dispose of many of its assets. An NRV approach to valuation would therefore be misleading.

- **Indexation**

  Indexation could be used to revalue the asset to its current value. Under an indexation approach, a price index is used to inflate the historic purchase cost to a current value. This approach differs from MEA valuation as it is linked to the historic cost of the asset.

  There are difficulties in determining an appropriate price index and this approach takes no account of

[201] See Volume 3, Chapter 3 of our methodology consultation 'Our work in regulating the Scottish water industry: The calculation of prices', for a description of depreciation methods.
[202] Ofwat, RAG 1.03, January 2003.

changes in technology. It would be likely to overstate the appropriate level of depreciation.

Ofwat's approach to determining a depreciation charge

Ofwat calculates depreciation on a current cost basis. It separately considers investment:

- in assets that deliver base levels of service; and
- in assets that enhance levels of service.

It calculates depreciation separately on each type of investment, namely:

- depreciation on existing assets; and
- depreciation on new capital expenditure.

Ofwat uses the reported depreciation charge from the business plans of the companies in England and Wales but conducts a check on its reasonableness before it is included in the final price determination. Ofwat takes the following factors into account:

- **Asset valuation.** Depreciation is calculated using MEA valuations of assets. This ensures that assets are valued in terms of their replacement value, rather than their actual realisable value if sold.
- **Assets' useful lives.** The assets in the water industry have wide-ranging useful lives. In order to ensure consistency between companies in the price setting process, assets are classified into five categories. Each category is assigned a 'standard life' which is used in the depreciation calculation:
  - very short (assets having a life of up to five years are assigned a standard life of five years);
  - short (assets having a life of six to 15 years are assigned a standard life of 10 years);
  - medium (assets having a life of 16 to 30 years are assigned a standard life of 20 years);
  - medium/long (assets having a life of 31 to 50 years are assigned a standard life of 40 years); and
  - long (assets having a life exceeding 50 years are assigned a standard life of 60 years).
- **Asset apportionment.** Ofwat apportions new capital expenditure between the above asset categories according to a series of set proportions. Different apportionments are used depending on whether the capital expenditure is an enhancement or a renewal and whether it is for a water or waste water asset. The apportionments are used to reduce the effects on the price setting process of the companies' different accounting policies.
- **Depreciation method.** Ofwat calculates depreciation on a straight-line basis. We understand that all water companies in England and Wales are also currently using straight-line depreciation.
- **Overall check on total depreciation – 'broad equivalence'.** For each company, Ofwat combines reported depreciation on existing assets with depreciation on new capital expenditure to provide a figure for total depreciation. It applies a check on this total figure to ensure that it is reasonable. This check is called 'broad equivalence'. Where calculated depreciation fails this check, Ofwat will adjust the level of depreciation to ensure that prices are set at an appropriate level.

  The rationale behind broad equivalence is relatively simple[203]. The level of depreciation should depend on the level of investment. Depreciation should only increase if there is net new investment.

  The practical effect of broad equivalence is to use projected capital maintenance expenditure as a 'cap' on the level of future depreciation. This ensures that customers do not face bills that are higher than is necessary.

[203] Ofwat first set out its rationale in its consultation for the 1999 price review, 'Setting price limits for water and sewerage services. The framework and business planning process for the 1999 Periodic Review' (February 1998).

Alternative ways to calculate depreciation

We have reviewed other potential approaches for calculating depreciation. In a consultation paper which it published in March 2002[204], Ofwat outlined the following alternative approaches to depreciation:

- the renewals accounting approach;
- the economic depreciation approach; and
- an approach which bases the depreciation charge on the RCV.

We examined these approaches in our methodology consultation[205]. We believe that the use of the Modern Equivalent Asset Value (MEAV) is the most appropriate given the circumstances of the water industry.

Calculating Scottish Water's depreciation charge

In our methodology consultation[206], we noted our intention to use an approach to calculate depreciation which is:

- consistent with Ofwat's approach in England and Wales;
- appropriate for long life assets; and
- consistent with Accounting Standard FRS15.

In this draft determination, therefore, our approach to calculating depreciation:

- uses Ofwat's five-step classification of asset life, ranging from very short to long;
- establishes the economic value of the asset on the basis of an MEA valuation; and
- assumes straight-line depreciation over the life of the asset.

In order to calculate depreciation, we have considered Scottish Water's assets in two parts, namely:

- the assets expected to be in existence on 1 April 2006; and
- additions to the asset base after 1 April 2006 (the first day of the new regulatory control period).

Depreciation charge for existing assets

To calculate the depreciation on Scottish Water's existing assets we needed to establish:

- the starting value of the assets; and
- the remaining useful lives of the assets.

Scottish Water has not yet had to report a current cost depreciation charge on a basis that is consistent with the companies south of the border.

Starting values

We have used the expected MEA value of Scottish Water's assets on 1 April 2006. Scottish Water reports information on the value of its assets to us as part of its business plan submission. We used actual asset values at the end of the financial year 2003-04 and accepted Scottish Water's projections of asset additions for the remainder of the 2002-06 regulatory control period.

We have used the net asset value in our calculation. By using net rather than gross asset values, we are essentially assessing the cost to replace Scottish Water's assets in their current condition. We take into account the remaining useful lives of these assets[207].

In its second draft business plan, Scottish Water valued its assets on an Equivalent Asset Replacement Cost (EARC) basis. We have used these valuations in this draft determination. Scottish Water plans to respond to this draft determination with MEA asset values. We understand from Scottish Water that the methods for calculating EARC and MEA values are similar[208]. We

[204] Ofwat, 'The approach to depreciation for the periodic review 2004 – a consultation paper', (March 2002).
[205] See Volume 3.
[206] Volume 3 of our methodology document, 'Our work in regulating Scottish Water: The calculation of prices', Chapter 10.
[207] Net asset value = gross asset value * (remaining asset life/asset life if new).
[208] Letter from Scottish Water dated 23 July 2004.

expect that Scottish Water's MEA valuation should not be significantly different from the reported EARC value.

Scottish Water reported a net EARC value of £2,488 million for all non-infrastructure assets. £2,274 million of this net EARC has to be depreciated. This total asset value has been apportioned across the same asset life categories as used by Ofwat. The value of the assets in each category is shown in Table 16.1.

Table 16.1: Reported EARC valuation of assets expected to be in existence for year end 2005-06

	Year end 2005-06 Net EARC
Very short	£34.1m
Short	£272.6m
Medium	£560.5m
Medium/long	£152.8m
Long	£1,254.0m
Land/non-depreciated assets	£214.0m
Total	**£2,487.9m**
Total excluding land and non-depreciated assets	**£2,274.0m**

Remaining useful lives

We have assumed that Scottish Water's existing assets on 1 April 2006 will be half-way through their useful lives. Our analysis of reported EARC values suggests that this is a fair assumption to make. The net EARC is 53% of the gross EARC. This is illustrated in Table 16.2.

Table 16.2: Net EARC valuations as a percentage of gross EARC valuations for year end 2005-06

	Year end 2005-06 gross EARC	Year end 2005-06 net EARC	Net EARC as percentage of EARC
Very short	£50.6 m	£34.1 m	67.4%
Short	£655.2 m	£272.6 m	41.6%
Medium	£1,129.4 m	£560.5 m	49.6%
Medium/long	£234.6 m	£152.8 m	65.1%
Long	£2,218.5 m	£1,254.0 m	56.5%
Land	£214.0 m	£214.0 m	100.0%
Total	**£4,502.3m**	**£2,488m**	**55.3%**
Total (excluding land)	**£4,288.3m**	**£2,274.0m**	**53.0%**

We have applied the standard lives that Ofwat use for asset additions to each category of asset. We have halved Ofwat's standard lives to reflect the expected remaining lives of the assets in the net EARC. This is set out in Table 16.3.

Table 16.3: Standard lives applied to existing assets

	Ofwat standard life for asset additions (years)	WICS standard life for existing assets (years)
Very short	5	2.5
Short	10	5
Medium	20	10
Medium/long	40	20
Long	60	30
Land/non-depreciated assets	Infinite	Infinite

Profile of depreciation for existing assets

We have calculated depreciation on the net EARC on a straight-line basis. This creates the profile for depreciation detailed in Table 16.4.

Table 16.4: Profile of depreciation of base assets 2006-07 to 2009-10 (outturn prices)

Annual depreciation (outturn prices)	2006-07	2007-08	2008-09	2009-10
Very short	£14.0m	£14.5m	£7.4m	£0.0m
Short	£56.2m	£57.8m	£59.6m	£61.4m
Medium	£57.7m	£59.5m	£61.2m	£63.1m
Medium/long	£7.9m	£8.1m	£8.3m	£8.6m
Long	£43.1m	£44.3m	£45.7m	£47.0m
Total	**£178.8m**	**£184.2m**	**£182.3m**	**£180.1m**

Depreciation charge for asset additions (post 1 April 2006)

Scottish Water is tasked with delivering a very large investment programme in the 2006-10 regulatory control period. We need to estimate the appropriate level of depreciation on these new assets.

In Chapters 13 and 14 we set the maximum likely allowed level of capital expenditure for this regulatory control period. This investment is sufficient to allow the delivery of the Ministers' essential and desirable outputs. We allocate this investment to asset lives in Table 16.5.

We have used the investment allocation between infrastructure and non-infrastructure in Scottish Water's business plan.

Table 16.5 Profile of capital investment 2006-07 to 2009-10 (outturn prices)

Capital investment (outturn prices)	2006-07	2007-08	2008-09	2009-10
Very short	£25.5m	£3.8m	£35.5m	£39.0m
Short	£50.9m	£61.8m	£66.9m	£73.6m
Medium	£63.9m	£70.8m	£75.9m	£83.4m
Medium/long	£42.4m	£42.7m	£44.9m	£49.3m
Long	£130.9m	£128.5m	£136.1m	£149.6m
Infinite	£14.6m	£14.6m	£15.4m	£16.9m
Total	**£328.2m**	**£352.0m**	**£374.8m**	**£411.9m**

We have assumed that assets are added half-way through the financial year and are depreciated over their full useful life. For instance, if a very short life asset worth £100 million is added in year 1, then in year 1 the depreciation charge on that asset would be £10 million. In years 2, 3, 4 and 5, the depreciation charge would be £20 million. In year 6, the depreciation charge would be a further £10 million. In this way, the full asset value is accounted for over its useful life.

The profile of investment detailed above results in the depreciation profile shown in Table 16.6.

Table 16.6 Profile of depreciation for asset additions 2006-07 to 2009-10 (outturn prices)

Annual Depreciation (outturn prices)	2006-07	2007-08	2008-09	2009-10
Very short	£2.5m	£8.6m	£15.9m	£24.0m
Short	£2.5m	£8.3m	£15.1m	£22.7m
Medium	£1.6m	£5.1m	£8.9m	£13.2m
Medium/long	£0.5m	£1.6m	£2.8m	£4.1m
Long	£1.1m	£3.3m	£5.7m	£8.2m
Total	**£8.3m**	**£27.0m**	**£48.4m**	**£72.2m**

Total depreciation charge

We have added the ongoing depreciation charge on existing assets to the depreciation charge on new assets that are expected to be added during this regulatory control period. This is set out in Table 16.7.

Table 16.7 Total depreciation charge 2006-10 (outturn prices)

Annual depreciation (outturn prices)	2006-07	2007-08	2008-09	2009-10
Very short	£16.6m	£23.1m	£23.4m	£24.0m
Short	£58.7m	£66.2m	£74.7m	£84.0m
Medium	£59.3 m	£64.5m	£70.2m	£76.3m
Medium/long	£8.4m	£9.7m	£11.1m	£12.7m
Long	£44.1m	£47.7m	£51.3m	£55.3m
Total	**£187.2m**	**£211.2m**	**£230.7m**	**£252.3m**

Scottish Water's depreciation charge in context – comparisons with England and Wales

We have compared Scottish Water's depreciation charge with that of the water and waste water companies in England and Wales. This allows us to establish the reasonableness of the depreciation charge that we have allowed Scottish Water.

We would ideally have compared relative asset valuations, but these are not collected in a consistent manner on either side of the border. We have, therefore, compared the ratio of the reported current cost depreciation (CCD) of every water and waste water company in England and Wales to a number a different variables that could affect the CCD charge.

Our analysis involves the following steps:

1. Establish the factors that may influence the CCD charge.

2. Calculate the maximum, minimum, industry average and median values of the ratios between CCD and these factors.

3. Assess the extent of any relationship between the factor and the CCD charge.

4. Adjust for effects of PPP if appropriate. PPP contracts do not have an equivalent in England and Wales and form a separate element of Scottish Water's revenue requirement. Where appropriate we have adjusted for PPP.

5. Establish a range which, based on observed ratios, we would expect Scottish Water's depreciation charge to fall within for both 2002-03 and 2003-04.

We examined the relationship between the CCD charge and a number of factors, as shown in Table 16.8.

Table 16.8: Relationship between CCD and relevant factors

Water	Ratio of CCD to billed properties
	Ratio of CCD to connected properties
Waste water	Ratio of CCD to billed properties
	Ratio of CCD to population equivalent

We detail our analysis below.

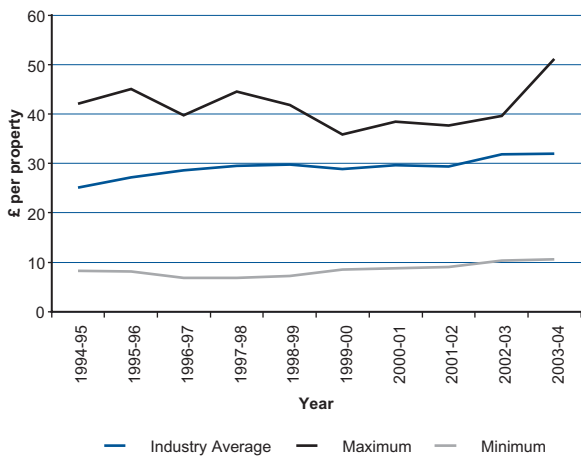
Water: billed properties

In general we would expect the water CCD to rise as the number of properties rises. This is because we would expect more assets to be employed or existing assets to be used more intensively. The ratio we have used for this comparison is:

Annual water CCD/Annual billed properties

The result is a CCD charge per billed property. The following diagram shows the change in the maximum, minimum and industry average for £CCD per billed property for England and Wales from 1994-95 to 2003-04.

Figure 16.1: Comparison of water CCD charge per billed property (England and Wales), 2003-04 prices

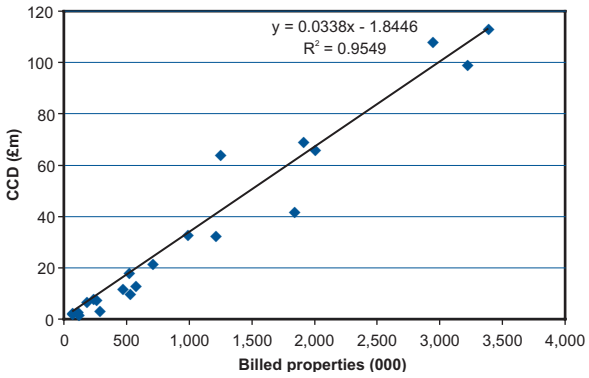


This comparison reveals that the minimum value remains fairly constant throughout the period, while the maximum declines towards the middle of the period before rising towards the end. The industry average generally rises throughout the period.

These observed trends are consistent with increasing standards for water quality, which have required greater use of assets, and therefore a higher CCD charge.

Figure 16.2 shows the relationship between the CCD charge and the number of billed properties in 2003-04.

Figure 16.2: Water CCD to number of billed properties for England and Wales (2003-04)



It is clear that there is a strong relationship between the level of current cost depreciation and the number of customers billed in England and Wales.

Scottish Water had 2.34 million billed properties in 2002-03. By applying this figure to the observed ratios from the England and Wales analysis, we have derived the CCD ranges detailed in Table 16.9.

Table 16.9: Implied range for Scottish Water's water CCD charge 2002-03 (billed properties)

	England and Wales CCD/number of billed properties 2002-03	Implied water CCD 2002-03 for Scottish Water
Industry average	£31.8	£74.5m
Maximum	£39.6	£92.8m
Minimum	£10.3	£24.1m
Median	£31.7	£74.2m

Our analysis suggests that, using 2002-03 variables, Scottish Water's CCD charge for water should be approximately £75 million (in 2003-04 prices). Scottish Water had 2.36 million billed properties in 2003-04. By applying this figure to the observed ratios from the England and Wales analysis, we have derived the CCD ranges detailed in Table 16.10.

Table 16.10: Implied range for Scottish Water's water service CCD charge 2003-04 (billed properties)

	England and Wales CCD/number of billed properties 2003-04	Implied water CCD for Scottish Water 2003-04
Industry average	£32.0	£75.5m
Maximum	£51.2	£120.8m
Minimum	£10.6	£24.9m
Median	£30.5	£72.0m

Our analysis suggests that, using 2003-04 variables, the CCD charge for water should again be approximately £75 million (in 2003-04 prices).

Water: connected properties

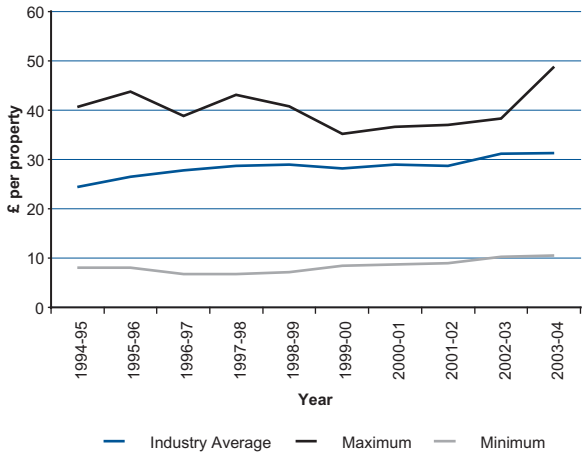
We would expect water CCD broadly to increase as the number of properties rises. In our comparisons, we have used the ratio of:

Annual water current cost depreciation/Annual connected properties

The result is a CCD charge per connected property.

Figure 16.3 shows the change in the maximum, minimum and industry average for CCD per connected property for England and Wales from 1994-95 to 2003-04.

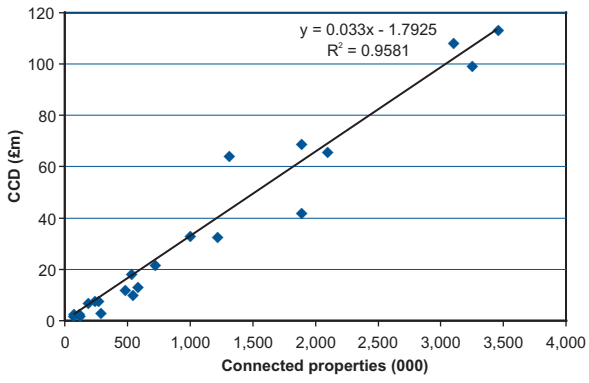
Figure 16.3: Comparison of water CCD charge per connected property (England and Wales), 2003-04 prices



The picture here is broadly similar to the earlier relationship with billed properties.

The relationship between CCD and the number of connected properties is shown in Figure 16.4.

Figure 16.4: Water CCD to number of connected properties for England and Wales (2003-04)



Not surprisingly, there is again a strong relationship between the level of current cost depreciation and the number of customers connected in England and Wales.

Scottish Water had 2.39 million connected properties in 2002-03. Our analysis would suggest the CCD range that is shown in Table 16.11.

Table 16.11: Implied range for Scottish Water's water CCD charge 2002-03 (connected properties)

	England and Wales CCD/number of connected properties 2002-03	Implied water CCD for Scottish Water 2002-03
Industry average	£31.1	£74.4m
Maximum	£38.3	£91.5m
Minimum	£10.3	£24.6m
Median	£31.4	£74.9m

Analysis of 2002-03 connected properties would suggest that Scottish Water's CCD charge for water should again be approximately £75 million (in 2003-04 prices).

Scottish Water had 2.48 million connected properties in 2003-04. Our analysis would suggest the range for Scottish Water's water CCD charge as outlined in Table 16.12.

Table 16.12: Implied range for Scottish Water's water CCD charge 2003-04 (connected properties)

	England and Wales CCD/number of connected properties 2003-04	Implied water CCD for Scottish Water 2003-04
Industry average	£31.3	£77.6m
Maximum	£48.8	£121.2m
Minimum	£10.5	£26.1m
Median	£30.2	£75.0m

Analysis for the 2003-04 number of connected properties would suggest a modestly higher CCD charge for water. In this case, around £77 million may be appropriate.

Waste water: CCD per property billed

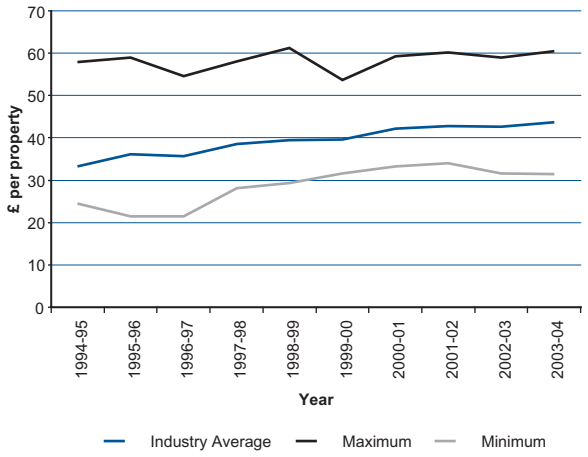
We would expect the waste water CCD charge to rise as the number of properties billed rises. In our analysis, we used the ratio of:

Annual waste water CCD/Annual billed properties

The result is a CCD charge per billed property.

Figure 16.5 shows the change in the maximum, minimum and industry average for the CCD charge per billed property for England and Wales from 1994-95 to 2003-04.

Figure 16.5: Comparison of waste water CCD charge per billed property (England and Wales), 2003-03 prices

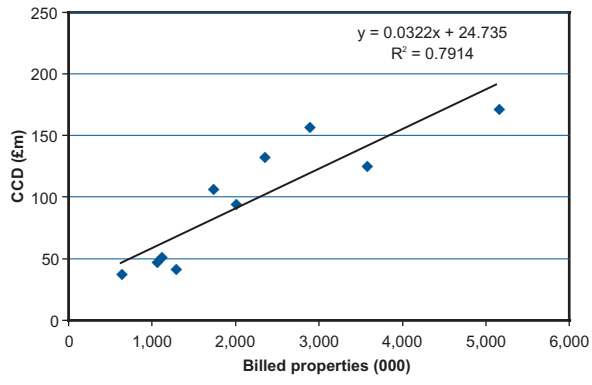


The pattern in waste water is similar to that which we saw on the clean water side. The average generally rises throughout the period.

This would seem to be consistent with the increasing standards for waste water treatment in England and Wales. Achieving higher standards has required significant investment and consequently increased CCD.

Figure 16.6 shows the relationship between the CCD charge and the number of billed properties in 2003-04.

Figure 16.6: Waste water CCD to number of billed properties in England and Wales (2003-04)



The relationship is less strong than that which we saw for water. However, there is still a clear correlation.

Scottish Water had 2.23 million billed waste water properties in 2002-03. The proportion of customers not served by a PPP-operated works is 51% or around 1.14 million customers. Our analysis would suggest the CCD range detailed in Table 16.13.

Table 16.13: Implied range for Scottish Water's waste water CCD charge 2002-03 (billed properties)

	England and Wales CCD/number of billed properties 2002-03	Implied waste water CCD for Scottish Water 2002-03
Industry average	£42.6	£48.6m
Maximum	£58.9	£67.2m
Minimum	£31.7	£36.1m
Median	£46.4	£52.9m

Our analysis for 2002-03 billed properties would suggest that Scottish Water's CCD for waste water (net of PPP) should be approximately £53 million (in 2003-04 prices).

In 2003-04 we believe that Scottish Water had around 1.13 million customers not served by PPP sites. This would suggest the CCD ranges detailed in Table 16.14.

Table 16.14: Implied range for Scottish Water's waste water CCD charge 2003-04 (billed properties)

	England and Wales CCD/number of billed properties 2003-04	Implied waste water CCD for Scottish Water 2003-04
Industry average	£43.7	£48.3m
Maximum	£60.6	£66.8m
Minimum	£31.4	£35.9m
Median	£45.8	£52.6m

This analysis would suggest that Scottish Water's CCD for waste water should be approximately £53 million.

Waste water: CCD per population equivalent

We would expect waste water CCD to rise as the number of equivalent customers rises. Our use of a population equivalent allows us to measure the extent of treatment delivered by a company. This helps us to ensure that we are comparing like-for-like with England and Wales.

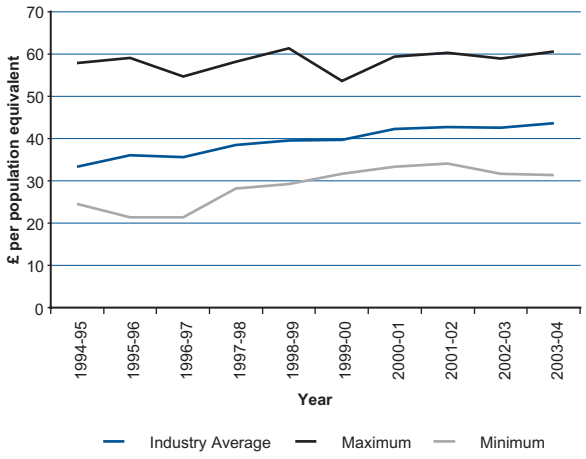
In our analysis, we use the ratio of:

Annual waste water CCD/Annual domestic equivalent properties

The result is a CCD charge per domestic equivalent customer.

Figure 16.7 shows the change in the maximum, minimum and industry average for the CCD charge per domestic equivalent customer for England and Wales from 1994-95 to 2003-04.

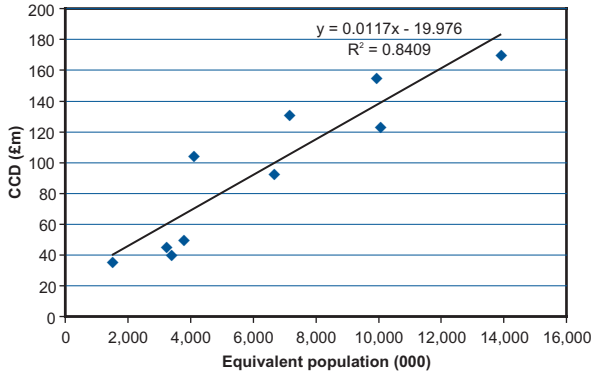
Figure 16.7: Comparison of waste water CCD charge per population equivalent (England and Wales), 2003-04 prices



This comparison reveals that the minimum value rises throughout the period while the maximum remains reasonably constant. The industry average rises steadily during the period.

Figure 16.8 shows the relationship between waste water CDD and the domestic population equivalent in 2003-04.

Figure 16.8: Waste water CCD to domestic population equivalent in England and Wales (2003-04)



This reveals that there is a stronger relationship than there was in the comparison of simple billed properties.

Scottish Water had 6.8 million domestic equivalent customers in 2002-03. This is reduced to approximately 3.5 million customers after we adjust for the impact of PPP. This suggests the CCD range detailed in Table 16.15.

Table 16.15: Implied range for Scottish Water's waste water CCD charge 2002-03 (population equivalent)

	England and Wales CCD/population equivalent	Implied waste water CCD for Scottish Water 2002-03 2002-03
Industry average	£14.6	£51.0m
Maximum	£26.7	£93.4m
Minimum	£11.1	£38.7m
Median	£13.8	£48.4m

Our analysis of the 2002-03 population equivalent would suggest a CCD for waste water of approximately £51 million (in 2003-04 prices).

Scottish Water had 7.18 million domestic equivalent waste water customers in 2003-04. The adjustment for PPP reduces this to 3.61 million. This suggests a CCD range as set out in Table 16.16.

Table 16.16: Implied range for Scottish Water's waste water CCD charge 2003-04 (population equivalent)

	England and Wales CCD/population equivalent	Implied waste water CCD for Scottish Water 2003-04 2003-04
Industry average	£14.8	£53.6m
Maximum	£25.4	£91.8m
Minimum	£11.8	£42.6m
Median	£13.9	£50.3m

Our analysis of Scottish Water's population equivalent in 2003-04 would suggest a CCD for waste water of approximately £54 million (in 2003-04 prices).

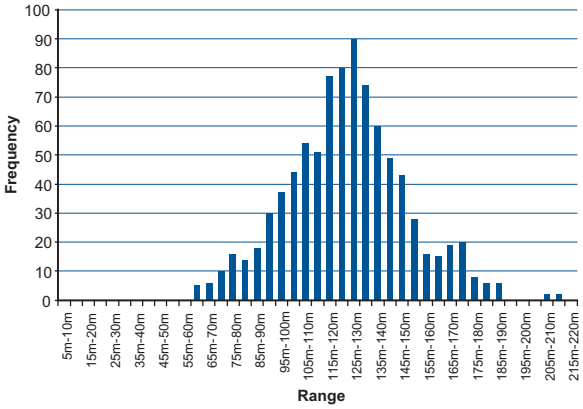
Implications for Scottish Water's depreciation charge

Our analysis would therefore suggest that Scottish Water should have:

- A current cost depreciation charge for water of approximately £75 million. This would be consistent with the average position in England and Wales.
- A current cost depreciation charge for waste water of approximately £54 million. This would be consistent with the average in England and Wales.

We have also analysed the range and frequency of answers for the level of CCD for water and waste water. This is shown in Figure 16.9.

Figure 16.9: Frequency of comparisons between Scotland and England and Wales for CCD for water and waste water.



The overall average is £125 million. Most answers are in the range of £105 million to £140 million. A CCD charge of between £180 million and £185 million would be consistent with the upper-end of this range analysis.

We need to project forward the appropriate level of CCD. This requires us to take account of:

- increases in the allowed maintenance spend in England and Wales from 2005 onwards; and
- inflation.

In its final determinations, Ofwat allowed a 22% increase in capital maintenance. If we assume that this is evenly divided between both infrastructure and non-infrastructure assets, this would increase expected CCD to around £150 million to £160 million.

Furthermore, if we assume an inflation rate of 2.5%, the average CCD would increase to approximately £155 million to £165 million at the start of the period. The maximum reasonable CCD would be approximately £230 million to £240 million (in 2005-06 prices).

This analysis is a useful check on our calculation of Scottish Water's CCD charge. In this draft determination, we have allowed Scottish Water an annual depreciation charge ranging from £182 million to £224 million (in 2005-06 prices). This is at the upper end of the range that Scottish Water should receive that is suggested by comparisons with England and Wales.

Summary

Our move towards the RCV method of price setting will make it increasingly important that we include an appropriate depreciation charge in our price determinations.

In this draft determination we have accepted information from Scottish Water on its net EARC. We have been advised that this should be in line with its net MEAV.

This suggests that Scottish Water's depreciation charge in the 2006-10 regulatory control period is relatively high. We have conducted a number of comparisons with the companies south of the border, which suggest that the level of depreciation that we have allowed is prudent.

Section 4: Funding capital expenditure
Chapter 17: Corporation tax

Introduction

In Volume 3 of our methodology consultation we explained that we did not expect Scottish Water to be liable to pay corporation tax during the regulatory control period 2006-10. The three former water authorities had previously assured us that the industry in Scotland should not be liable for corporation tax until after 2010.

In its response to our methodology consultation and in its first and second draft business plans, Scottish Water indicated that it expects to pay corporation tax from 2006-07. We took expert tax advice from Ernst & Young LLP and in this draft determination we have taken full account of the tax for which Scottish Water could reasonably be liable.

In this chapter we explain:

- how corporation tax is calculated;
- issues specific to the water industry which complicate how corporation tax is calculated;
- representations from Scottish Water concerning corporation tax issues; and
- the assumptions we have made to calculate corporation tax.

In Chapter 4 of Volume 7 we explain the levels of corporation tax that we expect Scottish Water to pay in each year.

Calculation of corporation tax

Corporation tax is paid according to an assessment by HM Revenue and Customs (HMRC) of the profits that a company makes. This may be different from the level of profit that is recognised in a company's accounts. This is because HMRC requires different assumptions to be made in order to calculate the level of profit. These differences can be divided into four broad categories:

- the classification of operating (revenue) expenditure and capital expenditure;
- depreciation;
- amortisation; and
- other non-allowable items.

The starting point for the calculation of corporation tax is company historic cost operating profit, as stated in the company accounts. Operating profit is also known as profit before interest and tax. It can be calculated by subtracting operating costs and depreciation from total revenue.

HMRC then requires a series of adjustments to be made to the company's reported operating profit to calculate the profit on which tax will be payable. This value is then multiplied by the corporation tax rate to calculate a tax charge. The first adjustment relates to the interest that a company pays on its debt.

Interest paid on debt is a tax-deductible expense[209].

Classification of revenue and capital expenditure

In company accounts, revenue (operating) expenditure is recognised in the year it is spent while capital expenditure is depreciated over the underlying asset's useful life. Some types of expenditure, such as electricity costs, are clearly revenue (operating) expenditure. Other costs, such as building a new waste water treatment works, are clearly capital expenditure.

In other cases the distinction may be more blurred and the company's accountants must make a judgement about how the expenditure should be classified.

At the current time, HMRC classifies a significant proportion of capital expenditure, particularly that relating to maintenance, as revenue expenditure. Two separate rules apply to this expenditure:

- it can be deducted from operating profit in the same year (this would apply either to very short-term assets or specifically-recognised investment); or

[209] We consider the cost of debt in Chapter 18 on the allowed rate of return.

- it can be deducted from operating profits as the asset is depreciated through the accounts – this is known as deferred revenue expenditure.

Depreciation

We explained in the previous chapter that companies recognise a depreciation charge to reflect the use of their assets. In most cases, HMRC does not specifically recognise depreciation in the calculation of profit for tax purposes (with the exception of deferred revenue expenditure – see above). This is because it would allow companies to change their calculated tax liability by changing assumptions about the lives of their assets. Depreciation charges are therefore added back to accounting profit to calculate corporation tax.

HMRC has its own rules for calculating the costs of asset use. There are three principal categories:

- capital allowances,
- industrial buildings allowances, and
- finance leases.

We explained in Chapter 13 that the water industry uses renewals accounting. This means that certain parts of the network (mostly underground) have a renewals charge rather than a depreciation charge. We explain some of the issues that arise later in this chapter.

Capital allowances

For most capital expenditure, HMRC allows companies to deduct capital allowances from their taxable profit.

Capital allowances are calculated on a reducing balance basis. This recognises that assets wear out more quickly at the start of their lives than at the end of their lives. HMRC allows the same percentage reduction to the starting asset value each year. Table 17.1 provides an example of an asset that is bought for £1,000 and which is assumed to wear out at 20% per year.

Table 17.1: Reducing balance depreciation

	Year 1	Year 2	Year 3	Year 4	Year 5
Opening asset value	1,000	800	640	512	410
Depreciation for year (20% of opening asset value)	200	160	128	102	82
Closing asset value	800	640	512	410	328

HMRC applies three separate rates – 100%, 25% and 6%. HMRC also sets out clear rules on the allocation of capital expenditure to each of these categories (which are known as pools).

Capital allowances are deducted from taxable operating profit.

Industrial buildings allowances

Some types of specialist plant and machinery are not included in capital allowances. These assets are treated slightly differently. HMRC assumes that these assets wear out over 25 years on a straight-line basis. Table 17.2 shows the allowances for such an asset bought for £1,000.

Table 17.2: Straight-line industrial buildings allowance

	Year 1	Year 2	Year 3	Year 4	Year 5
Opening asset value	1,000	960	920	880	840
Depreciation for year	40	40	40	40	40
Closing asset value	960	920	880	840	800

These capital allowances are also deducted from taxable operating profit.

Finance leases

Finance leases are long-term leases where ownership and maintenance of the asset is generally passed to the company using the asset (the lessee).

The cost of finance leases is allowed for the calculation of corporation tax. It is treated as if it were revenue expenditure (see above).

Amortisation

When a grant is received to pay for the purchase of an asset the income is recognised in the accounts as the asset wears out. This is known as amortisation.

HMRC does not recognise amortisation for the calculation of corporation tax. Instead, grants are added to operating profit in the year that they are received. Amortisation is therefore deducted from operating profit to calculate corporation tax.

Other non-allowable items

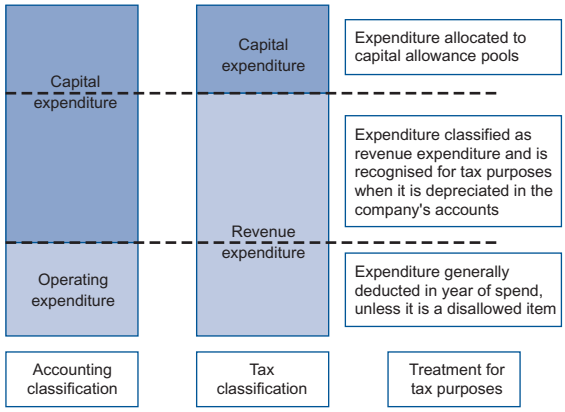
Other non-allowable items include the following:

- general provisions, which are only recognised when the underlying transaction actually occurs;
- purchase of some assets, for example land, which does not qualify for capital allowances;
- some revenue/operating expenditure; and
- some income may not be treated as income for tax purposes.

Overall calculation of profit for tax purposes

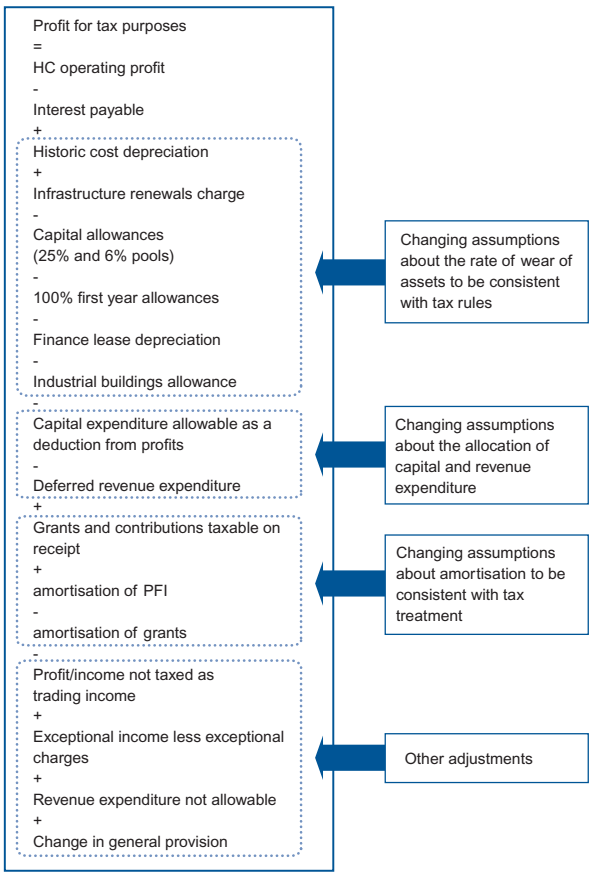
Figure 17.1 compares the treatment of expenditure for accounting and tax purposes. It explains at a high level the factors that are important in our calculation of Scottish Water's potential tax charge.

Figure 17.1: High level explanation of Scottish Water's potential tax charge



We show the calculation of corporation tax that we use in Figure 17.2.

Figure 17.2: Calculating corporation tax



The profit for tax purposes is multiplied by the corporation tax rate (currently 30%) to calculate the tax paid in a year.

A company can also make a tax loss. That is, the calculation of profit for tax purposes is negative. Tax losses can be carried forward to future years and can be used to reduce future tax paid.

Specific issues in the water industry

Two issues that are specific to the water industry complicate the calculation of the tax charge:

- Tax Bulletin 53, and
- the switch to international accounting.

Tax bulletin 53

In 1999, HMRC[210] issued Tax Bulletin 53. This bulletin further clarified the rules for deducting capitalised revenue expenditure from taxable operating profit. The bulletin made it clear that capitalised revenue expenditure relating to fixed assets should only be deducted when it is recognised in the company accounts. The water industry was given six years' grace, until 1 April 2005, to comply with the new rules.

In 2000, Water UK (the water and sewerage companies' trade association) signed an 'entirety agreement' with HMRC. The agreement does not have a fixed end date and is signed on behalf of all water and sewerage companies.

This agreement means that large portions of the companies' networks are considered as one asset for the purposes of tax calculation. The terms of the agreement mean that replacement of assets (both infrastructure and non-infrastructure assets) is considered as capitalised revenue expenditure. In the absence of this agreement, the replacement of constituent parts would be considered capital expenditure and would be allocated to the capital allowance pools. Tax Bulletin 53 allowed this additional capitalised revenue expenditure to be deducted in the year of spend. This reduced the companies' tax liability in each year.

From 1 April 2005, capitalised revenue expenditure must be recognised for tax purposes when it is recognised in the company accounts. This affects the companies in two ways since infrastructure and non-infrastructure assets are treated differently.

Capitalised revenue expenditure for non-infrastructure assets should now be claimed as a tax-deductible expense when it is depreciated. The entirety agreements may now disadvantage companies (in their expenditure on non-infrastructure assets), since accounting depreciation generally assumes longer asset lives than those underpinning the capital allowances.

Capitalised revenue expenditure for infrastructure assets can be claimed as a tax-deductible expense when it is recognised in the accounts through the infrastructure renewals charge. Since the infrastructure renewals charge is set at the expected level of infrastructure renewals expenditure in the long term, this generally means that infrastructure assets can still be deducted in the year from taxable operating profit.

Tax Bulletin 53 will probably increase the corporation tax paid in the short term for the companies that are covered by the entirety agreement.

Change to International Accounting Standards

The UK plans to adopt International Financial Reporting Standards (IFRS), and some accounting rules will change as a result. This will have a particular impact on the water industry, because IFRS rules do not allow renewals accounting. IFRS will require infrastructure assets to be depreciated in the conventional way, with an assumed asset life.

This will affect the tax charge paid by water and sewerage companies. Capitalised infrastructure renewals expenditure will no longer be able to be deducted in the year of spend. It will be deducted in line with the depreciation of the asset.

The move to International Accounting Standards will increase the tax charge in the short term. However, in the long term tax should return to existing levels once allowable annual depreciation has built up to current levels.

[210] Then called the Inland Revenue.

Scottish Water's view on tax

Scottish Water has provided us with information about its views on its tax liabilities in:

- the first draft business plan;
- a response to an official information request (WIC57); and
- the second draft business plan.

We found it difficult to replicate the tax calculations that were provided in the first draft business plan. We therefore wrote to Scottish Water (WIC57) to ask for detailed information on its current tax position.

The letter addressed the following issues:

- entirety agreements;
- allocation of capital expenditure to capital allowance pools;
- treatment of infrastructure renewals;
- treatment of research and development;
- core and non-core functions;
- deferred tax;
- effects of history on the projected tax charge;
- effects of Scottish Water Solutions on the tax charge; and
- differences between Scottish Water's circumstances for tax purposes and those of the water and sewerage companies in England and Wales.

Scottish Water's response is available on our website. The key points that Scottish Water raised in its response are summarised below.

Scottish Water explained that because it had inherited the tax position of the three former water authorities, it had significant tax losses which prevented it from being liable for corporation tax when it was first set up. Scottish Water now expects these accumulated losses to have all been used by the end of 2006. The Scottish Executive has also required Scottish Water not to undertake an aggressive tax minimisation strategy. Accordingly, the tax benefits of investment were to be realised over a longer period than a more aggressive company may have chosen to claim.

- Scottish Water does not currently claim capital allowances for work in progress. Capital allowances are claimed when assets are commissioned. Scottish Water expects to start claiming capital allowances on work in progress during this regulatory control period.
- Scottish Water has not signed an entirety agreement with HMRC. This means that the effects of Tax Bulletin 53 will be less marked in Scotland than in England and Wales. Instead, non infrastructure maintenance is allocated to capital allowance pools, as opposed to capitalised revenue expenditure.

In its second draft business plan, Scottish Water again indicated that it expects to pay corporation tax over the 2006-10 period. In the business plan, Scottish Water recognises that the change to International Accounting Standards may increase its annual tax liability.

How we have dealt with corporation tax in the Strategic Review 2006-10

We have revised our financial model in order to estimate Scottish Water's tax liability for the 2006-10 regulatory control period.

In our model, we have decided to fund Scottish Water's estimated tax liability based on information received from Scottish Water:

- Scottish Water has received specific instructions not to pursue an aggressive tax minimisation strategy. This may be different from the incentives for a privatised water and sewerage company that is looking to maximise shareholder value; and

- Scottish Water does not have an entirety agreement with HMRC.

In particular, we have accepted Scottish Water's assumptions on the treatment of assets as either capital expenditure or capitalised revenue expenditure and the allocation of capital assets to capital allowance pools.

We have assumed that there is minimal capitalised revenue non-infrastructure investment because Scottish Water does not have an entirety agreement with HMRC.

We have based our allocation of assets to capital allowance pools on the split of assets used. This is shown in Table 17.3.

Table 17.3: Allocation of assets to capital allowance categories

	Apportionment*
25% pool	43%
6% pool	30%
4% IBA	10%
Capitalised revenue expenditure (deducted on year of spend)	0%
Capitalised revenue expenditure (infrastructure depreciated)	1%
Capitalised revenue expenditure (non- infrastructure depreciated)	14%
Not qualifying	2%
Total	**100%**

We have set prices in this draft determination that take account of the likely changes in the rules for corporation tax. We have assumed also therefore that the capitalised revenue expenditure for infrastructure assets will not be available in the year of spend.

Instead, we assume that infrastructure renewals are depreciated over 30 years. This means that our price determination funds Scottish Water for the likely effects of moving to International Financial Reporting Standards.

This assumption may overstate Scottish Water's tax charge, particularly in the earlier years of our price determination. If it proves to be the case that we have overestimated Scottish Water's tax charge, we expect the new Commission will reduce future charge caps to reflect any benefit[211].

Conclusion

Scottish Water has not yet had to pay any significant amounts of corporation tax. This reflects accumulated losses inherited from the three predecessor authorities.

Changes to accounting rules are likely to increase the tax paid by the water industry both north and south of the border. We have decided to take a conservative approach in our calculation of the potential tax liability that will be faced by Scottish Water. This reflects a clear concern of customers that prices should be as predictable as possible.

[211] We would handle any such benefit in line with our proposals for dealing with out-performance of the regulatory contract. This is discussed in detail in Volume 7.

Section 4: Funding capital expenditure
Chapter 18: The allowed rate of return

Introduction

In the private sector, a regulator sets an allowed rate of return. This is often referred to as the cost of capital. The regulator will set this rate of return to reflect current and expected market conditions. The regulator has a duty to set an appropriate rate of return that allows an efficient company properly to finance its functions. The company is free to choose a mix of debt and equity funding, but its rate of return on its RCV is fixed (unless it outperforms efficiency targets).

In the public sector, the regulator is not able to set the rate of return based on his observation of the cost of capital in the market. Government sets Scottish Water's cost of debt. We have therefore taken account of the Ministerial Guidance on the public expenditure that could be made available to Scottish Water.

As a public sector organisation, Scottish Water has no contributed equity capital, although it generates trading surpluses and reinvests these proceeds. We term this reinvestment 'customer retained earnings'.

We have set an allowed cost of debt and an allowed cost of customer retained earnings; we have also made full allowance for the costs of embedded debt. We have therefore ensured that Scottish Water is not penalised for the cost associated with debt taken out at historically higher interest rates.

This chapter begins by explaining the rate of return; it then reviews how regulators have set the allowed rate of return for companies in the private sector. It concludes by explaining the analysis that we have completed to set an appropriate allowed rate of return for Scottish Water.

The allowed rate of return

What is a rate of return?

A simple example of what the rate of return means would be to consider the interest that is earned on savings in a bank account. Say, for example, that we deposited £200 in a bank at the start of the year and at the end of the year the bank statement says there is £210 in the account. We can calculate the rate of return as follows:

$$\text{Rate of return} = \frac{210 - 200}{200} * 100\%$$

$$= \frac{10}{200} * 100\%$$

$$= 0.05 * 100\%$$

$$= \mathbf{5\%}$$

In the above example, it is a relatively straightforward exercise to calculate the rate of return in the year since we know the values at the start and at the end of the period. The bank sets a rate of return which it believes will allow it to attract funds. The bank will make use of these funds to generate a profit.

In a similar way, we need to set a rate of return that will allow Scottish Water to cover its costs, invest for the future and remain financially sustainable.

What is an allowed rate of return?

The allowed rate of return is the rate of return that we believe Scottish Water requires in order to meet the objectives that have been set by the Scottish Ministers. Our role is to set maximum charges which are consistent with the delivery of Ministerial Guidance at the lowest reasonable overall cost.

If we set the allowed rate of return at too low a level, there is a risk that Scottish Water would not have sufficient funds to meet its obligations. This could result in debt increasing to unsustainable levels. This would benefit current customers, but would penalise future customers. Alternatively, it could result in a failure to deliver environmental, public health or customer service benefits. Customers would pay lower charges if the rate of return was set too low, but they would also receive a poorer service.

If we set the allowed rate of return at too high a level, customers will pay more than they need to. This could act as a disincentive on management to improve the

efficiency of the company. This would mean that customers pay more than is necessary in the medium term. Alternatively, the level of outstanding debt could decline significantly relative to the asset value of the company. This would penalise current customers to the benefit of future customers.

Our objective therefore has to be to ensure that we set an allowed rate of return for Scottish Water so that it can finance its efficient operation.

What is a weighted average cost of capital?

The weighted average cost of capital (WACC) is the overall cost of capital for a firm. It takes account of the capital structure of the firm (ie the market value of its debt and equity) and the rates of return it pays on both its debt and equity.

Retained earnings and share issues are examples of equity. Investors normally hold equity because they expect that they will earn dividends or because they expect that the shares will increase in value.

A private firm can also borrow, by issuing bonds or commercial paper or by seeking a loan from bankers. The firm will have to repay the initial amount of money borrowed at the end of the loan term, and meet interest costs as they become due.

Investors will seek a higher return if they consider that the investment carries a higher level of risk. By risk, we mean the possibility that the investor will not get back some or all of the money invested.

Debt is usually viewed as being less risky than equity. This is because debt normally carries a defined annual rate of interest and in the event of bankruptcy debt holders get paid before shareholders. Equity also pays a less certain amount each year (dividends are at the discretion of the firm). Investors therefore typically require a greater return from providing equity than from providing debt to a firm.

However, as the amount of debt a firm has increases, so does the risk that a firm will not be able to meet its interest payments or repay all of its debt on time. Firms with high levels of debt may have to provide investors with a higher rate of return for new debt than other similar but less indebted firms.

The WACC combines the rate of return from debt and from equity relative to the share of each in the market value of the firm. The formula for assessing the WACC is shown in Figure 18.1[212].

Figure 18.1: Pre-tax weighted average cost of capital

$$WACC = r_D * \frac{D}{(D+E)} + r_E * \frac{E}{(D+E)}$$

Where:

r = return

D = debt

E = equity

As a worked example, assume that the market value of a firm's debt is £25 million and a firm's equity is £75 million. It pays an annual interest rate of 10% and dividends at 15% of the market value of the equity. The weighted average cost of capital is calculated as follows:

$$WACC = 10\% * \frac{25}{25+75} + 15\% * \frac{75}{25+75}$$

$$= 10\% * 25\% + 15\% * 75\%$$

$$= 2.5\% + 11.25\%$$

$$= \mathbf{13.75\%}$$

In order to calculate a weighted average cost of capital, a regulator has to decide an appropriate rate of return for both debt and equity. He also has to assign an appropriate market value to the debt and equity of the firm. Calculation of the rate of return is further complicated by both taxation and inflation.

Taxation

Debt and equity are treated differently for tax purposes. Interest charges are an allowable expense for the

[212] Assuming no tax advantage to debt or equity.

purpose of corporation tax. Interest charges therefore reduce a company's tax bill. Dividends are paid from the profit that a company makes after paying tax.

The corporation tax advantages of debt are recognised in the post-tax weighted average cost of capital calculation. This is shown in Figure 18.2.

Figure 18.2: Post-tax weighted average cost of capital

$$WACC = [r_D * \frac{D}{D+E} * (1-t)] + [r_E * \frac{E}{D+E}]$$

Where:

r	=	return
D	=	debt
E	=	equity
t	=	corporation tax rate

Inflation

Inflation is the measure of the general rise in the prices of goods and services. Inflation causes the purchasing power of money to be eroded. The investor is therefore concerned with the real rate of return – that is the return after having adjusted for the effect of inflation.

The formula for calculating the real rate is shown in Figure 18.3.

Figure 18.3: Formula for calculating the real rate of return

Real rate of return

=

nominal rate of return

–

inflation rate

It is important to differentiate between the real rate of return (when inflation has been taken off) and the nominal rate of return (when it has not).

How regulators set WACC for private sector companies

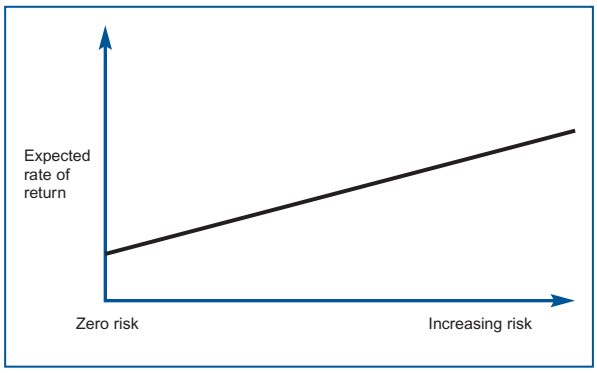
The rates of return for debt and equity

An investor decides where to invest his money by considering the rates of return offered to him for the options open to him, and by taking account of the rate of return relative to his view of the risk.

The ratio of the rate of return to the level of risk should be constant. The lowest rate of return is paid on an investment that has no risk.

Figure 18.4 illustrates that an investor would expect a greater return if the investment were considered to be more risky.

Figure 18.4: Comparison of expected rate of return and risk



Risk-free rate of return

Figure 18.4 shows the 'risk-free' rate of return. Even if there is no risk, an investor would still require a return because of the opportunity cost incurred in having chosen not to spend on goods and services immediately.

UK Government bonds[213] are generally considered to have no default risk, since it is believed that the Government will always meet its financial obligations. The return on a bond is set by the interest rate and the principal to be repaid. Over time, inflation will erode the value of this return. There is therefore a residual inflation risk for the investor.

[213] Also known as gilt-edged bonds or gilts.

The Treasury also issues index-linked bonds. These bonds pay an annual interest rate of inflation[214] plus a real rate of return. These bonds have no default or inflation risk.

Regulators can establish the risk-free rate of return by analysing the rate of return on index-linked Treasury bonds. If we take, for example, an index-linked Treasury bond which costs £98 today and matures in one year's time, paying £100 plus £3 in interest and £2.50 in inflation. Inflation is expected to be 2.5%. The real risk-free rate of return would be calculated as follows:

$$\text{Real rate of return}^{215} = \frac{105.5 - [98 \times 1.025]}{98 \times 1.025} * 100\%$$

$$= \frac{105.5 - 100.45}{100.45} * 100\%$$

$$= \frac{5.05}{100.45} \times \frac{100\%}{1} = 5.03\%$$

The real risk-free rate of return for the forthcoming year is 5.03%.

The risk-free rate will change according to market conditions.

Estimates of the risk-free rate

The risk-free rate of return is an important input into the calculation of the WACC. Table 18.1 shows a comparison of some recent estimates of the risk-free rate. Each of the studies uses index-linked Treasury bonds as the basis for their estimate. However, each estimate uses a different time horizon to judge the appropriate risk-free rate.

Table 18.1: How other regulators estimate the risk-free rate

Regulator	Year of review	Basis	Time period	Rate
Ofwat	2004	Index-linked Treasury bonds	Medium-term historical average	2.5%-3%
Oxera (for Ofgem)	2004	Index-linked Treasury bonds	Considered both historical averages and future rates	2.25%-2.75%
Civil Aviation Authority	2001	Index-linked Treasury bonds	Medium-term historical average	2.75%-3.25%
Joint regulator study[216]	2003	Index-linked Treasury bonds	Medium-term historical average	2.5%

[214] Measured using, for example, the retail price index.
[215] This is the real rate of return since it includes the effects of inflation.
[216] Wright, Mason and Miles: 'A study into certain aspects of the cost of capital for regulated utilities in the UK'; February 2003 report on behalf of Smithers & Company Limited, published by Ofgem and commissioned by the UK economic regulators and the Office of Fair Trading.

A regulator also has to make an assessment of the extra risk (beyond the risk-free rate) that an investor in the regulated company must assume. The extra risk and therefore extra return required by an investor will be lower in the case of debt than in the case of equity.

Additional rate of return on debt

The debt of a regulated company has a risk of default. Investors will therefore demand a higher rate of return than the risk-free rate.

If a company's debt is traded on a market then the regulator can observe the additional rate of return that investors demand. The additional rate of return is calculated by subtracting the risk-free rate from the observed return on the company's debt.

Alternatively, regulators can seek to establish an appropriate return by using information from ratings agencies. Firms with traded debt are rated by agencies such as Moody's, Fitch Ratings and Standard and Poor's.

One potential issue in setting an appropriate rate of return on debt is whether or not to include the cost of 'embedded' debt. A company borrows at prevailing market rates. The market rate will fall if inflation falls. A company has to accept the inflation risk when it borrows unless it borrows on an index-linked basis. Such borrowing (termed embedded debt) may appear expensive (or cheap) in the future.

In theory, if a regulator correctly assesses both the long-term risk-free rate and the long-term debt premium, companies should develop a portfolio of debt that is broadly equivalent to the long-term rate of return. At times of low interest rates a company will be able to borrow at below the assessed rate of return on debt; at times of high interest rates a company will be forced to borrow above the assessed rate of return.

It is, however, not certain that the risk-free rate and debt premium can be determined with sufficient confidence or that a company is likely to issue debt sufficiently often to benefit from this portfolio effect.

Estimating the rate of return on equity

The cost of equity cannot easily be observed in the market. Regulators therefore typically use the capital asset pricing model and the dividend growth model to estimate an appropriate cost of equity.

The capital asset pricing model

The capital asset pricing model estimates the return on a particular equity using three variables: the risk-free rate (discussed above), the market risk premium and the beta of the stock. The market risk premium is the expected return on the equity market as a whole minus the risk-free rate. This cannot be calculated with certainty but can be estimated using historical returns. The beta of a stock measures its volatility relative to the volatility of the overall market. A stock with a beta of 1 is no more or less volatile than the market, whereas a stock with a beta of 0.5 will be only half as volatile (ie it will typically move 0.5% if the market moves 1%).

The formula for the capital asset pricing model is shown in Figure 18.5.

Figure 18.5: The capital asset pricing model

$$r = r_f + \beta(r_m - r_f)$$

Where:
r = return on the equity of the firm
r_f = risk-free rate
β = beta
rm = return on the market

Dividend growth model

The dividend growth model measures the return on a share by forecasting future dividend growth. The model assumes that expectations on future dividends are correctly incorporated into the current share price. The formula for the dividend growth model is shown in Figure 18.6.

Figure 18.6: The dividend growth model

$$r = \frac{DIV_1}{P_0} + g$$

Where:

r	=	rate of return
DIV_1	=	projected dividend for next year
P_0	=	current market price
g	=	expected rate of growth in dividends

The present share price can be observed in the market. Expected dividends and the likely growth rate of dividends have to be estimated based on company guidance or analysts' reports.

How regulators have calculated the rate of return on equity

Ofgem, Ofwat and the Civil Aviation Authority (CAA) all use the capital asset pricing model to estimate the return on equity. Ofwat and Ofgem have also used the dividend growth model to confirm their analysis.

Regulators generally comment on the difficulty of estimating the market return. However, regulators have arrived at similar views of the equity risk premium. This is shown in Table 18.2.

Table 18.2: Comparison of calculation of market rate of return

Review	Year of review	Basis	Rate
Ofwat	2004	Forward looking, based on market evidence	4%-4.5%
Oxera (for Ofgem)	2004	Forward looking, based on market evidence	3.5%-4.5%
CAA	2001	Actual market returns on equity	3.5%-4.5%

Ofwat and Ofgem used a beta of 1 in their 2004 final determinations. They believe that recent declines in the beta are the result of increased market volatility and do not reflect a reduction in the risk of water companies or electricity distribution companies. Ofwat has suggested that it is prudent to use a beta of 1 in volatile markets.

The mix of debt and equity

As discussed above, regulators have to determine an appropriate capital structure in order to set an allowed weighted average cost of capital.

There is no consensus on the optimum mix of debt and equity. Regulators can set the allowed rate of return with reference either to:

- projected proportions of debt and equity in the market value of the company; or
- an assessed efficient level of debt and equity.

There are two ways that a regulator can measure the level of debt and equity in a company:

- by using the market value of debt and equity; and
- by using the RCV as a proxy for the market value of the company – the level of debt is the debt issued by the company; the difference between the RCV and the level of debt is therefore the level of equity.

Ofwat has used the RCV as a proxy for the market value of the regulated entity. This approach avoids the difficulty of assessing the market value of the regulated firm's equity. This is difficult because the regulated firm will usually be a subsidiary of a holding company. It will be the shares of the holding company that are traded on the Stock Exchange.

If weights are set using the projected proportions of debt and equity in the market value of the company, then the allowed rate of return will probably better match the demands for interest payments and dividends that a company faces. However, companies are likely to have chosen different mixes of debt and equity. It would not be appropriate for a regulator to set a different allowed rate of return for each company. Moreover, it is important that the onus is placed on the company to maintain the balance between debt and equity that allows it to access the capital markets on a sustainable basis.

If weights are set on the basis of an assessed efficient capital structure then this creates the incentive for the

company to manage the costs associated with debt and equity efficiently.

In 2004, Ofwat and Ofgem estimated WACC based on their view of an efficient capital structure. Their view on the efficient capital structure was based on discussions with experts, market observations, academic evidence and advice from the ratings agencies.

Summary of approaches to setting WACC by regulators of private sector companies

Regulators generally follow a broadly similar procedure in setting the allowed rate of return. This is summarised in Figure 18.7.

Figure 18.7: Setting an allowed rate of return

1) Assess the appropriate risk-free rate using long-term return on index-linked Treasury bonds.

↓

2) Assess the appropriate debt premium. If the company's debt is not traded, find an appropriate comparator.

↓

3) The sum of 1) and 2) gives the return on debt.

↓

4) Calculate the market risk premium using long-term returns.

↓

5) Calculate the company's beta. If the company is not traded then use the beta of a comparator.

↓

6) Using information from 1), 4) and 5), calculate the return on equity using the capital asset pricing model.

↓

7) Calculate the proportion of the company's RCV that is debt, use this to weight the information from 2) and 6) to calculate the company's weighted average cost of capital – this is the allowed rate of return.

The formula for calculating the allowed rate of return is shown in Figure 18.8.

Figure 18.8: Calculation of the allowed rate of return

$$WACC = \frac{D}{RCV} * (r_f + r_i) + \left[1 - \frac{D}{RCV}\right] * [r_f + \beta(r_m - r_f)]$$

Where:

D	=	level of debt
RCV	=	regulatory capital value
r_f	=	risk-free rate
r_i	=	interest rate premium
β	=	beta
r_m	=	return on the market

Setting an allowed rate of return for Scottish Water

We have described the process that is used by the regulators of the private sector utilities to set an allowed rate of return. We now outline how we have set an appropriate rate of return for Scottish Water. Our aim has been to allow Scottish Water to earn a return that is sufficient for it to fund its activities in a sustainable way. We have sought a balance between current and future customers by ensuring that the allowed rate of return is only just high enough to cover the costs of the benefits provided to current customers.

Financing of Scottish Water

As a public corporation, Scottish Water has only two sources of funds: revenue from customers and new debt. Scottish Water does not borrow directly from the capital markets, nor does it borrow at commercial rates. Scottish Water borrows from the Scottish Consolidated Fund at public-sector borrowing rates.

Scottish Water does generate surpluses and therefore has retained earnings, which it can invest to achieve the outputs set by Scottish Ministers. It does not currently pay dividends and therefore all of the surplus generated can be reinvested for the benefit of current and future customers. These retained earnings have essentially the

same properties as retained earnings (a form of equity) in the private sector, except that they are reinvested for the benefit of customers, rather than with the specific aim of generating increased future profits.

We considered four possible approaches to setting an appropriate rate of return for Scottish Water:

- adopt the Ofwat allowed cost of capital;
- use long-term average real borrowing rates;
- use the discount rate suggested in HM Treasury's Green Book; and
- use a hybrid approach.

We examine each in turn and summarise the advantages and disadvantages of each approach.

Ofwat's assessment of the allowed cost of capital

We considered whether it would be appropriate to use Ofwat's allowed rate of return. This could potentially have been justified on the grounds that the companies in England and Wales are good comparators for Scottish Water.

Scottish Water and Water UK have argued in their response to our methodology consultation that it would be appropriate to allow Scottish Water the same rate of return as Ofwat allowed to the companies south of the border. They argued that this would more fairly reflect the opportunity cost of the capital used by Scottish Water. Water UK suggested that Scottish Water could return any excess funds to customers. We have not accepted this argument for four reasons.

- It is not for this Office to question the price at which the Government has chosen to make capital available to Scottish Water. This would not be consistent with the requirement on us to determine the maximum level of charges consistent with Scottish Water delivering Ministers' objectives at the lowest reasonable overall cost.
- This approach would not be consistent with the tight budgetary constraint and continuing challenge to improve efficiency that underpins this determination.
- The opportunity cost of capital will vary significantly between investors, and while the Ofwat allowed rate of return may represent the opportunity cost to the marginal next investor in the private sector water industry south of the border, there is no reason to believe that the opportunity cost of Scottish Executive funding is the same.
- The retained earnings within Scottish Water belong to the customers of Scottish Water. The available evidence suggests that customers want certainty in pricing and this would be inconsistent with an opportunity cost approach where the size of a 'dividend' would only be known at the end of a financial year.

Moreover, the allowed rate of return south of the border has to be sufficient to attract debt and/or equity investment. The water and sewerage companies have to compete for capital with many other investment choices that are available to providers of capital. Ofwat has a duty to ensure that an efficient company is able to access the capital markets and attract sufficient capital to finance its functions.

In contrast, Scottish Water does not have to compete for capital in the same way. It would therefore not be realistic to set an allowed rate of return at or close to the same level as in England and Wales.

Scottish Water's risk profile could also reasonably be considered to be lower than that of the companies south of the border. This is because competition is more extensive in England and Wales, where inset appointments, special deals outside the tariff baskets (which are at the risk of the shareholder) and common carriage are possible. The companies have also improved their operating cost efficiency, thereby reducing the opportunity for significant outperformance of the regulatory settlement.

Long-term average borrowing rates

Scottish Water currently relies on debt provided by Government and retained earnings to finance an increase in its asset base. A second possible approach that we considered in our methodology consultation was to set an allowed rate of return that was consistent with an average of observed historic real borrowing costs.

We discounted this approach for two reasons. There is a wide range of maturities and coupons, which would have complicated our assessment of an appropriate rate of return.

We were also concerned that this approach could overestimate the required rate of return in the medium term, as the premium on longer-term debt is at historic lows. We considered that it would be better to allow for the costs of embedded debt and make an estimate of the current real cost of debt.

This approach would still have required us to set an allowed rate of return for the non-leveraged portion of the RCV. This is likely to become an increasingly important element of the funding of Scottish Water. For the reasons that we set out below, we would have sought to reduce the assessed cost of debt to ensure that there was no advantage to funding investment through debt or customer retained earnings.

The Treasury Green Book[217]

We considered using a cost of capital from 'The Green Book'. Published by HM Treasury, this is a guide to appraisal and evaluation in the public sector. 'Appraisal' relates to the decision to commit funds to the achievement of objectives and 'evaluation' relates to the assessment of past and present activities. The preface to the 2003 edition of The Green Book states that the guidance "is relevant to all appraisals and evaluations":

> "Some central government bodies sell goods or services commercially, including to the government itself. These activities may be controlled by requiring prices to be set to provide a required rate of return (RRR) on the capital employed by the activity as a whole. Government policy is generally to set charges for goods and services sold commercially at market prices, and normally to recover full costs for monopoly services, (including the cost of capital as defined in the Treasury Fees and Charges Guide)."

The 2003 edition of The Green Book reduced the Treasury estimate of the discount rate to 3.5% real.

The 'discount rate' measures 'the rate of social time preference'. The Green Book defines social time preference as "the value society attaches to present, as opposed to future, consumption".

We considered setting the allowed rate of return for Scottish Water in line with The Green Book discount rate of 3.5% real. We saw one major advantage of this approach, in that it uses a rate of return that is established by Government and is sufficient for Scottish Water to fund its efficient operation.

However, setting an allowed rate of return at 3.5% real would be significantly higher than the observed cost of new debt to Scottish Water. This could have the effect of encouraging Scottish Water to increase its borrowing and may have delayed the necessary improvements in efficiency. The effect of this could have been reduced if we regarded the 3.5% real rate as the pre-tax return rather than the post-tax return. We have decided not to use this approach because we felt that this rate of return was higher than Scottish Water currently needs. As such, it would have been inconsistent with our establishing the lowest reasonable overall cost of delivering the objectives of Ministers[1].

Hybrid approach

We have decided to apply a modified version of the WACC approach that is used by the regulators of private sector companies. We have combined an observed real cost of debt with an estimate of an appropriate rate of return on the customer retained earnings (the equity portion of Scottish Water's RCV) in order to produce an allowed rate of return[218].

[217] 'The Green Book' Appraisal and Evaluation in Central Government, HMSO, 2003.
[218] This equity (unleveraged) portion of the RCV is equivalent to the Glas Cymru financial buffer.

The future real rate of interest on debt for Scottish Water was estimated by looking at an average of current borrowing rates faced by Scottish Water.

We have made an allowance for the full cost of embedded debt.

We have collected information on the real rates offered by government gilts. Similarly, we have analysed the premium of Public Works Loans Board rates to government gilts. The real rate on long dated gilts has averaged 1.8% during 2004-05. Expected RPI inflation is 2.5%. The premium on public lending is approximately 0.3% to the real return on gilts. This gives an allowed rate of return for Scottish Water's debt of 4.6%. We have linked prices and the cost of capital to RPI (rather than the CPI measure we are using for operating cost inflation) in order to ensure that Scottish Water is not exposed to funding risks associated with changes in the RPI.

We have set the pre-tax allowed rate of return on the customer retained earnings at the post-tax allowed rate of return for debt. We believe that it is appropriate for customers to finance a relatively low return on the customer retained earnings. There is consequently no incentive for Scottish Water to seek to change its current ratio of debt to its regulatory capital value. If the return on the customer retained earnings had been greater than the return on debt, Scottish Water would have had an incentive to repay debt. In contrast, if the return on the customer retained earnings had been lower than the return on debt, Scottish Water would have had an incentive to take on more debt.

This approach should help stakeholders to monitor Scottish Water's performance. The level of its outstanding debt relative to its RCV should be in line with the forecasts that are included in the Strategic Review of Charges. If the level of debt to RCV declines, Scottish Water has not delivered its capital programme as planned. Conversely, if the level of debt relative to its RCV increases, Scottish Water is either ahead of schedule in delivering the capital programme, or has underperformed relative to its efficiency targets.

The allowed rate of return on customer retained earnings is 3.22%[219].

We have made a full allowance for the costs of embedded debt[220]. Specifically, we have added the extra interest costs above 4.6% to the cash return on the RCV for each year of the regulatory control period.

Conclusion

We have set an allowed rate of return that reflects the current cost of borrowing for Scottish Water. We have linked this to the retail price index in order to ensure that Scottish Water is not exposed to financing risks resulting from changes to the RPI.

The rate of return that we have allowed is 4.6% for debt and 3.22% for customer retained earnings. This has ensured that Scottish Water should have no preference between debt and retained earnings funding of its investment. We have also allowed Scottish Water the full cost of any embedded debt over the 4.6% allowed rate for new debt.

[219] 4.6% less the value of the 30% corporation tax shield (1.38% [0.3 x 4.6%])
[220] Embedded debt is debt taken out prior to April 2004 that carries a higher coupon than the allowed rate of return.

Section 4: Funding capital expenditure
Chapter 19: How we set the initial RCV

Introduction

In chapter 12 we explained that we have moved towards the RCV method of price setting in this draft determination. The RCV method of price setting separates the financing of the capital programme into the financing and management costs of investment and the cost of purchasing assets. We discussed the infrastructure renewals charge and depreciation in chapters 13 and 16 respectively.

We calculate financing and management costs by multiplying the allowed rate of return and the regulatory capital value. The regulatory capital value will change each year to reflect inflation, asset purchases and depreciation.

This chapter focuses on how we have set the initial value of the RCV. In our methodology consultation[221] we outlined four broad approaches to setting the initial RCV for a regulated utility. We can calculate the RCV based on an appropriate asset value; using market based valuations; using financial valuation techniques; or using a comparator approach.

We believe that a variant of the comparator approach to setting the initial RCV is the most appropriate. This approach is consistent with that which Ofwat used to set the RCV of the water only companies.

We have set the initial RCV such that if Scottish Water meets the terms of its regulatory contract, it will be in a financially sustainable position by the end of the regulatory control period. In other words, the cash allowed rate of return in 2009-10 (given the allowed levels of operating cost, capital expenditure and depreciation) is sufficient to ensure that all the targeted cash-based financial ratios are met at the end of the regulatory control period.

We calculated the initial RCV by subtracting asset purchases during the regulatory control period, discounting by the assumed rate of inflation and adding back the depreciation charge and the IRC. We then use the comparator method to assess the reasonableness of this initial regulatory capital value.

Options for setting Scottish Water's initial RCV

The four broad approaches that regulators can use to establish the initial RCV of a regulated utility in the private sector are as follows:

- **A market value approach.** The RCV adopts the value placed on the company by the financial markets.
- **An accounting approach.** The RCV takes into account the asset value of the company.
- **A comparator approach.** The RCV is set through comparison with a similar company that has an RCV.
- **A discounted cash flow approach.** The RCV is calculated by using financial valuation techniques.

A market value approach

Most of the regulators in the UK used the first approach to estimate the initial RCV of their regulated businesses. However, it is clearly not possible to use this method for a public corporation such as Scottish Water. This is because there is no market value of equity to form the basis of an estimate of RCV.

An accounting approach

There are other precedents where an RCV has been established for a public sector organisation. The CAA, for example, set the RCV for Manchester Airport and in Australia regulators have tended to use asset-based approaches. We could potentially have chosen to set the RCV using one of four common asset-based approaches:

- *Depreciated actual cost:* this approach is straightforward to implement but tends to understate (possibly significantly) the replacement costs of assets.
- *Depreciated indexed historical cost:* although this approach is preferable to depreciated actual cost, it does not take account of changes in technology.

[221] 'Our work in regulating the Scottish water industry: The calculation of prices', Volume 3, Section 2, Chapter 8, page 88.

- *Depreciated optimised replacement cost:* this approach is theoretically the best asset-based approach; however, it is information intensive and could be regarded as quite subjective.

- *Modern equivalent asset value:* this approach has many of the advantages of DORC, but is less subjective as it does not try to assess reductions in cost that could be achieved by optimising the design of the water and sewerage network.

A comparator approach

A second option available to us was to use a comparator approach. This had the advantage of being consistent with the approach that Ofwat used to set the initial RCV of the water only companies. To use this approach, we needed to identify companies that were broadly comparable to Scottish Water. We also needed to identify two sets of information for the comparator company.

- First, we needed to use a financial measure for the comparator company that would also be available for Scottish Water. Possible financial measures were the book value of debt, the book value of fixed assets and the current cost accounting value of fixed assets.

- Second, we needed a financial measure that would be relevant when estimating the RCV. If the comparator company were regulated and had an RCV this could be the RCV itself. If the comparator had no RCV it could be an equity value for the firm.

The discounted cash flow approach

The final option that we considered was the discounted cash flow approach to asset valuation. This would involve using our financial model to calculate Scottish Water's current value. However, we decided that this approach would not be suitable as it would be difficult for us to establish an appropriate discount rate.

Setting an initial RCV for Scottish Water

Introduction

In our methodology consultation we explained that we favoured the comparator approach. Most respondents to the consultation agreed with this view.

The water and sewerage companies in England and Wales provide the most obvious comparators for Scottish Water. There were a number of ways we could use comparisons with these companies to set an initial RCV for Scottish Water. If we had used a straightforward comparator approach, the initial RCV may have required us to make a significant adjustment (either upwards or downwards) to ensure that Scottish Water had sufficient revenue to deliver the objectives set by Ministers (given the borrowing constraints). However, we would also have had to ensure that Scottish Water had no more revenue that it could reasonably need to deliver these objectives. This is consistent with our responsibility to set maximum charges that reflect the lowest reasonable overall cost of delivering the Ministers' objectives. It is also consistent with normal regulatory practice of ensuring that the regulated company should have a tight budgetary constraint.

We have therefore set the RCV at a level in 2009-10 that would not require any adjustment for financial sustainability. We set the initial RCV such that allowed inflation, capital investment and depreciation would result in the targeted level of RCV in 2009-10. We then used the comparator method to verify that the chosen level of the initial RCV was reasonable.

We chose to use the water and waste water companies in England and Wales as the comparators. We did not use the water only companies because they do not provide a reasonable comparator with the scope of activities that is undertaken by Scottish Water.

How we calculate the revenue cap

We calculate the revenue cap by totaling the cash allowed return on the RCV, allowed for operating costs,

PPP costs, depreciation, the infrastructure renewals charge and taxation. This is illustrated in Figure 19.1.

Figure 19.1: Components of the revenue settlement[222]

Total revenue:	£1,018.2m

Operating costs	£293.8m
PPP charge	£135.8m
Depreciation	£252.3m
Infrastructure renewals charge	£96.8m
Taxation	£14.8m
Embedded debt allowance	£29.1m
Cash Return on RCV	£198.5m - £2.9m[223]

In order to comply with our targeted financial ratios, Scottish Water would require £1,018.2 million revenue in 2009-10 given the levels of costs and investment that we have allowed. We have set the RCV for 2009-10 such that the cash allowed return on the RCV and the allowance for embedded debt is equal to the difference between the required level of revenue and the allowed for level of costs.

We then divide the allowed cash return on the RCV (net of the embedded debt allowance) by our allowed rate of return of 4.12% (this is based on a 65% gearing ratio, consistent with the financial ratios we use to assess financial sustainability). This equates to an average RCV in 2009-10 of £4,821.8 million.

Allowed investment in 2008-09 is £633.3 million. The allowed depreciation and IRC are £230.7 million and £94.0 million respectively. Inflation is assumed to be 2%. This gives an average RCV in 2008-09 of £4,410.2 million.

Allowed investment in 2007-08 is £593.0 million. The allowed depreciation and IRC are £211.2 million and £91.2 million respectively. Inflation is assumed to be 2%. This gives an average RCV in 2007-08 of £4,031.0 million.

Allowed investment in 2006-07 is £534.3 million. The allowed depreciation and IRC are £187.2 million and £88.6 million respectively. Inflation is assumed to be 2%. This gives an average RCV in 2006-07 of £3,683.8 million.

Adjustments to the average RCV

We have adjusted the average RCV in 2006-07. This reflects allowed investment during 2006-07 and the reduction in the RCV, which we included to compensate customers for the overhang from Quality and Standards II[224]. This removes £274.5 million[225] from the initial RCV. We also adjusted capital spending in each year to take account of the efficiencies that were erroneously claimed by the former East of Scotland Water Authority in 2001 .

The impact of this investment and the other adjustments is summarised in Table 19.1.

Table 19.1: Calculation of the initial RCV

	Outturn prices	2006-07	2007-08	2008-09	2009-10
	Opening RCV	£3,519.8m	£3,847.8m	£4,214.3m	£4,606.1m
plus	Inflation adjustment	£70.4m	£77.0m	£84.3m	£92.1m
plus	New investment	£534.3m	£593.0m	£633.3m	£689.5m
less	Depreciation	£187.2m	£211.2m	£230.7m	£252.3m
less	Infrastructure renewals charge	£88.6m	£91.2m	£94.0m	£96.8m
less	Disposal of assets	£1.0m	£1.1m	£1.1m	£1.1m
equals	Closing RCV	£3,847.8m	£4,214.3m	£4,606.1m	£5,037.5m
	Year average	£3,683.8m	£4,031.0m	£4,410.2m	£4,821.8m

An initial RCV of £3,794.4 million (£3,519.8 million plus £274.5 million) is therefore consistent with achieving financial sustainability.

We then used the comparator approach to verify that this initial RCV was reasonable. We followed a five-step process, summarised below.

[222] Totals may not add exactly due to rounding.
[223] £2.9m relates to the current cost working capital adjustment
[224] We discuss the extent of the investment overhang from Quality and Standards II in Chapter 6 of this Volume. We also discuss how we have taken account of the unsubstantiated efficiencies claimed by East of Scotland Water Authority.
[225] £274.5 million is the value of the outputs remaining to be delivered from Quality and Standards II.

Using the comparator approach to verify the initial RCV

The comparator approach allows us to check the consistency of our initial RCV with those of the companies south of the border. This required us to identify factors that influenced the RCV, which we could also measure for Scottish Water.

Step 1: Establish the factors that may influence the RCV

We identified six factors that seemed broadly to correlate with the RCV of the comparator companies. We adopted the following principles in our approach:

- Information about the factor that could influence the RCV needed to be collected consistently across England, Wales and Scotland. The absence of regulatory accounts limited the choice of factors available to us.
- The factor needed to reflect the value of both the water and waste water businesses of the comparator companies. The RCV in England and Wales is reported for the water and sewerage services combined.
- In principle, there needs to be a relatively steady relationship over time between the factor and the RCV. For example, while we could accept a gradual change over the years, we could not use a factor where there may be very significant changes in the relationship between the factor and the RCV.

Step 2: Analyse the ratio between the factor and the RCV for the water and sewerage companies in England and Wales

We analysed the ratio between the RCV and the selected factor for each water and sewerage company in England and Wales in each year from 1999-2000 to 2003-04. Our analysis allowed us to consider the relationship of each factor to the RCV.

Step 3: Apply the observed outcomes for each factor to the corresponding factor for Scottish Water

We used the average, median, minimum and maximum ratio for each factor in 2002-03 and 2003-04 to calculate an implied initial RCV for Scottish Water.

Step 4: Adjust for PPP costs if appropriate

There is no equivalent in England and Wales to PPP contracts (where the assets are built, financed and operated on a long-term concession basis). Where comparisons considered revenue or total asset bases, it was therefore appropriate to remove costs and revenues associated with PPP.

Step 5: Adjust the implied RCVs to reflect likely changes in the period up to 2005-06

This gives a range of implied Scottish Water RCVs for each factor compared in 2005-06.

The six factors that we identified and were able to use in the comparator analysis were:

- revenue (minus operating costs);
- revenue (minus operating costs and the infrastructure renewals charge);
- historic cost net book value of fixed assets;
- net debt;
- total customers (water + waste water); and
- total annual volume (water delivered + sewage returned).

Adjusting comparators to 2005-06

Our comparisons used information from 2002-03 and 2003-04. However, we had to determine an initial RCV for 2005-06 – the starting point for the revenue calculation in our financial model.

The usual method for 'rolling forward' an RCV to a future date is to add the total efficient capital investment and subtract the current cost depreciation for each year. Unfortunately, we are not able to know the efficient investment that Scottish Water will deliver in 2005-06, nor do we know the current cost depreciation for 2005-06.

We were, however, able to analyse likely changes in the RCVs of the companies south of the border. In its final determinations for 2005-10, Ofwat forecasts year-end RCVs for each water and sewerage company in 2002-03 year-end prices. These can then be adjusted to 2005-06 prices. We assumed 2.5% RPI for each year beyond 2002-03. The outcome is shown in Table 19.2.

Table 19.2: Rolling forward the RCVs

(Year-end RCVs)	2002-03 (outturn prices)	2003-04 (outturn prices)	2005-06 (2002-03 prices)	2005-06 (outturn prices)[226]
Anglian	£4,032.3m	£4,250.3m	£4,153.0m	£4,472.3m
Dwr Cymru	£2,362.3m	£2,594.2m	£2,806.0m	£3,021.8m
Northumbrian	£2,171.1m	£2,318.2m	£2,421.0m	£2,607.2m
Severn Trent	£4,397.0m	£4,688.3m	£4,853.0m	£5,226.2m
South West	£1,620.3m	£1,750.9m	£1,929.0m	£2,077.3m
Southern	£2,191.8m	£2,335.5m	£2,324.0m	£2,502.3m
Thames	£4,777.6m	£5,027.3m	£5,435.0m	£5,852.9m
United Utilities	£5,156.6m	£5,366.6m	£5,863.0m	£6,313.8m
Wessex	£1,474.4m	£1,580.0m	£1,692.0m	£1,822.1m
Yorkshire	£2,957.1m	£3,145.5m	£3,392.0m	£3,652.8m
Total	£31,140.4m	£33,057.3m	£34,868.0m	£37,549.0m

For the water and waste water companies in England and Wales, the RCVs increased by 20.6% between 2002-03 and 2005-06, and by between 2003-04 and 2005-06 it was 13.6%. We applied these growth rates to the results of our comparator analysis.

Revenue (excluding operating costs)

The first factor we analysed was 'revenue excluding operating costs'. We could have analysed revenue figures. However, we considered that this would not have been appropriate since the RCV method of price setting that is used south of the border takes separate account of an appropriate level of operating costs.

Table 19.3 shows the ratios of RCV to revenue excluding operating costs for each of the English and Welsh water and waste water companies. It covers the period 1999-00 to 2003-04. It also shows the calculated average, median, minimum and maximum ratios for each year.

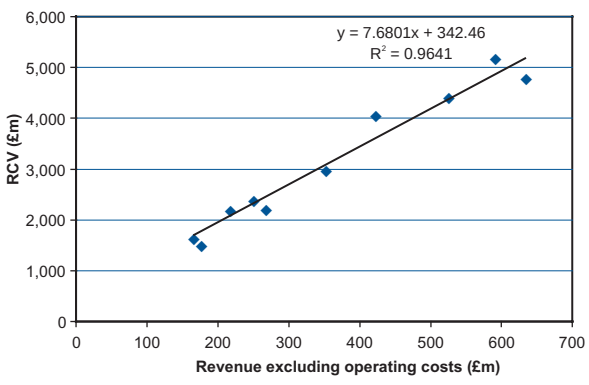
Table 19.3: Ratios of RCV to revenue (excluding operating costs)

	1999-00	2000-01	2001-02	2002-03	2003-04
Anglian	7.72	9.11	8.98	9.54	9.05
Dwr Cymru	6.47	8.54	8.61	9.42	10.33
Northumbrian	5.77	9.04	8.67	9.97	10.24
Severn Trent	6.63	7.81	7.81	8.36	8.40
South West	7.91	9.04	9.24	9.76	9.88
Southern	6.61	7.20	7.33	8.17	8.45
Thames	6.56	7.81	7.37	7.53	8.13
United Utilities	7.24	7.34	7.77	8.71	8.55
Wessex	5.62	7.13	7.62	8.32	8.23
Yorkshire	6.11	8.06	7.81	8.38	8.16
Average	6.66	8.11	8.12	8.82	8.94
Median	6.59	7.94	7.81	8.55	8.50
Minimum	5.62	7.13	7.33	7.53	8.13
Maximum	7.91	9.11	9.24	9.97	10.33

The revenue (excluding operating costs) to RCV ratios shown in Table 19.3 generally rise over time. We used the results of this analysis for the years 2002-03 and 2003-04 to check the initial RCV for Scottish Water.

Figure 19.2 shows that there is a strong relationship between revenue minus operating costs and the RCV.

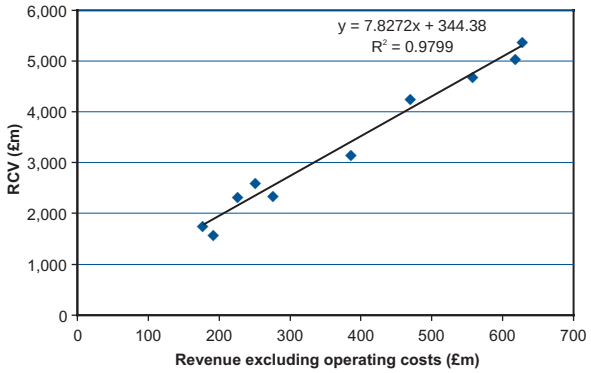
Figure 19.2: Revenue (excluding operating costs) to RCV for England and Wales water and sewerage companies



[226] Assuming 2.5% RPI a year.

Figure 19.3 shows that there is also a strong relationship between revenue excluding operating costs and the RCV in 2003-04 among the water and waste water companies.

Figure 19.3: 2003-04 revenue (excluding operating costs) to RCV for England and Wales water and sewerage companies



Scottish Water's revenue in 2002-03 was £895.3 million, of which £99.3 million was spent on PPP. We fund PPP activities separately and it is therefore appropriate to exclude them from revenue for the purposes of this comparison. Excluding revenue from PPP activities reduces Scottish Water's revenue to £796 million.

Operating costs in 2002-03 were £192.36 million for water and £169.33 million for waste water.

Scottish Water's revenue excluding operating costs in 2002-03 is therefore £434 million, as shown in Table 19.4.

Table 19.4: Scottish Water's revenue excluding operating costs 2002-03

Scottish Water's 2002-03 revenue	£895.3m
Less PPP activities	£99.3m
Less water operating costs	£192.3m
Less waste water operating costs	£169.3m
Revenue excluding operating costs:	**£434.4m**

We have used this information to assess the average, median, minimum and maximum initial RCVs for Scottish Water. This is illustrated in Table 19.5.

The table also shows the rolled-forward value of those implied RCVs for 2005-06. The range of implied RCVs for Scottish Water is from £3.9 billion to £5.2 billion.

Table 19.5: Implied RCVs for revenue excluding operating costs based on 2002-03 information

	Ratio of revenue minus operating costs to RCV (from Table 19.3)	Scottish Water revenue minus operating costs	Implied RCV for Scottish Water 2002-03	Implied RCV for Scottish Water 2005-06
Average	8.81	£434.4m	£3,829.1m	£4,617.1m
Median	8.55	£434.4m	£3,710.6m	£4,474.3m
Minimum	7.53	£434.4m	£3,269.4m	£3,942.2m
Maximum	9.97	£434.4m	£4,332.1m	£5,224.3m

In 2003-04, Scottish Water's revenue excluding operating costs was £477 million. We subtracted £112 million of PPP charges, £209.7 million of water operating costs and £159.4 million of waste water operating costs from revenue of £958.3 million. This is shown in Table 19.6.

Table 19.6: Scottish Water's revenue excluding operating costs 2003-04[227]

Scottish Water's 2003-04 revenue	£958.3m
Less PPP activities	£112.0m
Less water operating costs	£209.7m
Less waste water operating costs	£159.4m
Revenue excluding operating costs	**£477.1m**

Table 19.7 shows the range of implied RCVs for Scottish Water based on the comparison of revenue minus operating costs for 2003-04.

Table 19.7: Implied RCVs using revenue excluding operating costs for 2003-04

	Ratio of revenue minus operating costs to RCV (from Table 19.3)	Scottish Water revenue minus operating costs	Implied RCV for Scottish Water 2003-04	Implied RCV for Scottish Water 2005-06
Average	£8.94m	£477.1m	£4,265.9m	£4,845.5m
Median	£8.50m	£477.1m	£4,054.1m	£4,604.9m
Minimum	£8.13m	£477.1m	£3,879.0m	£4,406.1m
Maximum	£10.33m	£477.1m	£4,929.4m	£5,599.2m

This table shows a range of implied RCVs for Scottish Water of £4.4 billion to £5.6 billion.

[227] Totals may not add up due to rounding.

The revenue excluding operating costs comparisons based on 2002-03 and 2003-04 information suggest that the RCV for Scottish Water in 2005-06 should be in a range £3.9 billion to £5.6 billion. This comparison does not, however, take any account of Scottish Water's relative inefficiency in delivering its capital programme or of the reduced scope of activities delivered by Scottish Water for the level of operating costs incurred.

Revenue (excluding operating costs and infrastructure renewals charge)

Table 19.8 shows the ratios of the RCV for each water and waste water company against its revenue excluding its operating costs and its infrastructure renewals charge. It covers the years from 1999-00 to 2003-04. It also shows the calculated average, median, minimum and maximum ratios for each year.

Table 19.8: Ratios of RCV to revenue (excluding operating costs and the infrastructure renewals charge)

	1999-00	2000-01	2001-02	2002-03	2003-04
Anglian	8.05	9.76	9.59	10.19	9.60
Dwr Cymru	7.39	10.04	10.02	12.03	12.60
Northumbrian	6.26	10.59	10.07	11.81	12.06
Severn Trent	7.25	8.70	8.69	9.35	9.34
South West	8.21	9.87	10.05	10.65	10.74
Southern	7.05	7.75	7.92	8.97	9.40
Thames	7.02	8.40	8.22	8.55	9.07
United Utilities	8.33	8.75	9.32	10.10	9.53
Wessex	5.94	7.80	8.34	9.23	9.19
Yorkshire	6.72	8.91	8.64	9.33	9.08
Average	7.22	9.06	9.09	10.02	10.06
Median	7.15	8.83	9.01	9.73	9.47
Minimum	5.94	7.75	7.92	8.55	9.07
Maximum	8.33	10.59	10.07	12.03	12.60

Table 19.8 again shows that the ratio of RCV to revenue excluding operating costs and the infrastructure renewal charge generally rises over time in England and Wales.

Figure 19.4 shows that there is a strong relationship between RCV and revenue minus operating costs and infrastructure renewals.

Figure 19.4: 2002-03 revenue (excluding operating costs and IRC) for RCV to England and Wales water and sewerage companies

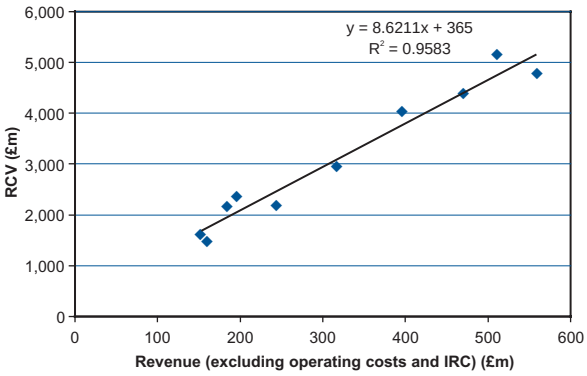
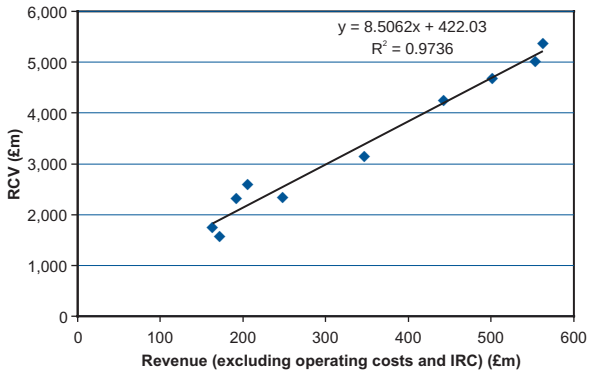


Figure 19.5 shows the same information for 2003-04. It indicates that there is a similarly strong relationship between revenue excluding operating costs and IRC and the RCV.

Figure 19.5: 2003-04 revenue (excluding operating costs and IRC) to RCV for England and Wales water and sewerage companies



In 2002-03 Scottish Water's revenue excluding operating costs was £434 million. Its infrastructure renewals charge for that year was £140 million. Revenue minus operating costs and infrastructure renewals was £294 million. This is shown in Table 19.9.

Table 19.9: Scottish Water's revenue excluding operating costs and IRC

Scottish Water's 2002-03 revenue excluding operating costs	£434.4m
Less infrastructure renewals charge	£140.0m
Revenue excluding operating costs and IRC	**£294.4m**

Table 19.10 shows the range of implied RCVs for Scottish Water indicated by comparing revenue minus operating costs and IRC for 2002-03 with the RCVs of the companies. We have again used the average, median, minimum and maximum value from our analysis of the companies south of the border.

Table 19.10: Implied RCVs for Scottish Water using revenue excluding operating costs and IRC comparator figures from 2002-03

	Ratio of revenue minus operating costs and IRC to RCV (from Table 19.8)	Scottish Water revenue minus operating costs and IRC	Implied RCV for Scottish Water 2002-03	Implied RCV for Scottish Water 2005-06
Average	10.02	£294.4m	£2,950.2m	£3,557.3m
Median	9.73	£294.4m	£2,863.2m	£3,452.4m
Minimum	8.55	£294.4m	£2,517.3m	£3,035.4m
Maximum	12.03	£294.4m	£3,541.9m	£4,270.9m

In 2003-04, Scottish Water's revenue excluding operating costs was £477.1 million. The IRC for that year was £143.0 million. Revenue minus operating costs and IRC was therefore £334.1 million. This is shown in Table 19.11.

Table 19.11: Scottish Water's revenue excluding operating costs and IRC 2003-04

Scottish Water's 2003-04 revenue excluding operating costs	477.1m
Less infrastructure renewals charge	143.0m
Revenue excluding operating costs and IRC	**334.1m**

Table 19.12 shows the range of implied RCVs for Scottish Water based on information for 2003-04.

Table 19.12: Implied RCVs for Scottish Water using revenue excluding operating costs and IRC comparator figures from 2003-04

	Ratio of revenue minus operating costs and IRC to RCV (from Table 19.8)	Scottish Water revenue minus operating costs and RCV	Implied RCV for Scottish Water 2003-04	Implied RCV for Scottish Water 2005-06
Average	10.06	£334.1m	£3,361.9m	£3,818.7m
Median	9.47	£334.1m	£3,162.3m	£3,592.0m
Minimum	9.07	£334.1m	£3,031.7m	£3,443.6m
Maximum	12.60	£334.1m	£4,211.2m	£4,783.4m

The RCV to revenue (excluding operating costs and IRC) comparisons for 2002-03 and 2003-04 suggest that the RCV should be in the range £3.0 billion to £4.8 billion. As before, this comparison does not take any account of the Scottish Water's relative inefficiency in delivering its capital programme or of the reduced scope of activities delivered by Scottish Water for the level of operating costs incurred.

Historic cost net book value of fixed assets

Our second approach considered the relationship between the historic cost net book value of fixed assets of companies south of the border and their RCV. The historic cost net book value of fixed assets is a measure of the value of assets invested in the business. We would have preferred to use the current cost value of assets but Scottish Water did not produce regulatory accounts for the period 2002-04.

Table 19.13 shows the ratios of RCV to historic cost net book value of fixed assets for each of the companies. It covers the period 1999-00 to 2003-04. It also shows the calculated average, median, minimum and maximum ratios for each year.

Table 19.13 Ratio of RCV to historic cost net book value of fixed assets

	1999-00	2000-01	2001-02	2002-03	2003-04
Anglian	0.96	1.04	1.06	1.10	1.13
Dwr Cymru	0.85	0.90	0.90	0.95	0.99
Northumbrian	0.86	0.98	0.93	0.94	0.96
Severn Trent	0.92	0.92	0.91	0.93	0.96
South West	0.93	0.83	0.83	0.86	0.90
Southern	1.01	0.90	0.83	0.84	0.87
Thames	1.04	1.03	1.02	1.02	1.01
United Utilities	1.02	0.96	0.97	0.98	0.92
Wessex	0.89	0.94	0.96	0.99	1.00
Yorkshire	0.85	0.90	0.88	0.92	0.94
Average	0.93	0.94	0.93	0.95	0.97
Median	0.93	0.93	0.92	0.95	0.96
Minimum	0.85	0.83	0.83	0.84	0.87
Maximum	1.04	1.04	1.06	1.10	1.13

As can be seen from the table, there is a relatively steady relationship over time between the net book value of fixed assets and the RCV for water and waste water companies in England and Wales.

Figure 19.6 illustrates that there is a clear relationship between the historic cost net book value of fixed assets and the RCV for the companies in 2002-03.

Figure 19.6: Comparison of RCVs and historic cost fixed assets for water and sewerage companies in England and Wales in 2002-03

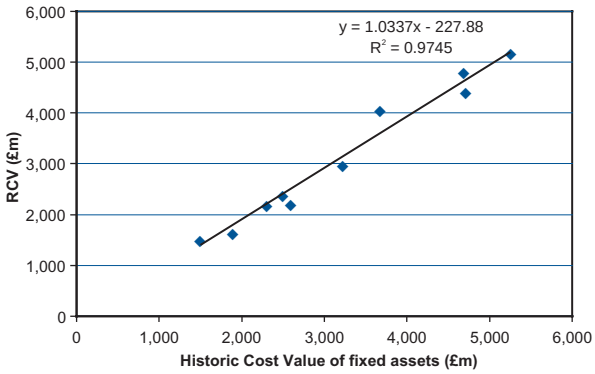
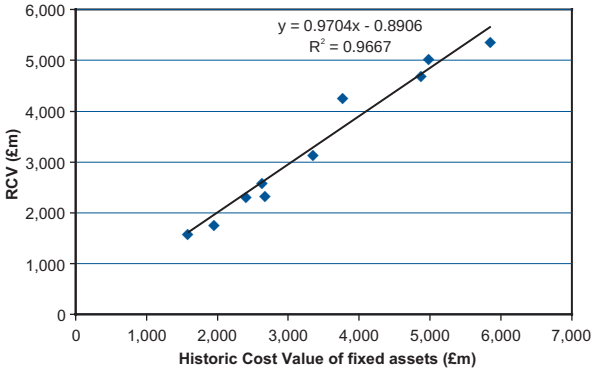


Figure 19.7 shows that there is a similarly strong correlation between the historic cost net book value of fixed assets and the RCV for the companies in 2003-04.

Figure 19.7: Comparison of RCVs and historic cost fixed assets for water and sewerage companies in England and Wales in 2003-04



Scottish Water's net book value for 2002-03 was £2,437.3 million. We have not had to make an adjustment for PPP since these assets are not included in the net book value of Scottish Water's assets.

Table 19.14 illustrates the RCVs based on a comparison of historic cost net asset values with the companies south of the border in 2002-03.

Table 19.14: Implied RCVs using historic cost net book value of fixed assets for 2002-03

	Ratio of historic cost fixed assets to RCV (from Table 19.13)	Scottish Water's historic cost fixed assets	Implied RCV for Scottish Water 2002-03	Implied RCV for Scottish Water 2005-06
Average	0.95	£2,437.3m	£2,321.5m	£2,799.3m
Median	0.94	£2,437.3m	£2,301.7m	£2,775.3m
Minimum	0.84	£2,437.3m	£2,059.7m	£2,482.3m
Maximum	1.10	£2,437.3m	£2,673.2m	£3,223.3m

Scottish Water's net book value of historic cost assets for 2003-04 was £2,581.2 million. Table 19.15 shows the results of comparisons for 2003-04.

Table 19.15: Implied RCVs using historic cost fixed assets for 2003-04

	Ratio of historic cost fixed assets to RCV (from Table 19.13)	Scottish Water's historic cost fixed assets	Implied RCV for Scottish Water 2003-04	Implied RCV for Scottish Water 2005-06
Average	0.97	£2,581.2m	£2,496.5m	£2,857.7m
Median	0.96	£2,581.2m	£2,486.6m	£2,824.5m
Minimum	0.87	£2,581.2m	£2,255.1m	£2,561.5m
Maximum	1.13	£2,581.2m	£2,912.4m	£3,308.1m

Our comparisons of net book value for 2002-03 and 2003-04 would suggest that the initial RCV for Scottish Water should be in a range from £2.5 billion to £3.3 billion.

Net debt

The initial RCVs for the water and sewerage companies in England and Wales reflected the market valuation of the companies in the period after they were privatised. Markets now consider that the RCV should be broadly equal to the enterprise (equity plus debt) value of the company. In general we could expect there to be a relationship between debt and the RCV. In Scotland, it is not clear that debt has been incurred either prudently or efficiently. There have been a number of instances south of the border where companies have decided to increase their level of debt in an attempt to reduce their cost of capital.

Table 19.16 shows the ratios of RCV to debt for each of the companies each year over the period 1999-00 to 2003-04. It also shows the calculated average, median, minimum and maximum ratios for each year.

Table 19.16: Ratios of RCV to debt

	1999-00	2000-01	2001-02	2002-03	2003-04
Anglian	2.23	2.30	1.93	1.22	1.22
Dwr Cymru	2.12	1.50	1.14	1.18	1.20
Northumbrian	2.25	1.83	1.69	1.60	1.68
Severn Trent	2.19	2.01	2.01	2.02	2.05
South West	2.80	2.36	1.92	1.74	1.72
Southern	2.32	2.04	1.72	1.74	1.19
Thames	2.22	2.05	2.19	2.11	2.09
United Utilities	2.25	2.09	2.10	2.07	1.89
Wessex	2.08	2.16	2.05	1.43	1.47
Yorkshire	2.89	2.71	2.60	2.53	2.52
Average	2.34	2.11	1.94	1.76	1.70
Median	2.24	2.07	1.97	1.74	1.70
Minimum	2.08	1.50	1.14	1.18	1.19
Maximum	2.89	2.71	2.60	2.53	2.52

Financial restructuring of some of the companies means that there is now no clear relationship between the RCV and levels of debt.

Figure 19.8 shows that in 2002-03 there is a limited correlation between the level of indebtedness and the size of the RCV. The correlation is not as strong as for the other factors that we have examined.

Figure 19.8: Comparison of net debt and RCVs for water and sewerage companies in 2002-03

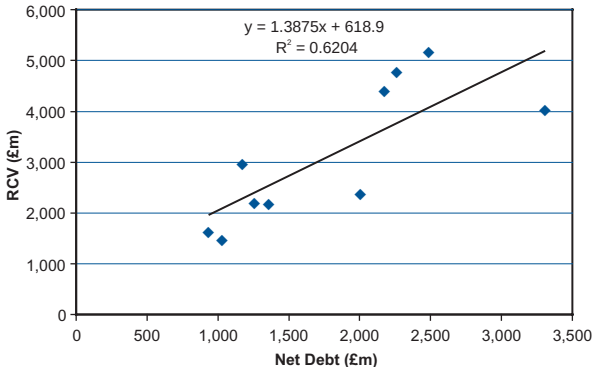
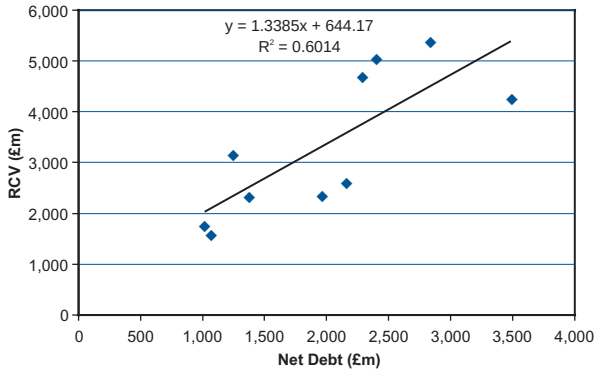


Figure 19.9 shows a similar pattern for 2003-04.

Figure 19.9: Comparison of net debt and RCVs for water and sewerage companies in 2003-04



We calculated Scottish Water's net debt by subtracting £1.7 million cash and short-term investments from the gross debt of £2,150.8 million. This gave net debt of £2,149.2 million.

Table 19.17 shows the results of this comparison for 2002-03.

Table 19.17: Implied RCVs using net debt for 2002-03

	Ratio of RCV to net debt (from Table 19.16)	Scottish Water's net debt 2002-03	Implied RCV for Scottish Water 2002-03	Implied RCV for Scottish Water 2005-06
Average	1.76	£2,149.2m	£3,792.3m	£4,572.7m
Median	1.74	£2,149.2m	£3,741.7m	£4,511.7m
Minimum	1.18	£2,149.2m	£2,530.7m	£3,051.6m
Maximum	2.53	£2,149.2m	£5,429.6m	£6,547.0m

In 2003-04, Scottish Water's net debt was £2,127.9 million.

Table 19.18 shows the results of a comparison based on debt for 2003-04.

Table 19.18: Implied RCVs using net debt for 2003-04

	Ratio of net debt to RCV (from Table 19.16)	Scottish Water's net debt 2003-04	Implied RCV for Scottish Water 2003-04	Implied RCV for Scottish Water 2005-06
Average	1.70	£2,127.9m	£3,621.4m	£4,113.5m
Median	1.70	£2,127.9m	£3,620.3m	£4,112.2m
Minimum	1.19	£2,127.9m	£2,524.8m	£2,867.8m
Maximum	2.52	£2,127.9m	£5,357.7m	£6,085.7m

The net debt comparisons for 2002-03 and 2003-04 suggest that the initial RCV for Scottish Water should be in the range £2.9 billion to £6.5 billion.

Water and waste water customers

We also examined the relationship between the total number of connected customers and the RCV. Our hypothesis was that the greater the number of connected customers, the greater the RCV. We made this comparison using the total number of water and waste water customers.

We subtracted the waste water customers of Scottish Water who are served by PPP contracts.

Table 19.19 shows the ratio of RCV to total water and waste water customers for each of the water and waste water companies in England and Wales between 1999-2000 and 2003-04. It also shows the calculated average, median, minimum and maximum ratios for each year.

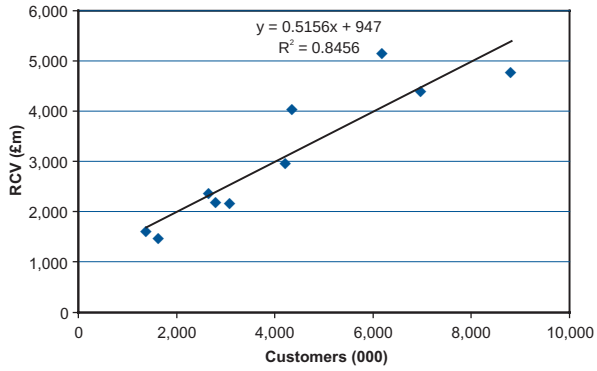
Table 19.19: Ratios of RCV to water and waste water customer numbers

	1999-00	2000-01	2001-02	2002-03	2003-04
Anglian	0.77	0.86	0.89	0.93	0.97
Dwr Cymru	0.69	0.78	0.80	0.89	0.98
Northumbrian	0.55	0.66	0.67	0.71	0.75
Severn Trent	0.60	0.60	0.60	0.63	0.67
South West	1.10	1.03	1.08	1.18	1.26
Southern	0.78	0.76	0.74	0.78	0.83
Thames	0.50	0.51	0.52	0.54	0.57
United Utilities	0.76	0.73	0.77	0.83	0.86
Wessex	0.72	0.80	0.84	0.91	0.96
Yorkshire	0.58	0.62	0.65	0.70	0.74
Average	0.71	0.74	0.76	0.81	0.86
Median	0.71	0.75	0.76	0.81	0.85
Minimum	0.50	0.51	0.52	0.54	0.57
Maximum	1.10	1.03	1.08	1.18	1.26

This analysis has revealed quite large variations between the companies, but also that there is a general increase in the ratio over time. This probably reflects the increasing investment in improving quality standards.

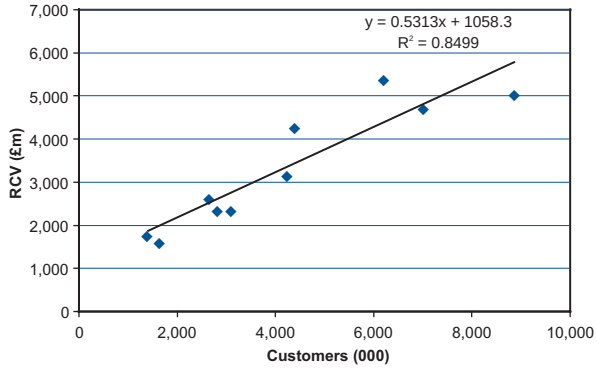
Figure 19.10 shows that there is a clear relationship between customer numbers and the RCV for each company in 2002-03.

Figure 19.10: Customer numbers compared with RCV for England and Wales in 2002-03



This pattern is repeated if we make the same comparison for 2003-04. Figure 19.11 illustrates this comparison.

Figure 19.11: Customer numbers compared with RCV for England and Wales in 2003-04



Scottish Water had 2.389 million connected properties for water and 2.232 million connected properties for waste water in 2002-03. There were 4.622 million customers in 2002-03.

Scottish Water does not report the number of properties connected to PPP treatment works. We cannot therefore easily subtract this figure from the total customer base served.

However, Scottish Water does report the total load (a measure of the strength of sewage) of sewage receiving treatment through PPP works and the total load for Scotland. We have assumed that the load characteristics of PPP customers are the same as those for non-PPP customers. This has allowed us to determine the number of non-PPP waste water customers.

Table 19.20 illustrates this calculation for 2002-03. We have divided the total load receiving treatment through PPP assets by the total load receiving secondary treatment. This suggests that 48.9% of Scottish Water's waste water customers are served by PPP assets. The total number of Scottish Water waste water customers served by non-PPP sites is therefore 1.140 million. Scottish Water therefore has 3.53 million customers for the purposes of this analysis.

Table 19.20: Implied number of non-PPP waste water customers

Total load receiving treatment through secondary treatment works	67,515 tonnes
Total load receiving secondary treatment	138,045 tonnes
% treated at PPP treatment works	48.9%
Implied number of Scottish Water waste water customers	1.14 million

Table 19.21 shows the results of our analysis using customer numbers in 2002-03.

Table 19.21: Implied RCVs using customer numbers in 2002-03

	Ratio of RCV to customer numbers (from Table 19.19)	Scottish Water's customer numbers (water plus waste water) 2002-03 (million)	Implied RCV for Scottish Water 2002-03	Implied RCV for Scottish Water 2005-06
Average	0.81	3.53	£2,861.0m	£3,449.8m
Median	0.81	3.53	£2,855.9m	£3,443.7m
Minimum	0.54	3.53	£1,915.9m	£2,310.2m
Maximum	1.18	3.53	£4,159.6m	£5,015.6m

In 2003-04, Scottish Water had 2.481 million connected properties for water and 2.254 million connected properties for waste water. This gave a total number of customers in 2003-04 of 4.735 million.

Table 19.22 shows our calculation of the total number of customers served directly by Scottish Water in 2003-04.

Table 19.22: Implied number of non-PPP waste water customers

Total load receiving treatment through secondary treatment works	73,626 tonnes
Total load receiving secondary treatment	148,141 tonnes
% treated at PPP treatment works	49.7%
Implied number of waste water customers	1.134 million

For the purposes of this analysis, Scottish Water had 3.625 million customers in 2003-04.

Table 19.23 shows the results of the customer number comparison for 2003-04.

Table 19.23: Implied RCVs using customer numbers for 2003-04

	Ratio of RCV to customer numbers (from Table 19.19)	Scottish Water's customer numbers (water plus waste water) 2003-04 (million)	Implied RCV for Scottish Water 2003-04	Implied RCV for Scottish Water 2005-06
Average	0.86	3.62	£3,107.5m	£3,529.8m
Median	0.85	3.62	£3,062.4m	£3,478.5m
Minimum	0.57	3.62	£2,049.7m	£2,328.2m
Maximum	1.26	3.62	£4,563.7m	£5,183.8m

The customer numbers comparisons for 2002-03 and 2003-04 would suggest an initial RCV for Scottish Water of between £2.3 billion and £5.2 billion.

We would not want to rely solely on this comparison since it values water and waste water customers equally. This is likely to benefit Scottish Water (with a low proportion of waste water customers) because waste water assets typically cost more than clean water assets.

A water and waste water company with a water only company in its area will have a relatively higher proportion of waste water customers. This contrasts with Scottish Water where many waste water customers in its area are served by PPP.

Water and waste water volumes

We also examined the relationship between the output of the water companies south of the border and their RCV. Our analysis used the volume of water delivered rather than the volume of water treated. We do not believe that Scottish Water is operating at an economic level of leakage. Using the volume of water treated would reward Scottish Water for having a high level of leakage.

In order to compare outputs objectively we subtracted the volume of waste water treated by PPP works from the total outputs of Scottish Water. We adjusted waste water volumes in the same way that we had adjusted waste water customer numbers.

Table 19.24 shows the ratios of RCV to water and waste water volumes for each water and waste water company in England and Wales. It also shows the calculated average, median, minimum and maximum ratios for each year.

Table 19.24: Ratios of RCV to water and waste water volumes

	1999-00	2000-01	2001-02	2002-03	2003-04
Anglian	1.58	1.80	1.91	2.00	2.12
Dwr Cymru	1.33	1.49	1.59	1.80	1.98
Northumbrian	1.05	1.28	1.30	1.40	1.50
Severn Trent	1.26	1.29	1.30	1.43	1.43
South West	2.38	2.27	2.33	2.56	2.68
Southern	1.59	1.55	1.55	1.64	1.76
Thames	0.90	0.90	0.91	0.95	0.97
United Utilities	1.54	1.49	1.57	1.70	1.75
Wessex	1.44	1.59	1.69	1.87	1.89
Yorkshire	1.25	1.35	1.36	1.50	1.59
Average	1.43	1.50	1.55	1.69	1.77
Median	1.39	1.49	1.56	1.67	1.76
Minimu	0.90	0.90	0.91	0.95	0.97
Maximu	2.38	2.27	2.33	2.56	2.68

This table shows that, in general, the ratio is increasing over time. There are some differences between the companies in the level of the ratio.

Figure 19.12 shows that there is a reasonable correlation between the total output of the companies and their RCVs.

Figure 19.12: Comparison of RCV with water delivered and waste water returned for 2002-03

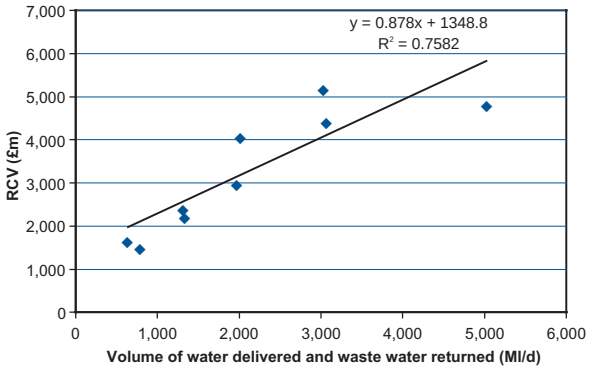
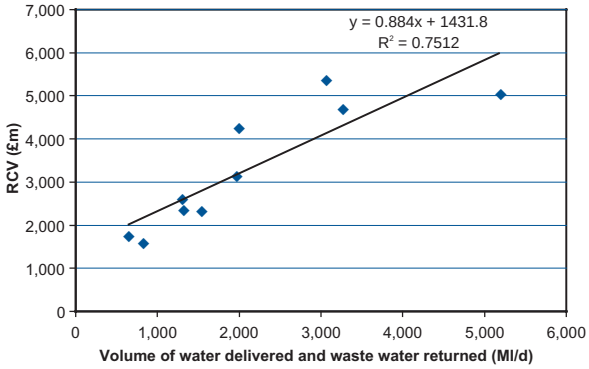


Figure 19.13 shows the same analysis for 2003-04.

Figure 19.13: Comparison of RCV with water delivered and waste water returned for 2003-04



In 2002-03, Scottish Water delivered 1,374.3 Ml/d of water and collected 1,068.9 Ml/d of sewage. We again assumed that 48.9% of sewage was returned to PPP works. The adjusted sewage volume for this comparison is therefore 546.1 Ml/d.

The total amount of water delivered and waste water returned was therefore 1,920.4 Ml.

Table 19.25 shows the results of our analysis of total volumes of water and waste water in 2002-03.

Table 19.25: Implied RCVs using volumes for 2002-03

	Ratio of RCV to volume (from Table 19.24)	Scottish Water's volume (water delivered plus sewage returned) 2002-03 (Ml/d)	Implied RCV for Scottish Water 2002-03	Implied RCV for Scottish Water 2005-06
Average	1.69	1,920.4	£3,238.4m	£3,904.9m
Median	1.67	1,920.4	£3,214.6m	£3,876.2m
Minimum	0.95	1,920.4	£1,826.5m	£2,202.3m
Maximum	2.56	1,920.4	£4,910.5m	£5,921.5 m

In 2003-04, Scottish Water delivered 1,378.4 Ml/d of water and collected 928.8 Ml/d of sewage. We again assumed that 49.7% of sewage was returned to PPP works in 2003-04. The total water delivered and waste water returned for the purpose of this analysis was therefore 1,845.6 Ml/d.

Table 19.26 shows the results of this analysis of total volumes of water and waste water in 2003-04.

Table 19.26: Implied RCVs using volumes for 2003-04

	Ratio of RCV to volume (from Table 19.24)	Scottish Water's volume (water delivered plus sewage returned) 2003-04 (Ml/d)	Implied RCV for Scottish Water 2002-03	Implied RCV for Scottish Water 2005-06
Average	1.77	1,845.6	£3,260.7m	£3,703.8m
Median	1.75	1,845.6	£3,236.0m	£3,675.7m
Minimum	0.97	1,845.6	£1,784.5m	£2,027.0m
Maximum	2.68	1,845.6	£4,938.5m	£5,609.6m

The comparisons of RCV to total volumes suggest that the initial RCV for Scottish Water should be in the range £2 billion to £5.9 billion.

As with the other methods of comparison, we would not want to rely wholly on this analysis of volumes. This analysis would probably unduly favour Scottish Water as we have assumed the same standards of water and treatment on both sides of the border. We also assume that the assets required to treat one unit of water will be the same as the assets required to treat one unit of waste water. This will benefit a company with a relatively lower proportion of waste water customers.

Conclusions

We do not believe that we can rely solely on one method of comparison. Some of these methods tend to favour Scottish Water (volumes, customer numbers and revenue-based comparisons), while some would seem to disadvantage Scottish Water (historic cost assets). However, we believe that our analysis is broadly consistent with the approximate £3.8 billion initial RCV that is required to ensure that Scottish Water would be in a financially sustainable position at the end of this regulatory control period.

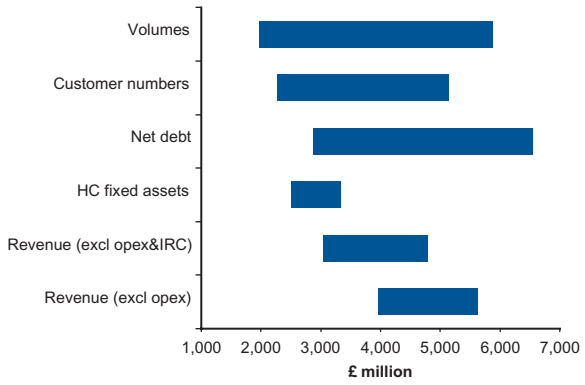
Table 19.27 summarises the results of each of the different approaches. The table shows the reliability of the comparison as measured by the average R^2 of the correlation. The closer the R^2 value is to 100%, the more we can rely on that ratio.

Table 19.27: Range of RCVs implied by each comparator approach

	Minimum	Maximum	Average R^2
Revenue (minus operating costs)	£3.9bn	£5.6bn	97.2%
Revenue (minus operating costs & IRC)	£3.0bn	£4.8bn	95.8%
Historic cost fixed assets	£2.5bn	£3.3bn	97.1%
Net debt	£2.9bn	£6.5bn	61.1%
Customer numbers	£2.3bn	£5.2bn	84.8%
Volumes	£2.0bn	£6.0bn	75.4%

There is no single RCV that satisfies each of the comparisons. Indeed, the two comparisons with the strongest relationship (revenue (minus operating costs) and historic cost fixed assets) produce ranges that do not overlap. Figure 19.14 shows the ranges for each of the comparisons.

Figure 19.14: Ranges implied by comparators for Scottish Water's initial RCV at 31 March 2006



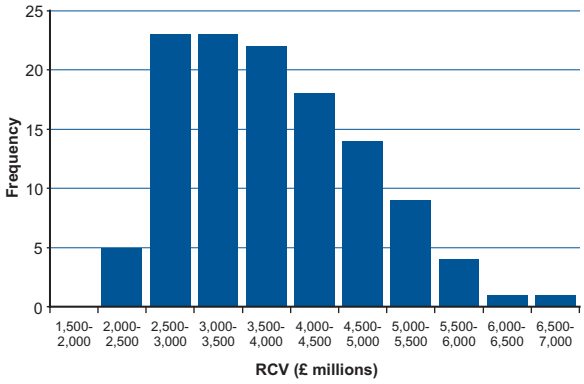
It suggests an initial RCV of £3,814 million. Table 19.28 illustrates this analysis. This is fully consistent with the approximate £3.8 billion initial RCV required for financial sustainability at the end of the regulatory control period.

Table 19.28: Implied RCV for Scottish Water, for each method of comparison

Year-end 2005-06 RCV	Turnover (excl opex)		Turnover (excl opex and IRC)		HC fixed assets		Net debt		Customer numbers		Volumes		
	2002-03	2003-04	2002-03	2003-04	2002-03	2003-04	2002-03	2003-04	2002-03	2003-04	2002-03	2003-04	Average
Anglian	£4,994.5m	£4,903.0m	£3,616.2m	£3,642.9m	£3,223.3m	£3,308.1m	£3,159.3m	£2,938.8m	£3,948.0m	£3,971.6m	£4,635.6m	£4,451.1m	£3,899.4m
Dwr Cymru	£4,933.8m	£5,599.2m	£4,270.9m	£4,783.4m	£2,779.7m	£2,891.8m	£3,051.6m	£2,899.1m	£3,795.5m	£4,025.9m	£4,164.5m	£4,153.7m	£3,945.8m
Northumbrian	£5,224.3m	£5,552.2m	£4,190.9m	£4,578.8m	£2,770.9m	£2,828.4m	£4,141.5m	£4,065.4m	£3,004.1m	£3,075.7m	£3,243.4m	£3,138.5m	£3,817.8m
Severn Trent	£4,379.4m	£4,550.4m	£3,319.7m	£3,546.1m	£2,743.2m	£2,820.6m	£5,239.6m	£4,943.4m	£2,685.0m	£2,745.9m	£3,322.9m	£3,001.4m	£3,608.1m
South West	£5,111.1m	£5,352.1m	£3,781.1m	£4,076.9m	£2,519.9m	£2,625.7m	£4,505.6m	£4,159.0m	£5,015.6m	£5,183.8m	£5,921.5m	£5,609.6m	£4,488.5m
Southern	£4,281.6m	£4,578.5m	£3,183.3m	£3,568.4m	£2,482.3m	£2,561.5m	£4,517.8m	£2,867.8m	£3,336.5m	£3,405.6m	£3,808.1m	£3,687.9m	£3,523.3m
Thames	£3,942.2m	£4,406.1m	£3,035.4m	£3,443.6m	£2,995.7m	£2,958.3m	£5,477.1m	£5,050.2m	£2,310.2m	£2,328.2m	£2,202.3m	£2,027.0m	£3,348.0m
United Utilities	£4,560.6m	£4,631.4m	£3,585.2m	£3,615.6m	£2,884.5m	£2,687.6m	£5,372.4m	£4,566.9m	£3,550.8m	£3,551.5m	£3,944.2m	£3,663.5m	£3,884.5m
Wessex	£4,355.9m	£4,460.4m	£3,278.1m	£3,486.6m	£2,895.3m	£2,923.8m	£3,715.4m	£3,558.6m	£3,864.2m	£3,961.0m	£4,331.9m	£3,968.1m	£3,733.3m
Yorkshire	£4,387.9m	£4,421.8m	£3,312.2m	£3,445.1m	£2,697.9m	£2,751.3m	£6,547.0m	£6,085.7m	£2,988.2m	£3,048.5m	£3,474.5m	£3,337.1m	£3,874.8m
Average	£4,617.1m	£4,845.5m	£3,557.3m	£3,818.7m	£2,799.3m	£2,835.7m	£4,572.7m	£4,113.5m	£3,449.8m	£3,529.8m	£3,904.9m	£3,703.8m	£3,812.3m

Figure 19.14 illustrates that the most common results of our comparisons are between £2.5 billion and £3.5 billion. Answers above £5 billion are relatively rare but are sufficient to increase the average.

Figure 19.15: Frequency of RCV occurrence using all means of comparison



Summary

Our priority is to ensure that Scottish Water is financially sustainable. We have used the same ratios that Ofwat used in its 2004 price determinations for the companies south of the border to measure the financial sustainability of Scottish Water. Our analysis has suggested that Scottish Water needs an initial RCV of approximately £3.8 billion in order to ensure that it remains financially sustainable at the end of the 2006-10 regulatory control period.

We used the comparator approach to check whether an initial RCV was consistent with the regulatory capital value of the companies south of the border. This is the same approach that Ofwat successfully used to set the initial RCV of the water only companies in England and Wales.

Our comparisons considered the relationship between a range of financial, customer and asset factors and the RCVs of the companies south of the border.

Our analysis would seem to confirm that an initial RCV of £3.8 billion is reasonable. Indeed this RCV may be higher than would be justified if we had adjusted our comparisons to take account of Scottish Water's relative efficiency, its level of leakage or its level of customer service.

Section 4: Funding capital expenditure
Chapter 20: Summary of costs of funding the capital programme

Introduction

In Chapter 12 we explained our move towards the regulatory capital value approach to price setting. We explained that this approach included the cost of financing and managing the asset base and the costs of replacing the assets as and when necessary. The cost of financing and managing the replacement of assets is termed the cash allowed return on the RCV. It is calculated by multiplying the average regulatory capital value for each year by the allowed rate of return. The allowance for embedded debt also needs to be added to this rate of return. The costs of asset replacement are recognised in the depreciation and infrastructure charges. In previous chapters we have set out our calculation of each of these elements. This chapter provides a summary of asset financing and replacement costs.

Financing the capital programme

The regulatory capital value in each year of this regulatory control period is set out in Table 20.1. The table also shows the depreciation and infrastructure renewals charges in each year. All investment is adjusted for inflation. The inflation adjustment for investment is the Construction Output Price Index (COPI) and is 3% compound. The adjustment to the RCV for inflation is made with reference to the consumer price index (CPI).

Table 20.1: Calculation of the initial RCV

Outturn prices	2006-07	2007-08	2008-09	2009-10
Opening RCV	£3,519.8m	£3,847.8m	£4,214.3m	£4,606.1m
Inflation adjustment	£70.4m	£77.0m	£84.3m	£92.1m
New investment	£534.3m	£593.0m	£633.3m	£689.5m
Depreciation	£187.2m	£211.2m	£230.7m	£252.3m
Infrastructure renewals charge	£88.6m	£91.2m	£94.0m	£96.8m
Disposal of assets	£1.0m	£1.1m	£1.1m	£1.1m
Closing RCV	£3,847.8m	£4,214.3m	£4,606.1m	£5,037.5m
Year average	£3,683.8m	£4,031.0m	£4,410.2m	£4,821.8m

The allowed rate of return was 0.72% real post-tax. We used an assumed debt/customer retained earnings rate of 65%. We therefore multiplied the RCV in each year by 4.12%. This is illustrated in Table 20.2. The table also includes the embedded debt allowance. The embedded debt allowance was set to cover all of the debt interest cost in excess of 4.6% nominal pre-tax. The table also shows the working capital adjustment for each year. This is the assumed annual percentage increase or decrease in the value of Scottish Water's working capital stock.

Table 20.2: The cash allowed return on the RCV (outturn prices)

Cash allowed return on the RCV	2006-07	2007-08	2008-09	2009-10
RCV average value	£3,683.8	£4,031.0	£4,410.2	£4,821.8
Rate of return	4.12%	4.12%	4.12%	4.12%
Sub-total	£151.7	£166.0	£181.6	£198.5
Embedded debt allowance	£33.8	£32.3	£30.7	£29.1
Sub-total	£185.5	£198.2	£212.3	£227.7
Working capital adjustment	-£2.8	-£2.4	-£2.7	-£2.9
Total	**£182.7**	**£195.9**	**£209.6**	**£224.8**

Depreciation and infrastructure charges are shown in Table 20.3.

Table 20.3: Depreciation and infrastructure renewals charges 2006-10 (outturn prices)

Depreciation and infrastructure renewals charges	2006-07	2007-08	2008-09	2009-10
Depreciation	£187.2m	£211.2m	£230.7m	£252.3m
IRC	£88.6m	£91.2m	£94.0m	£96.8m
Total	**£275.7m**	**£302.4m**	**£324.7m**	**£349.1m**

The total asset financing costs in this draft determination are outlined in Table 20.4.

Table 20.4: Total asset financing costs 2006-10

Cash allowed return on the RCV	2006-07	2007-08	2008-09	2009-10
Cash allowed return on the RCV	£182.7m	£195.9m	£209.6m	£224.8m
IRC	£88.6m	£91.2m	£94.0m	£96.8m
Depreciation	£187.2m	£211.2m	£230.7m	£252.3m
Total	**£458.4m**	**£498.3m**	**£534.3m**	**£573.9m**

In Table 20.5 we show the total capital investment included in the financial model for 2009-10. The table reconciles the total capital investment, asset-financing costs paid by customers and new borrowing from the

Scottish Executive. We show the reconciliation for 2009-10 as we have set the RCV so that there is no additional revenue required from customers to ensure Scottish Water is financially sustainable.

Table 20.5: Reconciliation of total allowed investment with net new borrowing

	Cash out 2009-10	Cash in 2009-10
Total capital expenditure	**£689.5m**	
Cash return on RCV minus interest		£57.2m
Working capital adjustments		£12.6m
Current cost depreciation		£252.3m
Infrastructure renewals charge		£96.8m
New debt		£270.6m
Total		**£689.5m**

Conclusion

The asset financing costs in this review increase from £458m to £574m during this regulatory control period. These costs are a very significant proportion of the customer's bill. Further net increases in investment (ie above the level of depreciation and infrastructure renewals charges) will tend to increase customers' bills. If Scottish Water did not have access to government borrowing or was required to pay dividends then the allowed rate of return would have to be higher. This would also increase customers' bills.

Section 4: Funding capital expenditure
Chapter 21: Sensitivity analysis of the cash allowed rate of return

Introduction

In the Strategic Review of Charges 2002-06, we used a cash flow balancing approach. The approach took account of the need to improve the Scottish water industry's financial sustainability. At that Strategic Review we could not make progress towards the RCV method of price setting. This was because the information that was then available about the modern equivalent asset value of the above-ground assets of the Scottish water industry was not sufficiently reliable. This asset value is an important element of the RCV method of price setting as this method seeks to ensure that sufficient resources are provided not only to operate the assets but also to refurbish, replace and finance them. As such, an improved understanding of the modern equivalent asset value was necessary.

Since then Scottish Water has made progress in developing its understanding of the asset base. As a result, we have decided to move towards the RCV method of price setting. This will bring the method for calculating prices for Scottish Water into line with that which is used by other regulators in the UK.

Moving towards the RCV method of price setting has required us to establish an initial RCV and an allowed rate of return. Our analysis is described in Chapters 19 and 20 of this volume. The RCV for each year reflects the efficient investment that has been delivered and the depreciation and infrastructure renewals costs that have been charged to the income and expenditure account.

The investment programme for the 2006-10 regulatory control period is described in detail in Chapter 14 and 15. The calculation of the depreciation and infrastructure renewals charge is outlined in Chapters 13 and 16.

This chapter looks first at the factors that influence the cash allowed rate of return on the RCV. It then considers the implications of the new Commission's statutory duty to set maximum charges at a level that is consistent with the delivery of Ministerial objectives by Scottish Water at the lowest reasonable overall cost. It concludes by illustrating the sensitivity of revenue to changes in the factors that influence the cash allowed return on the RCV.

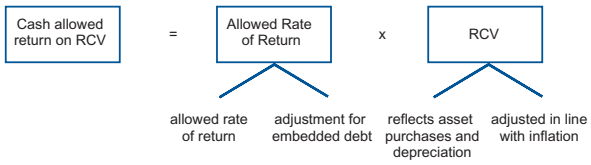
Factors that influence the cash allowed rate of return

The factors that influence the cash allowed return on the RCV are the:

- initial RCV,
- allowed rate of return,
- allowance for embedded debt,
- investment profile,
- mix of investment between capital maintenance and enhancement,
- depreciation charges,
- infrastructure renewals charges, and
- rate of inflation.

The calculation of the allowed rate of return is illustrated in Figure 21.1.

Figure 21.1: The calculation of the cash rallowed return on the RCV

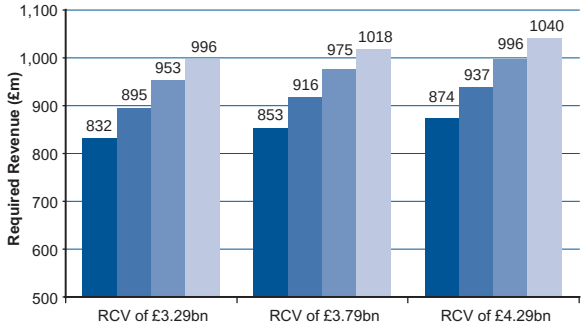


The cash allowed return on the RCV is the product of the RCV and the allowed rate of return. We have also made an allowance for embedded debt (ie the cost of all debt outstanding at April 2004 that has a coupon higher than 4.6% nominal pre-tax). The extra interest costs incurred on this embedded debt is added to the cash allowed rate of return that we have calculated by multiplying the allowed rate of return and the RCV.

The RCV is typically a very large number. In Scottish Water's case it starts at £3.52 billion and grows to £5.04 billion over the regulatory control period. The cash allowed return on the RCV is, however, a very small

number. In Scottish Water's case the allowed rate of return is 3.22% nominal post-tax. The following figure illustrates that, all else being equal, even a relatively large change in the RCV (plus or minus £500 million) would not impact on the allowed level of revenue by a significant amount.

Figure 21.2: The sensitivity of revenue to the initial RCV



The RCV will increase over the regulatory control period to reflect investment in enhancing the water and sewerage assets that are operated by Scottish Water. It will also increase in line with inflation so that the depreciation and infrastructure renewals charges properly reflect the cost of the assets used.

The cash allowed return will increase in line with the increase in the RCV that is brought about by enhancement investment expenditure and inflation.

During the regulatory control period, Scottish Water's embedded debt reduces as older debt is replaced by newer, lower coupon debt. The cash adjustment that we make to the cash allowed rate of return reduces as a result.

The following table summarises the cash allowed rate of return during the 2006-10 regulatory control period.

Table 21.1: Calculation of the cash allowed rate of return

	2006-07	2007-08	2008-09	2009-10
Average RCV for year (£bn)	3.68	4.03	4.41	4.82
Allowed rate of return (%)	4.12%	4.12%	4.12%	4.12%
Cash allowed rate of return before adjustment for embedded debt	£151.7m	£166.0	£181.6m	£198.5m
Embedded debt allowance	£33.8m	£32.3m	£30.7m	£29.1m
Cash allowed rate of return	£185.50m	£198.22m	£212.27m	£227.66m

The purpose of the allowed cash return is to cover the costs of financing and managing the assets that are required to provide a water and sewerage service to customers. The cash to replace existing assets that reach the end of their useful lives is made available through the depreciation and infrastructure renewals charges. The cash to invest in the enhancement of the asset base comes either from customer retained earnings (ie any surplus generated by Scottish Water after tax) or through new debt.

It follows that the cash allowed return will increase more quickly if the proportion of investment dedicated to enhancement of the current asset base is increased.

Setting maximum charges that reflect lowest reasonable overall cost

Comparison of duties

Ofwat has a duty to ensure that an efficient company can finance its functions. Most analysts now expect that water companies will be cash negative (ie they will have to increase their net borrowing) each year for the foreseeable future. Ofwat therefore has to set prices at a level that will ensure that debt and equity investors will remain willing to provide the necessary investment. Ofwat consults frequently with investors and the credit rating agencies to ensure that the companies will be able to finance their functions. Ofwat worked with the credit rating agencies to identify five important financial ratios to measure the financial strength of the companies south of the border. It is generally accepted that if a company is broadly compliant with these financial ratios then it should be able to finance its functions.

Our role is somewhat different. We have a duty to set maximum charges at a level that is consistent with Scottish Water delivering Ministerial objectives at the lowest reasonable overall cost. Scottish Water is able to borrow from the Scottish Executive at preferential rates and this should, therefore, be reflected in price limits.

The Ministerial Guidance that we received in February made it clear that Ministers did not want prices to be reduced in the current regulatory period if this reduction was not likely to be sustainable and if real increases in price were to become necessary as a consequence. Ministers also stated that they wanted the financial strength of Scottish Water to be improved during the regulatory control period.

We have set maximum charges at the lowest level that is consistent with this guidance. Our calculations of price limits have taken account of the actual cost of finance incurred by Scottish Water and a reasonable expectation of the improvement in efficiency that Scottish Water should be required to achieve. These calculations have also taken account of the resources that Scottish Water should reasonably require if its financial position over the regulatory control period is to be strengthened modestly. We measure the improvement in financial strength using the debt to RCV ratio.

Allowed rate of return comparison

In response to our methodology consultation, both Scottish Water and Water UK[228] argued that our proposals for setting the cost of capital for Scottish Water did not properly reflect the risks of the water industry in Scotland. They suggested that Scottish Water's cost of capital should reflect the opportunity cost of the capital that is made available to it. We discussed our response to this suggestion in Chapter 18.

As we outlined above, Ofwat has a duty to ensure that an efficient company can finance its functions. In determining the cost of capital for the industry, Ofwat has to allow a cost of capital that will enable the efficient companies to finance their functions. This does not have to be the lowest possible cost of capital.

The example of Glas Cymru, the owner of Welsh Water, is interesting[229]. Glas Cymru is a company limited by guarantee that has no shareholders. It does not, therefore, pay any dividends. The company is funded solely by debt and retained earnings. Welsh Water has made a commitment to reduce customers' bills to the maximum extent possible while maintaining the financial strength required to attract new capital.

It has recently announced that it will increase annual prices to the average household by £16 less than the price cap applied by Ofwat in its 2004 price determination. This is possible because Glas Cymru can finance its functions at a much lower cost of capital than that which Ofwat considered necessary for the industry as a whole. Our view is that if Ofwat had been responsible for regulating Welsh Water alone, it may have set a different cost of capital in its price determination for Welsh Water.

In 2003-04, Welsh Water had a regulatory capital value of just under £2.6 billion. It paid total interest of £142 million. Retained earnings were either reinvested in the operation of Welsh Water (improving the financial strength of the company) or distributed to customers in the form of lower bills. This implies that the cost of capital for Welsh Water was 5.47% nominal pre-tax. The post-tax, real cost of capital was 1.33%[230]. This compares very favourably with the 5.1% real post-tax cost of capital that Ofwat allowed the industry as a whole.

We have set the allowed rate of return for Scottish Water at 0.72% real post-tax. However, we have also allowed the full cost of all of the embedded debt (with coupons higher than 4.6% nominal pre-tax) that Scottish Water had outstanding at April 2004. We calculate that this increases the actual rate of return that we have allowed to Scottish Water to:

- 1.36% in 2006-07;
- 1.28% in 2007-08;
- 1.21% in 2008-09; and
- 1.14% in 2009-10.

[228] The trade association that represents the water and sewerage undertakers in the UK.
[229] We included a case study on Glas Cymru in Chapter 5 of Volume 4.
[230] All of the debt interest was allowable for the purposes of reducing taxation; this reduces the post-tax cost of capital by 30%. We have assumed a rate of retail price inflation of 2.5% for the purposes of this calculation.

This comparison demonstrates that Scottish Water is actually being allowed a broadly equivalent cost of capital to that required by Welsh Water to finance its functions in 2003-04.

To set the allowed rate of return at a higher level would seem in the current context to be inconsistent with our duty to set maximum charges at a level consistent with Scottish Water delivering the Ministerial objectives at the lowest reasonable overall cost. In coming to this conclusion, we have paid particular regard to the fact that Scottish Water can access sufficient government borrowing to deliver the required investment programme. We have also ensured that if Scottish Water delivers its regulatory contract, it will comply with the financial ratios identified by Ofwat and the credit rating agencies as being good indicators of financial health.

Measuring financial performance by key ratios

In its price determinations in 2004, Ofwat used five ratios to measure the financial strength of the companies south of the border. These ratios are set out in Table 21.2.

Table 21.2: Ofwat 2004 price determinations – key financial ratios

Ratio	Formula	Target[231]
Cash interest cover	(net operating cashflow[232] – tax)/interest expenses	Around 3
Adjusted cash interest cover	(net operating cashflow – depreciation – infrastructure renewals charge – tax)/interest expenses	Around 1.6
Funds from operations/debt	(net operating cashflow – tax – interest)/net debt	Greater than 13%
Retained cashflow/debt	(net operating cashflow – tax – interest – dividends)/net debt	Greater than 7%
Gearing	Net debt/RCV	Less than 65%

In 1999, Ofwat used a slightly different suite of ratios. Our advice to the Scottish Ministers in the Strategic Review of Charges 2002-06 sought to be consistent with the two ratios outlined in Table 22.3.

Table 21.3: Ofwat 1999 price determinations – key financial ratios

Ratio	Formula	Target
Debt payback (EBITDA)	Net debt/net operating cashflow	Maximum 5 years
Debt payback (EBDA)	(Net debt)/(net operating cashflow – interest – tax)	Maximum 7 years

We believe that it is in customers' interests to ensure that Scottish Water is financially sustainable. Our view is that the ratios adopted by Ofwat represent a good measure of financial sustainability. This explains our decision to set the initial RCV at a level which would allow Scottish Water, if it meets the terms of its regulatory contract, to comply with all the cash-based financial ratios.

Implications of the ratios

It is important to understand the factors that affect the calculated value of all of the ratios. For example, depreciation levels do affect the cash interest cover ratio, but do not impact on the adjusted cash interest cover ratio. The factors that will impact on all of the ratios are the level of revenue, the level of operating costs incurred, the level of tax and the size of the capital programme.

The allowed cash return will impact on the level of revenue that is calculated by the model. The size of the capital programme will impact on the RCV in each year of the regulatory control period and consequently will impact on the allowed cash return.

The overall level of prices is also sensitive to the level of tax that is expected and the level of operating cost, although neither of these have any effect on the allowed cash rate of return.

How the financial model works

The financial model calculates a level of revenue that is based on the formula shown in Figure 21.3.

231 Where a ratio is required to be 'around' a particular figure, we have assumed that it should be within a range of plus or minus 25% of the targeted value.
232 Net operating cashflow is equal to operating profit plus depreciation plus infrastructure renewals plus changes in working capital.

Figure 21.3: How the model calculates revenue[233]

Cash Return on RCV
Allowed for Operating Costs
Depreciation
Infrastructure Renewals Charge
PPP
Tax
Other adjustments[234]

The model adds the allowed cash return on the RCV, the allowed for operating costs, the depreciation charge, the infrastructure renewals charge, the costs of the PPP contracts, tax and any change in working capital.

The model also allows us to intervene manually and will recalculate all of the financial ratios based on our revised revenue cap.

When do we adjust the modelled answer?

In setting maximum charges we have changed the modelled answer to ensure that:

- the financial strength of Scottish Water improves over the regulatory control period;
- prices can remain broadly stable during the regulatory control periods; and
- prices are not cut in an unsustainable way that would lead to real increases in charges for customers in future years.

These manual interventions have allowed us to meet the terms of the Ministers' Guidance.

In altering the revenue level calculated by the model we have sought to:

- ensure that revenue is no higher than it needs to be (in other words no higher than that required to ensure that Scottish Water is compliant with the financial ratios);
- ensure that neither current nor future customers are disadvantaged;
- smooth the revenue profile; and
- minimise the impact of rebalancing from household to non-household customers.

Impact on customers' bills

The slow delivery of the capital programme during the 2002-06 regulatory control period has resulted in a lower level of debt than expected. In theory, this could have allowed us to increase the real reduction in prices that customers would receive in this draft determination. However, the capital outputs still have to be delivered and their delivery would have necessitated real increases in price in the later years of the regulatory control period. This would have been inconsistent both with the Ministerial Guidance and with the clear preferences that customers have expressed to us at public meetings.

Table 21.4 compares the revenue caps used for setting charges in this draft determination with the unadjusted modelled answer.

[233] Our approach to calculating Scottish Water's allowed level of revenue is outlined in greater detail in Volume 7, Chapter 3.
[234] Working capital and Asset disposals adjustments.

Table 21.4: Adjusted and unadjusted revenue caps

	2005-6	2006-07	2007-08	2008-09	2009-10	Comments
Required Revenue Formula	£965.1m	£852.9m (-11.62%)	£900.7m (5.60%)	£947.3m (5.18%)	£1,001.2m (5.90%)	- Key performance indicators breached in all years - PEL breached in year 4 - Large impact on year-on-year prices
Minimum Revenue required to meet cash KPIs in all years	£965.1m	£918.9m (-4.78%)	£913.3m (-0.61%)	£973.0m (6.54%)	£1,036.1m (6.49%)	- Key performance indicators compliant - PEL not breached - Still large impact on year-on-year prices
Draft Determination	£965.1m	£982.7m (1.82%)	£1,005.5m (2.33%)	£1,009.2m (0.36%)	£1,018.2m (0.90%)	- Key performance indicators compliant - PEL not breached - Smooth revenue profile

This assumes that we set charges at the lowest level each year that is consistent within the cash-based ratios.

Cash allowed return sensitivity analysis

We have described the circumstances when we intervene manually either to increase or to decrease the modelled level of revenue required from customers. We have explained that maximum charges have been set at the lowest level that is consistent with stable prices over the regulatory control period and with compliance with the key financial ratios. We could have increased or reduced the amount of revenue that was calculated by the financial model.

This chapter concludes by considering the impact of changes in the factors that influence the cash allowed return on the RCV on the level of prices that we have set in this draft determination.

Allowed rate of return

In Chapter 19 we outlined the response that we received from Scottish Water and Water UK to our proposed method of assessing the allowed rate of return for Scottish Water. Even if we had accepted their argument and had set a higher allowed rate of return, this would not have had an impact on the revenue required from customers that we would have considered necessary. This is because the implication of Scottish Water's arguments would have been to require us to set a lower initial RCV such that Scottish Water would have had enough revenue (as calculated by the model) in 2009-10 to comply with the key financial ratios.

We would have sought to increase or reduce the revenue calculated by the model to the minimum level that is consistent with delivering the objectives set out in the Ministerial Guidance and compliance with the key financial ratios. Our conclusion on the required level of revenue from customers would not have changed, even if we had set a higher rate of return.

If we had set a lower allowed rate of return, this would have increased the initial RCV that we would have set. We explained how we calculated the initial RCV in Chapter 20. Again, this would not have had any impact on this draft determination of prices.

Table 21.5 compares the modelled answer and an adjusted modelled answer if the allowed rate of return had been set at 5.1% real post-tax.

Table 21.5: Adjusted and unadjusted modelled answer with 5.1% real post-tax rate of return

		Revenue			
Return on Equity	**RCV**	**2006-07**	**2007-08**	**2008-09**	**2009-10**
0.72% real post tax plus embedded debt adjustment (Draft Determination)	£3.79bn	£982.7m	£1,005.5m	£1,009.2m	£1,018.2m
5.1% real post-tax plus with no embedded debt adjustment	£1.85bn	£982.7m	£1,005.5m	£1,009.2m	£1,018.2m
Variance between scenarios		£0m	£0m	£0m	£0m

Level and mix of investment

The level and mix of investment has a material impact on the level of revenue that Scottish Water requires from customers to comply with the key financial ratios. Table 21.6 illustrates the impact of different assumptions on the level of prices.

Table 21.6: Impact of size, profile and mix of investment programme in customer bills

Total Investment	**Profile**	**Revenue**[235]				
		2006-07	**2007-08**	**2008-09**	**2009-10**	**Avg. annual Increase**
£2.0bn (05-06 prices)	Increasing 460-493-508-540	£969.8m	£974.5m	£979.3m	£984.1m	0.49%
	Flat 500-500-500-500	£972.8m	£980.6m	£988.4m	£996.3m	0.80%
	Decreasing 540-508-493-460	£975.7m	£986.4m	£997.3m	£1008.2m	1.10%
£2.3bn (05-06 prices)	Increasing 529-566-584-621	£979.5m	£994.2m	£1009.1m	£1024.3m	1.50%
	Flat 575-575-575-575	£982.8m	£1000.9m	£1019.3m	£1038.1m	1.84%
	Decreasing 621-584-566-529	£986.2m	£1007.8m	£1029.9m	£1052.4m	2.19%
£2.6bn (05-06 prices)[236]	Increasing 598-640-660-702	£994.0m	£1023.8m	£1054.5m	£1086.2m	3.00%
	Flat 650-650-650-650	£995.5m	£1026.8m	£1059.2m	£1092.5m	3.15%
	Decreasing 702-660-640-598	£996.9m	£1029.8m	£1063.8m	£1098.9m	3.30%

Depreciation and IRC charges

We noted above that the depreciation and infrastructure renewals charges did not affect all of the key financial ratios. If the depreciation and IRC charges had been set at a higher level in 2009-10, we would have set a lower initial RCV since we would not have required the cash allowed return on the RCV to be as large. Correspondingly, a lower depreciation or infrastructure renewals charge in 2009-10 would have led to a higher initial RCV. The adjusted prices would not, however, have been affected by this change.

[235] For simplicity, we assumed equal annual increases for each year.
[236] Tariffs were affected by the public expenditure limit.

Table 21.7: Impact of depreciation (by changing opening MEAV) on initial RCV

2005-06 opening MEAV	RCV	2006-07	2007-08	2008-09	2009-10
£ 2.49 bn (draft determination)	£3.79bn	£982.7m	£1,005.5m	£1,009.2m	£1,018.2m
£ 1.99 bn	£4.49bn	£982.7m	£1,005.5m	£1,009.2m	£1,018.2m
Variance between scenarios		£0m	£0m	£0m	£0m

Initial RCV

If we had increased the initial RCV, the adjusted answer for the first three years of the regulatory control period would not have changed. However, we would have made a downward adjustment to the modelled answer in the final years of the regulatory control period as the model would have calculated a level of revenue that was greater than necessary to comply with the key financial ratios.

If we had reduced the initial RCV, the adjusted answer for the first three years of the regulatory control period would not have changed. However, we would also have made an upward adjustment to the modelled answer in the final year of the regulatory control period as the model would have calculated a level of revenue that was lower than necessary to comply with the key financial ratios.

This is illustrated in Table 21.8.

Table 21.8: The impact of changing the initial RCV

RCV	Scenario	2006-07	2007-08	2008-09	2009-10
£ 5.0 bn	Unadjusted modelled answer	£903.0m	£967.3m	£1,026.7m	£1,071.4m
	Financiability & phasing adjustment	£79.6m	£38.2m	£(17.5)m	**£(53.2)m**
	Adjusted modelled answer	**£982.7m**	**£1,005.5m**	**£1,009.2m**	**£1,018.2m**
£ 3.30 bn (Draft Determination)	Unadjusted modelled answer	£852.9m	£916.2m	£974.5m	£1,018.2m
	Financiability & phasing adjustment	£129.7m	£89.3m	£34.7m	£0.0m
	Adjusted modelled answer	**£982.7m**	**£1,005.5m**	**£1,009.2m**	**£1,018.2m**
£ 2.0 bn	Unadjusted modelled answer	£778.3m	£840.1m	£896.9m	£939.1m
	Financiability & phasing adjustment	£204.4m	£165.4m	£112.3m	**£79.2m**
	Adjusted modelled answer	**£982.7m**	**£1,005.5m**	**£1,009.2m**	**£1,018.2m**

Rate of inflation

If we changed our assumptions on the rate of inflation, both the modelled and the adjusted modelled answers would change. A higher rate of inflation will tend to make it easier to comply with cashflow based ratios which involve interest costs. This is because interest costs are fixed and become relatively easier to pay back if inflation is high.

A higher inflation environment would also mean that the actual nominal increase in prices to customers would be higher, even if in real terms they would still be decreasing.

Table 21.9 illustrates the real and nominal impact on prices if the rate of inflation was 10%.

Table 21.9: Real and nominal revenue increase if the rate of inflation was 10%

		2006-07	2007-08	2008-09	2009-10	Year on Year change
Percentage increase with current inflation assumptions[237]	Nominal	1.82%	2.33%	0.36%	0.90%	1.35%
	Real	-0.7%	-0.2%	-2.1%	-1.6%	-1.15%
Percentage increase with inflation at 10%[238]	Nominal	5.37%	5.37%	5.37%	5.37%	5.37%
	Real	-4.63%	-4.63%	-4.63%	-4.63%	-4.63%

Conclusion

The Ministerial Guidance required us to ensure that Scottish Water had sufficient resources to fund the delivery of the "essential" capital programme, irrespective of the impact of this level of capital spending on customers' bills. The guidance also made it clear that, if the essential programme could be delivered without a real increase in customers' bills, the next priority was to establish a regime of stable prices. The guidance explains the Ministers' intentions clearly: there should be no reduction in customers' bills if that reduction required there to be increases in real terms in subsequent years.

The guidance also looks to the longer term by requiring that Scottish Water's financial strength should be at least maintained over the regulatory control period and, if possible, that its financial strength should be improved.

Our financial model calculates the required level of revenue by adding the allowed cash return on the RCV, the allowed level of operating costs, the costs of PPP, depreciation and infrastructure renewals charges, tax and, if appropriate, the change in working capital. We set the modelled level of revenue in order to ensure that we comply with the Ministerial Guidance and with the key financial ratios by which we measure Scottish Water's financial strength. To this end, we have adopted the same financial ratios that Ofwat used in its 2004 price review for the companies south of the border.

The allowed cash return on the RCV covers Scottish Water's costs of financing and managing its investment in assets. In most cases, changes in the factors that influence this element of the process of setting maximum charges would not have an impact on the actual maximum charges that we have set in this draft determination. The exception to this is the size, profile and mix of the capital investment programme.

As a consequence, some apparently important issues (such as the cost of capital and the treatment of embedded debt) which can be contentious south of the border, have not had an impact on the price that customers in Scotland will actually pay. This reflects both our statutory duty to set maximum charges at a level that is consistent with Scottish Water delivering Ministerial objectives at the lowest reasonable overall cost and the ministerial intention to allow Scottish Water continued access to sufficient cheap government borrowing.

[237] CPI at 2%, COPI at 3% and RPI at 2.5% per annum
[238] CPI, COPI and RPI at 10% per annum

Section 5: Capital expenditure
Chapter 22: Monitoring capital delivery

Introduction

Monitoring and reporting on Scottish Water's performance in delivering investment is critical to ensuring that customers receive value for money. In particular, customers and stakeholders need to have confidence that investment will deliver the promised benefits. Monitoring by the economic, water quality and environmental regulators plays an essential part in maintaining this confidence.

In recent years we have established robust monitoring and reporting mechanisms for investment delivery. These include:

- gathering quarterly information on delivery performance;
- the annual collection of detailed information on past performance and future investment plans; and
- providing regular information to customers in our Investment and Asset Management reports.

In the next regulatory control period we expect the new Commission to strengthen further the monitoring and reporting regime. An important element of this will be the existence of a detailed baseline investment programme against which to monitor Scottish Water's capital investment performance. We are also seeking to increase further the involvement of other stakeholders in the monitoring process. We believe that SEPA and the DWQR have a key role in determining delivery of the investment outputs specified in the baseline programme.

Our proposal to channel an element of any out-performance of capital delivery into funding for investment of additional outputs[239] will require a more detailed annual assessment of Scottish Water's efficiency. The selection of investment priorities for any additional funding is a matter for Ministers. This is likely to be one of the responsibilities of the stakeholder group that has been formed by the Scottish Executive to oversee delivery of the Quality and Standards III investment programme.

Our aim is to ensure that the monitoring of capital delivery by Scottish Water will be every bit as rigorous as that which takes place in England and Wales. Scottish Water's quarterly and annual investment returns will be scrutinised by the Reporter so that all stakeholders can have confidence in the information provided.

The existing monitoring framework for capital investment

In the Strategic Review of Charges 2002-06 we set Scottish Water challenging, but achievable, efficiency targets for delivering the Quality and Standards II investment programme. It is important to keep in mind what we mean by 'efficiency'. An efficiency can only be claimed if the required outputs are delivered at lower cost. Efficiency does not mean delivering fewer outputs or delaying delivery into subsequent periods.

To allow us to assess Scottish Water's performance in delivering the outputs specified in Quality and Standards II, we have put in place a robust monitoring framework for capital expenditure. This comprises the following:

- Regular information submissions on investment performance

  The key investment submissions are the Annual Return and the capital investment return (CIR)[240]. The Annual Return is the largest single information request that we issue to Scottish Water each year. The format is based closely on Ofwat's June Return and it includes comprehensive information about progress with Scottish Water's investment programme. Submitted quarterly, the CIR provides summary information, at a project level, on financial and physical delivery of the investment programme.

  Through a combination of the quarterly CIRs and the investment tables in the Annual Return, we can track delivery of the investment programme and monitor the effectiveness and efficiency of Scottish Water's capital expenditure. The CIR also highlights any material changes from the planned investment programme. These may be positive (efficiencies or early delivery of projects) or negative (cost overruns or project delays).

[239] This proposal for handling out-performance of capital investment delivery is discussed in Volume 7, Chapters 6 and 7.
[240] The content of the Annual Return and CIR is described in more detail in our publication 'Our work in regulating the Scottish water industry: Setting out a clear framework for the Strategic Review of Charges 2006-10', Volume 1, Chapter 3, page 23.

- Independent audit of regulatory information

  We appointed a Reporter for the water industry in Scotland in December 2003. The Reporter is required to review all aspects of Scottish Water's information submissions. Our monitoring has benefited from the improvement in the quality of information that is supplied by Scottish Water as a result of this appointment.

- Audits of investment appraisal procedures

  In the last Strategic Review we highlighted our concerns about the level of scrutiny and challenge given by the three former water authorities to projects as they passed through the planning process. We introduced regular investment appraisal audits. These audits allow us to assess the effectiveness of investment decision making by Scottish Water.

- A stakeholder forum

  In Chapter 3 we described how we established a stakeholder forum to oversee development of the baseline investment programme for Quality and Standards II. The forum includes representatives from Scottish Water, the Scottish Executive, SEPA, the DWQR and this Office.

  This forum developed a 'substitution' process whereby stakeholders can agree to remove projects from the baseline programme and to add new projects.

This monitoring framework allows us to assess Scottish Water's performance in delivering the Quality and Standards II investment programme. We also assess Scottish Water's progress in improving its efficiency relative to that of the companies in England and Wales. To assess the performance of the companies in England and Wales we use:

- the companies' annual June Returns to Ofwat;
- comments on these returns by the independent Reporters, which are published by Ofwat;
- the companies' published regulatory accounts;
- Ofwat's published analysis of companies' progress; and
- benchmarking tools[241].

We publish the results of our analysis of Scottish Water's information returns in our annual Investment and Asset Management Report. We also report on capital expenditure efficiency in our annual Costs and Performance report. We compare performance year-on-year and against the companies in England and Wales. Through these reports, we provide customers and stakeholders with objective assessments of Scottish Water's progress in delivering investment.

Our overall monitoring framework for the Strategic Review of Charges 2006-10

In previous chapters we explained how we assess the levels of investment that are required to deliver the objectives set out by Ministers for the next regulatory control period.

Our current monitoring regime will be improved to take account of the need for stakeholders to scrutinise investment delivery. Specifically, we will take the following steps:

- Increase the involvement of the Reporter in ensuring that Scottish Water's capital investment returns are of a high quality. This will allow all stakeholders to be confident that the information provided in these returns presents an accurate picture of both the current and projected delivery of the capital investment programme.
- Create a rigorous but flexible 'substitution' process. This will allow project outputs to be moved in and out of the programme in a controlled manner, with full stakeholder involvement and a rigorous assessment of value for money. The Reporter will be asked to look at both the cost and the scope of projects that are planned for substitution.

[241] See Chapter 7.

- Develop a process to assess the annual efficiency of the capital investment programme.

We have worked with stakeholders to develop an appropriate substitution process. This has built on the substitution process that was developed for Quality and Standards II, but has been developed so that there is an appropriate level of scrutiny for each proposed substitution.

The Scottish Executive has established a stakeholder group to monitor the delivery of Quality and Standards III. We would expect this group to be involved in establishing the rules for identifying and incorporating additional outputs in the investment programme. This would include allocating additional outputs to the programme as a result of improved efficiency. We expect to report to this group on our assessment of Scottish Water's capital expenditure efficiency.

It will be especially important that Scottish Water's funding in three areas is agreed with the Capital Monitoring Group before it is committed. These areas are:

- development constraints;
- addressing malodour; and
- addressing the UIDs in the Portobello, Meadowhead and Stevenston catchments

As outlined in our methodology consultation, we have published the baseline investment programme in full. We have explained that this baseline programme may be subject to change (as a result of the substitution process). Customers should be assured, however, that overall value for money will not be adversely impacted as a result of project substitution. We shall also continue to publish our annual Investment and Asset Management reports.

The substitution process

Any changes in the investment programme must be subject to a high degree of scrutiny by stakeholders. This is important both to customers and other stakeholders. The way changes are treated needs to be fully transparent and auditable, and should be signed off by stakeholders.

All of the principal stakeholders were involved in detailed development of the investment programme through the Quality and Standards III process. Given that the regulatory control period is four years, we would expect the substitution process to be used only if it becomes clear that there is an output that could contribute more to the achievement of the Ministers' objectives than another similarly valued output that was included in the investment baseline. It is important to emphasise that the substitution process should not become an opportunity for Scottish Water to avoid delivering the more complicated projects.

Although the basic principles have remained the same, we asked the Reporter to build on the substitution process that we used during Quality and Standards II[242]. The Quality and Standards II process is based on the following elements:

- Monitoring of the process by the stakeholder group, which comprises the Scottish Executive, the DWQR, SEPA, the Water Industry Commissioner and Scottish Water.
- Substitutions within the same broad output category and up to a project value of £1 million cost can be agreed bilaterally between Scottish Water and the appropriate regulator. Other stakeholders are notified of the change.
- Substitutions between broad output categories or with a project value of more than £1 million must be agreed by all stakeholders.
- Substitutions that affect the achievement of Quality and Standards II objectives have to be agreed by Ministers.
- An audit trail back to the baseline programme must be maintained.
- The Water Industry Commissioner is required to approve the substitution costs used for both removals

[242] The Quality and Standards II substitution process is described in detail in our publication, 'Our work in regulating the Scottish water industry: The scope for capital investment efficiency' Volume 5, Chapter 7, page 68.

and additions. The Reporter provides an independent assessment of the proposed substitution costs.

The Capital Monitoring Group set up by the Scottish Executive is currently developing the substitution process for Quality and Standards III with assistance from the Reporter. The substitution process will contain a series of detailed rules, covering who can initiate substitutions, for what reasons and the timescale for resolving any proposed substitutions. These rules will also set out the frequency with which agreed substitutions should be subject to audit.

The monitoring regime in England and Wales

In arriving at our proposals for capital monitoring, we have taken account of the approach adopted in England and Wales.

Ofwat focuses its monitoring of investment delivery on specified investment outputs. The required minimum outputs are set out in some detail in the final determinations for each company. The outputs are consistent with Ministers' decisions on water quality and environmental performance standards for the industry.

Delivery of investment outputs is monitored through the use of company 'monitoring plans', the format of which is set out by Ofwat[243]. The companies set out their commitments to deliver the required level of drinking water quality and environmental quality outputs and standards of service in their monitoring plans. These plans have to be fully consistent with the price limits set by Ofwat.

Ofwat and the quality regulators review the companies' progress in delivering these outputs. Some outputs will relate to maintaining current performance and others to agreed improvements. Outputs are generally monitored on an annual basis through the June Returns and through the annual reports that the quality regulators provide.

If Ofwat believes that there is a risk to the delivery of some or all of these outputs, it will require the company to produce additional reporting (such as quarterly reports). These reports may be scrutinised by the Reporters. Ofwat's concerns could also lead to requirements for formal undertakings.

Failure to deliver the required minimum outputs would lead to regulatory action. Such action could include compensation payments and/or bill refunds to customers, and prosecution or enforcement proceedings by the quality regulators. Shortfalls are recorded and quantified in cost terms. Ofwat will conduct an interim determination of prices if the costs are material and impact on the price review settlement. If they are not material, the shortfalls would be handled through the logging up/down process before the next price review.

Companies were required to submit their monitoring plan for the 2005-10 regulatory period by 31 March 2005, just before the start of the period. Ofwat expects each company to publish its monitoring plan at the same time as it is submitted.

Ofwat reports annually on its analysis of the information provided by companies. With regard to investment delivery, the key reports provide information on:

- financial performance and expenditure;
- leakage and efficient use of water; and
- levels of service.

These reports comment on delivery of capital investment and provide customers with an analysis of company performance against the targets set at the price review.

Our approach to monitoring the outputs of the investment programme

It is clearly essential that we can assess Scottish Water's progress in delivering the required investment outputs. By 'outputs' we mean measurable benefits such as achieving an agreed standard of water quality, an improvement in environmental performance at a specific location, or a defined improvement in the level of

[243] For the 'AMP4' investment programme covering 2005-10 the requirements are detailed in Ofwat's publication, 'AMP4 monitoring plan for 2005-10: Company strategy for 2005-10 – its commitments on drinking water quality, environmental improvements, services to customers, maintaining serviceability to customers and prices', available on Ofwat's website at www.ofwat.gov.uk

customer service. Our monitoring is designed to ensure that we can form an objective view of progress.

We believe that it is important to monitor the delivery of outputs as well as the level of spending and efficiency. Spending is not an end in itself, and it is important that customers benefit from targeted improvements. It is in customers' interests that we make sure that the full benefits of the investment programme are delivered.

Capital maintenance objectives/outputs

To assess delivery of the capital maintenance objectives set out by Ministers, we will use a combination of project level monitoring and high level output monitoring through 'serviceability measures'. We propose to introduce additional reporting requirements so that stakeholders can develop a better understanding of the serviceability of assets.

Serviceability indicators (for example, the number of water pipe bursts or sewer flooding incidents), describe asset performance in delivering water and sewerage services to customers. For a number of years, Ofwat has used such indicators to assess trends in the overall level of service to customers. It is now able to judge whether the level of capital maintenance expenditure is resulting in stable, improving or deteriorating service to customers.

In Quality and Standards III, and in its first draft business plan, Scottish Water based its capital maintenance expenditure proposals on delivering defined levels of service. The objectives for the investment programme for the period 2006-10 set out by Ministers[244] also use serviceability measures to define the required level of performance. The serviceability indicators selected by Ministers, and the baseline position established for each of the indicators, are shown in Table 22.1.

By the end of the period, for almost all of these measures there should be improvements in the serviceability indicators beyond the levels shown in Table 22.1. This is due to investment associated with drinking water quality improvements, environmental performance improvements, growth or customer service enhancement programmes. It should be remembered, however, that the baseline position represents the minimum acceptable performance in each year of the period and is linked to the delivery of the required levels of capital maintenance investment. Scottish Water will need to ensure that levels of serviceability are at least maintained throughout the period.

We will collect information on these serviceability indicators to monitor delivery of the capital maintenance element of the investment programme. This information will also allow us to gain a picture of the long-term effectiveness of Scottish Water's capital maintenance expenditure.

We have also made extra capital maintenance available in order that Scottish Water can comply with best practice in its implementation of the UKWIR common framework. We will ask the Reporter to comment separately on Scottish Water's progress in this area.

Table 22.1: Capital maintenance serviceability indicators 2006-14

Serviceability indicators	Scottish Water baseline
Water serviceability indicator	
% compliant zones for iron	83
% compliant zones for manganese	94
No of microbiological (total coliform) failures at water treatment works	90
Number of properties on the low pressure register	12,957
Properties with unplanned interruptions to supply > 12 hours	16,184
Number of bursts per 1,000km of mains	204
Wastewater serviceability indicator	
Number of properties at risk of internal flooding	1,603
Number of properties internally flooded due to other causes	366
Number of failing wastewater treatment works (capital maintenance)	45
Number of unsatisfactory intermittent discharges	867
Number of pollution incidents	555
Management & general	
Fleet, scientific, property, IT, telemetry	Maintain to standards to be secured by Quality & Standards II.
Health & safety compliance	Secure compliance with all existing and known new legislation.
Asset data	Enhance Scottish Water's data to a sufficient level to support the operation of the common framework approach and other aspects of the investment programme.

[244] These measures are set out in the Scottish Executive's policy statement, 'Investing in water Services 2006-14', which is available at www.scotland.gov.uk/Topics/Environment/Water/17583/Investment.

Capital enhancement objectives/outputs

For capital enhancement work, such as delivering improved water quality or environmental performance, we will monitor expenditure and delivery of the detailed list of projects in the baseline capital investment programme[245].

The baseline programme will contain information about each capital enhancement project, including timescales, costs and the expected outcome in terms of environmental benefit, water quality improvement or customer service enhancement. This will allow us to monitor in detail the levels of expenditure and the progress of projects against the baseline schedule of delivery. This will allow us to provide customers and other stakeholders with objective information on the physical delivery of these projects.

We are less well placed to monitor delivery of the water quality and environmental performance improvements that should result from this investment. The DWQR is responsible for monitoring compliance with the agreed improvements in drinking water quality. SEPA has a comprehensive monitoring regime that allows it to determine whether improved standards for discharges and bathing water quality have been met. We will rely on the quality regulators to confirm actual delivery of the required output. We are also keen to work with SEPA and DWQR to monitor progress in delivery of the investment programme. This could allow the quality regulators to take earlier action if they are worried about progress in delivery of key outputs.

We will share our analysis with the Scottish Executive and the quality regulators on a regular basis at the stakeholder monitoring group. This group will:

- review progress in delivering the investment plan;
- oversee the substitution of projects in and out of the programme;
- oversee the measurement of efficiency; and
- agree the additional outputs that are to be provided as a result of any outperformance.

Summary

In recent years we have established a detailed framework for monitoring capital expenditure. This comprises:

- regular information submissions on investment performance;
- independent audit of regulatory information;
- audits of investment appraisal procedures;
- investment performance reporting; and
- a stakeholder forum.

We propose to develop this framework by:

- reviewing the format for investment reporting in the Annual Return and CIR to ensure that it is consistent with the format of the baseline investment programme;
- providing further independent assessment of the regulatory submissions by the Reporter;
- consulting with stakeholders on a mechanism for allowing projects to be substituted within the baseline programme;
- introducing a serviceability monitoring regime which is similar to that used by Ofwat; and
- working with other stakeholders to ensure detailed monitoring of both investment performance and output delivery.

We will continue to publish reports on Scottish Water's progress, particularly with regard to performance against the minimum acceptable levels of performance set in the Strategic Review of Charges 2006-10. These reports will provide customers with a clear understanding of Scottish Water's performance in delivering water and wastewater services.

[245] This baseline programme is described in detail in our publication, 'Our work in regulating the Scottish water industry: The scope for capital investment efficiency', Volume 5, Chapter 9 and Appendix 1.

In preparing this draft determination, we have drawn on the work of the Office of Water Services in England and Wales.

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